RFP DACW61-02-R-0007

US Army Corps
of Engineers
Philadelphia District

Alteration of the Lift Bridge Across the Reserve Basin

Philadelphia Naval Business Center Philadelphia, PA

Construction Solicitation and Specifications

3 January 2002

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

CAUTION TO BIDDERS

All information required by the terms of the Solicitation must be furnished. MISTAKES OR OMISSIONS CAN BE COSTLY. Important items for you to check are included in but not limited to those listed below. This checklist is furnished only to assist you in submitting a proper bid. Check as you read.

[ ] Are you registered in the Central Contractor Database? See DFARS Clause 52.204-7004 “REQUIRED CENTRAL CONTRACTOR REGISTRATION” in Section 00700 of this solicitation?

[ ] Have you acknowledged all amendments? Have you submitted your bid on the latest amended bid schedule?

[ ] Have you completed the "Representations and Certifications" {Section 00600} portion of the Solicitation? Is your Contractor Establishment Code listed on the Standard Form 1442?

[ ] Is your bid properly signed by an officer of your company?

[ ] If a bid guarantee is required, is it included with your bid {A late bid guarantee is treated the same as a late bid.} and is it in the proper amount? {Usually 20 percent of the total bid price, including any options or additives.} If your bid guarantee is in the form of a bid bond, is the bond properly signed by both the bidder and surety and are all required seals affixed? A bid guarantee is required when your bid exceeds $100,000.00.

[ ] Is the name in which you submitted the bid the same on your bid as on the bid bond?

[ ] If required, have you entered a unit price for each bid item? {The solicitation will specifically state when this is necessary.}

[ ] The Government may reject a bid as nonresponsive if it is materially and mathematically unbalanced as to price for any bid item or combination of items. A bid is unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

[ ] Are decimals in unit prices in the proper places? Are your figures legible?

[ ] Are the extensions of your unit prices, and your total bid price correct?

[ ] Are all erasures or corrections initialed by the person signing the bid?

[ ] Have you restricted your bid by altering the provisions of the solicitation?

[ ] If you are a large business and your bid is greater than $1,000,000.00 have you included your Sub-Contracting Plan in your bid package? {NOTE: AN AWARD WILL NOT BE MADE WITHOUT AN APPROVED SUB-CONTRACTING PLAN. IN ORDER TO BE APPROVED YOUR PLAN MUST DESIGNATE 5% OF THE TOTAL SUB-CONTRACTING DOLLARS TO SMALL DISADVANTAGED BUSINESSES}.

[ ] Is the envelope containing your bid properly identified that it is a sealed bid and does it contain the correct solicitation number and bid opening time?

[ ] Will your bid arrive on time? See paragraph entitled "Late Submissions, Modifications, and Withdrawals of Bids" in the Instructions to Bidders {Section 00100} of the solicitation.

July 02, 1998

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

REQUEST NO. DACW61-02-R-0007

PHILADELPHIA DISTRICT
CORPS OF ENGINEERS

REQUEST FOR PROPOSAL
FOR

ALTERATION OF THE LIFT BRIDGE
ACROSS THE RESERVE BASIN

PHILADELPHIA NAVAL BUSINESS CENTER
PHILADELPHIA, PA

I. NOTE THE AFFIRMATIVE ACTION REQUIREMENT OF THE EQUAL OPPORTUNITY CLAUSE WHICH MAY APPLY TO THE CONTRACT RESULTING FROM THIS SOLICITATION.

II. OFFERORS ARE REQUIRED TO COMPLETE THE REPRESENTATIONS AND CERTIFICATIONS PORTION OF SECTION 00600 OF THIS SOLICITATION AND SUBMIT THIS WITH THEIR OFFER.

III. SITE VISIT: PROSPECTIVE OFFERORS ARE INVITED TO VISIT THE SITE OF THE WORK TO ACQUAINT THEMSELVES WITH THE SITE CONDITIONS AND ANY PROBLEMS INCIDENT TO THE PROSECUTION OF THE WORK. THE SITE VISIT WILL BE HELD ON 16 JANUARY 2002. THE SITE VISIT WILL BEGIN AT 10:00 AM AT THE SOUTH SIDE OF THE LIFT BRIDGE, PHILADELPHIA NAVAL BUSINESS CENTER (PNBC), INTERSECTION OF BRIDGE ST. AND WHARF F/G, PHILADELPHIA, PA. ALL THOSE PLANNING TO ATTEND SHOULD CONTACT MR. MICHAEL BOROVICKA AT (609) 562-2853/4. ALL ATTENDEES ARE REQUIRED TO BRING AND WEAR A SAFETY VEST AND HARD HAT. THERE WILL ALSO BE A PRE-AWARD MEETING AT THE PNBC, BUILDING 4 AUDITORIUM, BROAD ST. ENTRANCE BETWEEN PHILLIP AND PORTER AVENUE, AT 1:00 PM THE SAME DAY.

3 January 2002

MAIN TABLE OF CONTENTS

SECTION	TITLE	PAGE NO.
00010	SF1442 AND BIDDING SCHEDULE	00010-1 to 00010-5
00100	INSTRUCTIONS, CONDITIONS, AND NOTICE TO BIDDERS	00100-1 to 00100-8
00600	REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF BIDDERS	00600-1 to 00600-16
00605	SMALL, VETERAN-OWNED SMALL, HUBZONE SMALL, SMALL DISADVANTAGED, AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN	00605-1 to 00605-6
00700	CONTRACT CLAUSES	00700-1 to 00700-150
00800	SPECIAL CONTRACT REQUIREMENTS	00800-1 to 00835-1
	SPECIFICATIONS	01010-1 to 16910-47

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

TABLE OF CONTENTS

SECTION 00010

TITLE	PAGE NOS.
SOLICITATION, OFFER & AWARD (SF1442)	00010-1 to 00010-2
BIDDING SCHEDULE	00010-3 thru 00010-5

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SOLICITATION, OFFER, AND AWARD (Construction, Alteration, or Repair)	1. SOLICITATION NO. DACW61-02-R-0007	2. TYPE OF SOLICITATION ☐ SEALED BID (IFB) ☒ NEGOTIATED (RFP)	3. DATE ISSUED January 3, 2002	PAGE OF PAGES

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO. W25PHS11808267	6. PROJECT NO.

7. ISSUED BY CODE	8. ADDRESS OFFER TO
District Engineer U.S. Army Engineer District, Philadelphia Wanamaker Building, 100 Penn Square East Philadelphia, PA 19107	U.S. Army Engineer District, Philadelphia Attn: CENAP-CT-C (DeTitta), Room 643 Wanamaker Building, 100 Penn Square East Philadelphia, PA 19107

9. FOR INFORMATION CALL:	A. NAME Denise DeTitta	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) 215-656-6775

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS (Title, identifying no., date):

RFP NO: DACW61-02-R-0007

PROJECT TITLE: ALTERATION OF LIFT BRIDGE, PHILADELPHIA NAVAL BUSINESS CENTER, PHILADELPHIA, PA

ISSUE DATE: January 3, 2002
PROPOSALS DUE: February 7, 2002, Close of Business, local time, 4:00 p.m.

This is an unrestricted acquisition.

Award will be made pursuant to the Small Business Competitveness Demonstration Program.
NAICS: 234120 SIZE STANDARD: $27.5 Million

11. The Contractor shall begin performance within 5 calendar days and complete it within 600 calendar days after receiving

☐ award, ☒ notice to proceed. This performance period is ☒ mandatory, ☐ negotiable. (See _____.)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES," indicate within how may calendar days after award in Item 12B.) ☒ YES ☐ NO	12B. CALENDAR DAYS 10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 6 copies to perform the work required are due at the place specified in Item 8 by 1500 hours local time 02/07/02 (date). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee ☒ is, ☐ is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 60 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

OFFER *(Must be fully completed by offeror)*

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*	15. TELEPHONE NO. *(Include area code)*
	16. REMITTANCE ADDRESS *(Include only if different than Item 14)*
CODE FACILITY CODE	

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within _____ calendar days after the date offers are due. *(Insert any number equal to or greater than the minimum requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.*

AMOUNTS ▶

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)

AMENDMENT NO.										
DATE										

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*	20B. SIGNATURE	20C. OFFER DATE

AWARD *(To be completed by Government)*

21. ITEMS ACCEPTED:

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 Copies unless otherwise specified)* ▶	ITEM	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO ☐ 10 U.S.C 2304(c) ( ) ☐ 41 U.S.C 253(c) ( )
26. ADMINISTERED BY CODE		27. PAYMENT WILL BE MADE BY

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *Contractor is required to sign this document and return _____ copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications incorporated by reference in or attached to this contract.

☐ 29. AWARD *(Contractor is not required to sign this document.)* Your offer on this solicitation is hereby accepted as to the items listed. This award con- summates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*		31A. NAME OF CONTRACTING OFFICER *(Type or print)*	
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY	31C. AWARD DATE

STANDARD FORM 1442 BACK (REV. 4-85)

USAPPC V1.00

SECTION 00010

BIDDING SCHEDULE

#	DESCRIPTION	ESIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
1	Mobilization/Demobilization	1	JB	LS	
2	Maintenance and Protection of Traffic	1	JB	LS	
3	Approach Excavation	550	CY		
4	Pile Load Test	1	JB	LS	
5	Pipe Piles	465	LF		
6	Concrete Pile Cap	1	JB	LS	
7	Prestressed Box Beams	1	JB	LS	
8	Backfill	116	CY		
9	Approach Slab	1	JB	LS	
10	Concrete Curb and Sidewalk	11	CY		
11	Roadway Repair	1	JB	LS	
12	Fender System Removal	1	JB	LS	
13	New Fender System	1	JB	LS	
14	Substructure Concrete Removal	1	JB	LS	
15	New 6-foot Caissons	735	LF		
16	New 3-foot Caissons	437	LF		
17	New Substructure Concrete	1	JB	LS	
18	Float-Out/Float-In	1	JB	LS	
19	Lift Span Deck Removal	1	JB	LS	
20	Lift Span Paint Removal w/ Containment	1	JB	LS	
21	Paint Waste Disposal	545	TONS		
22	Lift Span Painting	1	JB	LS	
23	New Lift Span Structural Steel	1	JB	LS	
24	New Lift Span Rehabilitation Steel	2720	LB		
25	Rivet Replacement	1	JB	LS	
26	New Lift Span Steel Grid Deck	1	JB	LS	
27	New Lift Span Steel Parapet	1	JB	LS	
28	New Lift Span Concrete Sidewalk	1	JB	LS	

29 Tower Removal	1	JB	LS	
30 New Tower Structural Steel	1	JB	LS	
31 New Machinery Room Architectural	1	JB	LS	
32 New Operator and Electrical Building	1	JB	LS	
33 New Tower Concrete Deck	1	JB	LS	
34 New Tower Concrete Parapet	1	JB	LS	
35 New Tower Concrete Sidewalk	1	JB	LS	
36 New Tower Filled-Grid Deck	1	JB	LS	
37 Counterweight Removal	1	JB	LS	
38 New Maintenance Lifts	1	JB	LS	
39 New Counterweight Steel	1	JB	LS	
40 New Counterweight Concrete	1	JB	LS	
41 Operating Machinery	1	JB	LS	
42 Counterweight Ropes	1	JB	LS	
43 New Balance Blocks	100	EA		
44 Lift Span Balancing	1	JB	LS	
45 Operating and Maintenance Manual	1	JB	LS	
46 Bridge Electrical and Control System	1	JB	LS	
47 Bridge Electrical Service	1	JB	LS	
48 Emergency Generator System	1	JB	LS	
50 Traffic Gates and Signals	1	JB	LS	
51 Track Removal	1	JB	LS	
52 New Lift Span Track	1	JB	LS	
53 New Miter Rail Joints	1	JB	LS	
54 New Tower Track	1	JB	LS	
55 New Approach Track	100	LF		
56 New Bridge Access Metalwork	1	JB	LS	
57 New Sidewalk Pipe Railing	1	JB	LS	
58 Soil Analysis	12	EA		
59 Regulated Construction/Demolition Waste Disposal	533	CY		
60 Regulated Dredge Spoil Disposal	413	CY		
61 Hazardous Soil Disposal	213	CY		

62	Clean Soil Disposal - On Site	138	CY		
63	Clean Soil Disposal - Off Site	138	CY		
64	Asbestos Removal	1	JB	LS	
65	Asbestos Waste Disposal	1	JB	LS	
	TOTAL ESTIMATED BASE BID				
49	Railroad Signalization (Optional)	1	JB	LS	
	TOTAL ESTIMATED BASE BID AND OPTION				

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 00100 Bidding Schedule/Instructions to Bidders

CLAUSES INCORPORATED BY FULL TEXT

52.204-6 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER (JUN 99)

(a) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "DUNS" followed by the DUNS number that identifies the offeror's name and address exactly as stated in the offer.

(b) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one. A DUNS number will be provided immediately by telephone at no charge to the offeror. For information on obtaining a DUNS number, the offeror, if located within the United States, should call Dun and Bradstreet at 1-800-333-0505. The offeror should be prepared to provide the following information:

(1) Company name.

(2) Company address.

(3) Company telephone number.

(4) Line of business.

(5) Chief executive officer/key manager.

(6) Date the company was started.

(7) Number of people employed by the company.

(8) Company affiliation.

(c) Offerors located outside the United States may obtain the location and phone number of the local Dun and Bradstreet Information Services office from the Internet Home Page at http://www.customerservice@dnb.com. If an offeror is unable to locate a local service center, it may send an e-mail to Dun and Bradstreet at globalinfo@mail.dnb.com.

(End of provision)

52.214-34 SUBMISSION OF OFFERS IN THE ENGLISH LANGUAGE (APR 1991)

Offers submitted in response to this solicitation shall be in the English language. Offers received in other than English shall be rejected.

(End of provision)

52.214-35 SUBMISSION OF OFFERS IN U.S. CURRENCY (APR 1991)

Offers submitted in response to this solicitation shall be in terms of U.S. dollars. Offers received in other than U.S. dollars shall be rejected.

(End of provision)

52.215-1 INSTRUCTIONS TO OFFERORS--COMPETITIVE ACQUISITION (MAY 2001)

(a) Definitions. As used in this provision--

"Discussions" are negotiations that occur after establishment of the competitive range that may, at the Contracting Officer's discretion, result in the offeror being allowed to revise its proposal.

In writing, writing, or written means any worded or numbered expression that can be read, reproduced, and later communicated, and includes electronically transmitted and stored information.

"Proposal modification" is a change made to a proposal before the solicitation's closing date and time, or made in response to an amendment, or made to correct a mistake at any time before award.

"Proposal revision" is a change to a proposal made after the solicitation closing date, at the request of or as allowed by a Contracting Officer as the result of negotiations.

"Time", if stated as a number of days, is calculated using calendar days, unless otherwise specified, and will include Saturdays, Sundays, and legal holidays. However, if the last day falls on a Saturday, Sunday, or legal holiday, then the period shall include the next working day.

(b) Amendments to solicitations. If this solicitation is amended, all terms and conditions that are not amended remain unchanged. Offerors shall acknowledge receipt of any amendment to this solicitation by the date and time specified in the amendment(s).

(c) Submission, modification, revision, and withdrawal of proposals. (1) Unless other methods (e.g., electronic commerce or facsimile) are permitted in the solicitation, proposals and modifications to proposals shall be submitted in paper media in sealed envelopes or packages (i) addressed to the office specified in the solicitation, and (ii) showing the time and date specified for receipt, the solicitation number, and the name and address of the offeror. Offerors using commercial carriers should ensure that the proposal is marked on the outermost wrapper with the information in paragraphs (c)(1)(i) and (c)(1)(ii) of this provision.

(2) The first page of the proposal must show--

(i) The solicitation number;

(ii) The name, address, and telephone and facsimile numbers of the offeror (and electronic address if available);

(iii) A statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any or all items upon which prices are offered at the price set opposite each item;

(iv) Names, titles, and telephone and facsimile numbers (and electronic addresses if available) of persons authorized to negotiate on the offeror's behalf with the Government in connection with this solicitation; and

(v) Name, title, and signature of person authorized to sign the proposal. Proposals signed by an agent shall be accompanied by evidence of that agent's authority, unless that evidence has been previously furnished to the issuing office.

(3) Submission, modification, or revision, of proposals.

(i) Offerors are responsible for submitting proposals, and any modifications, or revisions, so as to reach the Government office designated in the solicitation by the time specified in the solicitation. If no time is specified in the solicitation, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that proposal or revision is due.

(ii)(A) Any proposal, modification, or revision received at the Government office designated in the solicitation after the exact time specified for receipt of offers is “late” and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late offer would not unduly delay the acquisition; and--

(1) If it was transmitted through an electronic commerce method authorized by the solicitation, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or

(2) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or

(3) It is the only proposal received.

(B) However, a late modification of an otherwise successful proposal that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(iii) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the proposal wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(iv) If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at the office designated for receipt of proposals by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation, the time specified for receipt of proposals will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(v) Proposals may be withdrawn by written notice received at any time before award. Oral proposals in response to oral solicitations may be withdrawn orally. If the solicitation authorizes facsimile proposals, proposals may be withdrawn via facsimile received at any time before award, subject to the conditions specified in the provision at 52.215-5, Facsimile Proposals. Proposals may be withdrawn in person by an offeror or an authorized representative, if the identity of the person requesting withdrawal is established and the person signs a receipt for the proposal before award.

(4) Unless otherwise specified in the solicitation, the offeror may propose to provide any item or combination of items.

(5) Offerors shall submit proposals in response to this solicitation in English, unless otherwise permitted by the solicitation, and in U.S. dollars, unless the provision at FAR 52.225-17, Evaluation of Foreign Currency Offers, is included in the solicitation.

(6) Offerors may submit modifications to their proposals at any time before the solicitation closing date and time, and may submit modifications in response to an amendment, or to correct a mistake at any time before award.

(7) Offerors may submit revised proposals only if requested or allowed by the Contracting Officer.

(8) Proposals may be withdrawn at any time before award. Withdrawals are effective upon receipt of notice by the Contracting Officer.

(d) Offer expiration date. Proposals in response to this solicitation will be valid for the number of days specified on the solicitation cover sheet (unless a different period is proposed by the offeror).

(e) Restriction on disclosure and use of data. Offerors that include in their proposals data that they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, shall--

(1) Mark the title page with the following legend: This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed--in whole or in

part--for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of--or in connection with-- the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in sheets [insert numbers or other identification of sheets]; and

(2) Mark each sheet of data it wishes to restrict with the following legend: Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal.

(f) Contract award. (1) The Government intends to award a contract or contracts resulting from this solicitation to the responsible offeror(s) whose proposal(s) represents the best value after evaluation in accordance with the factors and subfactors in the solicitation.

(2) The Government may reject any or all proposals if such action is in the Government's interest.

(3) The Government may waive informalities and minor irregularities in proposals received.

(4) The Government intends to evaluate proposals and award a contract without discussions with offerors (except clarifications as described in FAR 15.306(a)). Therefore, the offeror's initial proposal should contain the offeror's best terms from a cost or price and technical standpoint. The Government reserves the right to conduct discussions if the Contracting Officer later determines them to be necessary. If the Contracting Officer determines that the number of proposals that would otherwise be in the competitive range exceeds the number at which an efficient competition can be conducted, the Contracting Officer may limit the number of proposals in the competitive range to the greatest number that will permit an efficient competition among the most highly rated proposals.

(5) The Government reserves the right to make an award on any item for a quantity less than the quantity offered, at the unit cost or prices offered, unless the offeror specifies otherwise in the proposal.

(6) The Government reserves the right to make multiple awards if, after considering the additional administrative costs, it is in the Government's best interest to do so.

(7) Exchanges with offerors after receipt of a proposal do not constitute a rejection or counteroffer by the Government.

(8) The Government may determine that a proposal is unacceptable if the prices proposed are materially unbalanced between line items or subline items. Unbalanced pricing exists when, despite an acceptable total evaluated price, the price of one or more contract line items is significantly overstated or understated as indicated by the application of cost or price analysis techniques. A proposal may be rejected if the Contracting Officer determines that the lack of balance poses an unacceptable risk to the Government.

(9) If a cost realism analysis is performed, cost realism may be considered by the source selection authority in evaluating performance or schedule risk.

(10) A written award or acceptance of proposal mailed or otherwise furnished to the successful offeror within the time specified in the proposal shall result in a binding contract without further action by either party.

(11) The Government may disclose the following information in postaward debriefings to other offerors:

(i) The overall evaluated cost or price and technical rating of the successful offeror;

(ii) The overall ranking of all offerors, when any ranking was developed by the agency during source selection;

(iii) A summary of the rationale for award; and

(iv) For acquisitions of commercial items, the make and model of the item to be delivered by the successful offeror.

(End of provision)

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a firm fixed price contract resulting from this solicitation.

(End of clause)

52.217-4 EVALUATION OF OPTIONS EXERCISED AT TIME OF CONTRACT AWARD (JUN 1988)

Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate the total price for the basic requirement together with any option(s) exercised at the time of award.

(End of provision)

52.219-24 SMALL DISADVANTAGED BUSINESS PARTICIPATION PROGRAM--TARGETS (OCT 2000)

(a) This solicitation contains a source selection factor or subfactor related to the participation of small disadvantaged business (SDB) concerns in the contract. Credit under that evaluation factor or subfactor is not available to an SDB concern that qualifies for a price evaluation adjustment under the clause at FAR 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns, unless the SDB concern specifically waives the price evaluation adjustment.

(b) In order to receive credit under the source selection factor or subfactor, the offeror must provide, with its offer, targets, expressed as dollars and percentages of total contract value, for SDB participation in any of the North American Industry Classification System (NAICS Industry Subsectors as determined by the Department of Commerce. The targets may provide for participation by a prime contractor, joint venture partner, teaming arrangement member, or subcontractor; however, the targets for subcontractors must be listed separately.

(End of provision)

52.233-2 SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from

U.S. Army Engineer District, Philadelphia
Attention: Robert Sharamatew (Room 643)
Wanamaker Building, 100 Penn Square East
Philadelphia, PA 19107-3390

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

52.236-28 PREPARATION OF PROPOSALS--CONSTRUCTION (OCT 1997)

(a) Proposals must be (1) submitted on the forms furnished by the Government or on copies of those forms, and (2) manually signed. The person signing a proposal must initial each erasure or change
appearing on any proposal form.

(b) The proposal form may require offerors to submit proposed prices for one or more items on various bases, including--

(1) Lump sum price;

(2) Alternate prices;

(3) Units of construction; or

(4) Any combination of paragraphs (b)(1) through (b)(3) of this provision.

(c) If the solicitation requires submission of a proposal on all items, failure to do so may result in the proposal being rejected without further consideration. If a proposal on all items is not

required, offerors should insert the words “no proposal” in the space provided for any item on which no price is submitted.

(d) Alternate proposals will not be considered unless this solicitation authorizes their submission.

(End of provision)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

[Insert one or more Internet addresses]

252.204-7001 COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE REPORTING (AUG 1999)

(a) The offeror is requested to enter its CAGE code on its offer in the block with its name and address. The CAGE code entered must be for that name and address. Enter “CAGE” before the number.

(b) If the offeror does not have a CAGE code, it may ask the Contracting Officer to request one from the Defense Logistics Information Service (DLIS). The Contracting Officer will--

(1) Ask the Contractor to complete section B of a DD Form 2051, Request for Assignment of a Commercial and Government Entity (CAGE) Code;

(2) Complete section A and forward the form to DLIS; and

(3) Notify the Contractor of its assigned CAGE code.

(c) Do not delay submission of the offer pending receipt of a CAGE code.

(End of provision)

SECTION 00600 Representations & Certifications

CLAUSES INCORPORATED BY FULL TEXT

52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985)

(a) The offeror certifies that --

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to –

(i) Those prices,

(ii) The intention to submit an offer, or

(iii) The methods of factors used to calculate the prices offered:

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory --

(1) Is the person in the offeror's organization responsible for determining the prices offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provison _____ (insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision.

(c) If the offeror deletes or modifies subparagraph (a)(2) of this provision, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

(End of provision)

52.203-11 CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (APR 1991)

(a) The definitions and prohibitions contained in the clause, at FAR 52.203-12, Limitation on Payments to Influence Certain Federal Transactions, included in this solicitation, are hereby incorporated by reference in paragraph (b) of this Certification.

(b) The offeror, by signing its offer, hereby certifies to the best of his or her knowledge and belief that on or after December 23, 1989,--

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the offeror shall complete and submit, with its offer, OMB standard form LLL, Disclosure of Lobbying Activities, to the Contracting Officer; and

(3) He or she will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, Title 31, United States Code. Any person who makes an expenditure prohibited under this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

(End of provision)

52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.

"Common parent," as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"Taxpayer Identification Number (TIN)," as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) Taxpayer Identification Number (TIN).

___ TIN:._____

___ TIN has been applied for.

___ TIN is not required because:

___ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

___ Offeror is an agency or instrumentality of a foreign government;

___ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of organization.

___ Sole proprietorship;

___ Partnership;

___ Corporate entity (not tax-exempt);

___ Corporate entity (tax-exempt);

___ Government entity (Federal, State, or local);

___ Foreign government;

___ International organization per 26 CFR 1.6049-4;

___ Other _____

(f) Common parent.

___ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

___ Name and TIN of common parent:

Name _____

TIN _____

(End of provision)

52.204-5 WOMEN-OWNED BUSINESS (OTHER THAN SMALL BUSINESS) (MAY 1999)

(a) Definition. Women-owned business concern, as used in this provision, means a concern that is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

(b) Representation. [Complete only if the offeror is a women-owned business concern and has not represented itself as a small business concern in paragraph (b)(1) of FAR 52.219-1, Small Business Program Representations, of this solicitation.] The offeror represents that it ( ) is a women-owned business concern.

(End of provision)

52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (APR 2001)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that--

(i) The Offeror and/or any of its Principals--

(A) Are ( ) are not ( ) presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have ( ) have not ( ), within the three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property;

(C) Are ( ) are not ( ) presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision; and

(D) Have ( ) have not ( ), within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in

connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(E) Are ( ) are not ( ) presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(D) of this provision.

(ii)(A) The offeror, aside from the offenses enumerated in paragraphs (a)(1)(i)(A), (B), and (C) of this provision, has ( ) has not ( ) within the past three years, relative to tax, labor and employment, environmental, antitrust, or consumer protection laws--

(1) Been convicted of a Federal or state felony (or has any Federal or state felony indictments currently pending against them); or

(2) Had a Federal court judgment in a civil case brought by the United States rendered against them; or

(3) Had an adverse decision by a Federal administrative law judge, board, or commission indicating a willful violation of law.

(B) If the offeror has responded affirmatively, the offeror shall provide additional information if requested by the Contracting Officer; and

(iii) The Offeror has ( ) has not ( ), within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of

the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

(End of provision)

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (MAY 2001) ALTERNATE I (OCT 2000) & ALTERNATE II (OCT 2000)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 234120.

(2) The small business size standard is $27.5 million.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations. (1) The offeror represents as part of its offer that it ( ) is, ( ) is not a small business concern.

(2) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a women-owned small business concern.

(4) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a veteran-owned small business concern.

(5) (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(6) (Complete only if offeror represented itself as small business concern in paragraph (b)(1) of this provision). The offeror represents, as part of its offer, that--

(i) It ( ) is, ( ) is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR Part 126; and

(ii) It ( ) is, ( ) is not a joint venture that complies with the requirements of 13 CFR Part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. (The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture: _____.) Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(7) (Complete if offeror represented itself as disadvantaged in paragraph (b)(2) of this provision.) The offeror shall check the category in which its ownership falls:

( ) Black American.

( ) Hispanic American.

( ) Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

( ) Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, U.S. Trust Territory of the Pacific Islands (Republic of Palau), Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

( ) Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

(c) Definitions. As used in this provision--

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

Small business concern means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern --

(1) That is at least 51 percent owned by one or more women; in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) Notice.

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

52.219-19 SMALL BUSINESS CONCERN REPRESENTATION FOR THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (OCT 2000)

(a) Definition.

"Emerging small business" as used in this solicitation, means a small business concern whose size is no greater than 50 percent of the numerical size standard applicable to the North American Industry Classification System (NAICS) code assigned to a contracting opportunity.

(b) [Complete only if the Offeror has represented itself under the provision at 52.219-1 as a small business concern under the size standards of this solicitation.] The Offeror [ ] is, [ ] is not an emerging small business.

(c) (Complete only if the Offeror is a small business or an emerging small business, indicating its size range.)

Offeror's number of employees for the past 12 months (check this column if size standard stated in solicitation is expressed in terms of number of employees) or Offeror's average annual gross revenue for the last 3 fiscal years (check this column if size standard stated in solicitation is expressed in terms of annual receipts). (Check one of the following.)

No. of Employees	Avg. Annual Gross Revenues
____ 50 or fewer	____ $1 million or less
____ 51 - 100	____ $1,000,001 - $2 million
____ 101 - 250	____ $2,000,001 - $3.5 million
____ 251 - 500	____ $3,500,001 - $5 million
____ 501 - 750	____ $5,000,001 - $10 million
____ 751 - 1,000	____ $10,000,001 - $17 million
____ Over 1,000	____ Over $17 million

(End of provision)

52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999)

The offeror represents that --

(a) [ ] It has, [ ] has not participated in a previous contract or subcontract subject to the Equal

Opportunity clause of this solicitation;

(b) [ ] It has, [ ] has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

(End of provision)

52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (OCT 2000)

(a) Submission of this certification is a prerequisite for making or entering into this contract imposed by Executive Order 12969, August 8, 1995.

(b) By signing this offer, the offeror certifies that--

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: (Check each block that is applicable.)

[ ] (i) The facility does not manufacture, process or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

[ ] (ii) The facility does not have 10 or more full-time employees as specified in section 313.(b)(1)(A) of EPCRA 42 U.S.C. 11023(b)(1)(A);

[ ] (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

[ ] (iv) The facility does not fall within Standard Industrial Classification Code (SIC) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; or

[ ] (v) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands,

the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

52.226-2 HISTORICALLY BLACK COLLEGE OR UNIVERSITY AND MINORITY INSTITUTION REPRESENTATION (MAY 2001)

(a) Definitions. As used in this provision--

Historically black college or university means an institution determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. For the Department of Defense, the National Aeronautics and Space Administration, and the Coast Guard, the term also includes any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

Minority institution means an institution of higher education meeting the requirements of Section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1067k, including a Hispanic-serving institution of higher education, as defined in Section 316(b)(1) of the Act (20 U.S.C. 1101a)).

(b) Representation. The offeror represents that it--

( ) is ( ) is not a historically black college or university;

( ) is ( ) is not a minority institution.

(End of provision)

52.230-1 COST ACCOUNTING STANDARDS NOTICES AND CERTIFICATION (JUN 2000)

Note: This notice does not apply to small businesses or foreign governments. This notice is in three parts, identified by Roman numerals I through III.

Offerors shall examine each part and provide the requested information in order to determine Cost Accounting Standards (CAS) requirements applicable to any resultant contract.

If the offeror is an educational institution, Part II does not apply unless the contemplated contract will be subject to full or modified CAS coverage pursuant to 48 CFR 9903.201-2(c)(5) or 9903.201-2(c)(6), respectively.

I. DISCLOSURE STATEMENT--COST ACCOUNTING PRACTICES AND CERTIFICATION

(a) Any contract in excess of $500,000 resulting from this solicitation will be subject to the requirements of the Cost Accounting Standards Board (48 CFR Chapter 99), except for those contracts which are exempt as specified in 48 CFR 9903.201-1.

(b) Any offeror submitting a proposal which, if accepted, will result in a contract subject to the requirements of 48 CFR Chapter 99 must, as a condition of contracting, submit a Disclosure Statement as required by 48 CFR 9903.202. When required, the Disclosure Statement must be submitted as a part of the offeror's proposal under this solicitation unless the offeror has already submitted a Disclosure Statement disclosing the practices used in connection with the pricing of this proposal. If an applicable Disclosure Statement has already been submitted, the offeror may satisfy the requirement for submission by providing the information requested in paragraph (c) of Part I of this provision.

CAUTION: In the absence of specific regulations or agreement, a practice disclosed in a Disclosure Statement shall not, by virtue of such disclosure, be deemed to be a proper, approved, or agreed-to practice for pricing proposals or accumulating and reporting contract performance cost data.

(c) Check the appropriate box below:

(1) Certificate of Concurrent Submission of Disclosure Statement.

The offeror hereby certifies that, as a part of the offer, copies of the Disclosure Statement have been submitted as follows: (i) original and one copy to the cognizant Administrative Contracting Officer (ACO) or cognizant Federal agency official authorized to act in that capacity (Federal official), as applicable, and (ii) one copy to the cognizant Federal auditor.

(Disclosure must be on Form No. CASB DS-1 or CASB DS-2, as applicable. Forms may be obtained from the cognizant ACO or Federal official and/or from the loose-leaf version of the Federal Acquisition Regulation.)

Date of Disclosure Statement: _____ Name and Address of Cognizant ACO or Federal Official Where Filed: _____

The offeror further certifies that the practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement.

(2) Certificate of Previously Submitted Disclosure Statement.

The offeror hereby certifies that the required Disclosure Statement was filed as follows:

Date of Disclosure Statement: _____ Name and Address of Cognizant ACO or Federal Official Where Filed: _____

The offeror further certifies that the practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the applicable Disclosure Statement.

(3) Certificate of Monetary Exemption.

The offeror hereby certifies that the offeror, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards of negotiated prime contracts and subcontracts subject to CAS totaling more than $50 million (of which at least one award exceeded $1 million) in the cost accounting period immediately preceding the period in which this proposal was submitted. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Officer immediately.

(4) Certificate of Interim Exemption.

The offeror hereby certifies that (i) the offeror first exceeded the monetary exemption for disclosure, as defined in (3) of this subsection, in the cost accounting period immediately preceding the period in which this offer was submitted and (ii) in accordance with 48 CFR 9903.202-1, the offeror is not yet required to submit a Disclosure Statement. The offeror further certifies that if an award resulting from this proposal has not been made within 90 days after the end of that period, the offeror will immediately submit a revised certificate to the Contracting Officer, in the form specified under subparagraph (c)(1) or (c)(2) of Part I of this provision, as appropriate, to verify submission of a completed Disclosure Statement.

CAUTION: Offerors currently required to disclose because they were awarded a CAS-covered prime contract or subcontract of $50 million or more in the current cost accounting period may not claim this exemption (4). Further, the exemption applies only in connection with proposals submitted before expiration of the 90-day period following the cost accounting period in which the monetary exemption was exceeded.

II. COST ACCOUNTING STANDARDS--ELIGIBILITY FOR MODIFIED CONTRACT COVERAGE

If the offeror is eligible to use the modified provisions of 48 CFR 9903.201-2(b) and elects to do so, the offeror shall indicate by checking the box below. Checking the box below shall mean that the resultant contract is subject to the Disclosure and Consistency of Cost Accounting Practices clause in lieu of the Cost Accounting Standards clause.

( ) The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 48 CFR 9903.201-2(b) and certifies that the offeror is eligible for use of the Disclosure and Consistency of Cost Accounting Practices clause because during the cost accounting period immediately preceding the period in which this proposal was submitted, the offeror received less than $50 million in awards of CAS-covered prime contracts and subcontracts. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Officer immediately.

CAUTION: An offeror may not claim the above eligibility for modified contract coverage if this proposal is expected to result in the award of a CAS-covered contract of $50 million or more or if, during its current cost accounting period, the offeror has been awarded a single CAS-covered prime contract or subcontract of $25 million or more.

III. ADDITIONAL COST ACCOUNTING STANDARDS APPLICABLE TO EXISTING CONTRACTS

The offeror shall indicate below whether award of the contemplated contract would, in accordance with subparagraph (a)(3) of the Cost Accounting Standards clause, require a change in established cost accounting practices affecting existing contracts and subcontracts.

( ) YES ( ) NO

(End of clause)

252.209-7001 DISCLOSURE OF OWNERSHIP OR CONTROL BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) "Definitions."

As used in this provision --

(a) "Government of a terrorist country" includes the state and the government of a terrorist country, as well as any political subdivision, agency, or instrumentality thereof.

(2) "Terrorist country" means a country determined by the Secretary of State, under section 6(j)(1)(A) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(j)(i)(A)), to be a country the government of which has repeatedly provided support for such acts of international terrorism. As of the date of this provision, terrorist countries include: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria.

(3) "Significant interest" means --

(i) Ownership of or beneficial interest in 5 percent or more of the firm's or subsidiary's securities. Beneficial interest includes holding 5 percent or more of any class of the firm's securities in "nominee shares," "street names," or some other method of holding securities that does not disclose the beneficial owner;

(ii) Holding a management position in the firm, such as a director or officer;

(iii) Ability to control or influence the election, appointment, or tenure of directors or officers in the firm;

(iv) Ownership of 10 percent or more of the assets of a firm such as equipment, buildings, real estate, or other tangible assets of the firm; or

(v) Holding 50 percent or more of the indebtness of a firm.

(b) "Prohibition on award."

In accordance with 10 U.S.C. 2327, no contract may be awarded to a firm or a subsidiary of a firm if the government of a terrorist country has a significant interest in the firm or subsidiary or, in the case of a subsidiary, the firm that owns the subsidiary, unless a waiver is granted by the Secretary of Defense.

(c) "Disclosure."

If the government of a terrorist country has a significant interest in the Offeror or a subsidiary of the Offeror, the Offeror shall disclosure such interest in an attachment to its offer. If the Offeror is a subsidiary, it shall also disclose any significant interest the government of a terrorist country has in any firm that owns or controls the subsidiary. The disclosure shall include --

(1) Identification of each government holding a significant interest; and

(2) A description of the significant interest held by each government.

(End of provision)

252.225-7017 PROHIBITION ON AWARD TO COMPANIES OWNED BY THE PEOPLE'S REPUBLIC OF CHINA (FEB 2000)

(a) Definition. "People's Republic of China," as used in this provision, means the government of the People's Republic of China, including its political subdivisions, agencies, and instrumentalities.

(b) Prohibition on award. Section 8120 of the Department of Defense Appropriations Act for fiscal year 1999 (Pub. L. 105-262), as amended by Section 144 of Title I, Division C, of the Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999 (Pub. L. 105-277), prohibits the award of a contract under this solicitation to any company in which the Director of Defense Procurement (Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics)) has determined that the People's Republic of China or the People's Liberation Army of the People's Republic of China owns more than 50 percent interest.

(c) Representation. By submission of an offer, the offeror represents that the People's Republic of China or the People's Liberation Army of the People's Republic of China does not own more than 50 percent interest in the offeror.

(End of provision)

252.227-7028 TECHNICAL DATA OR COMPUTER SOFTWARE PREVIOUSLY DELIVERED TO THE GOVERNMENT (JUN 1995)

The Offeror shall attach to its offer an identification of all documents or other media incorporating technical data or computer software it intends to deliver under this contract with other than unlimited rights that are identical or substantially similar to documents or other media

that the Offeror has produced for, delivered to, or is obligated to deliver to the Government under any contract or subcontract. The attachment shall identify--

(a) The contract number under which the data or software were produced;

(b) The contract number under which, and the name and address of the organization to whom, the data or software were most recently delivered or will be delivered; and

(c) Any limitations on the Government's rights to use or disclose the data or software, including, when applicable, identification of the earliest date the limitations expire.

(End of clause)

252.247-7022 REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992)

(a) The Offeror shall indicate by checking the appropriate blank in paragraph (b) of this provision whether transportation of supplies by sea is anticipated under the resultant contract. The term supplies is defined in the Transportation of Supplies by Sea clause of this solicitation.

(b) Representation. The Offeror represents that it:

____ (1) Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

____ (2) Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

(c) Any contract resulting from this solicitation will include the Transportation of Supplies by Sea clause. If the Offeror represents that it will not use ocean transportation, the resulting contract will also include the Defense FAR Supplement clause at 252.247-7024, Notification of Transportation of Supplies by Sea.

(End of provision)

SMALL, VETERAN-OWNED SMALL, HUBZONE SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN

DATE:_____

CONTRACTOR: _____
ADDRESS: _____
SOLICITATION OR CONTRACT NUMBER: _____
ITEM/SERVICE: _____

The following, together with any attachments, is hereby submitted as a Subcontracting Plan to satisfy the applicable requirements of Public Law 95-507 as implemented by OFPP Policy Letter 80-2.

1. (a) The following percentage goals (expressed in terms of a percentage of total planned subcontracting dollars) are applicable to the contract cited above or to the contract awarded under the solicitation cited.

(i) Small Business Concerns: _____% of total planned subcontracting dollars under this contract will go to subcontractors who are small business concerns.

(ii) Veteran-Owned Small Business Concerns: _____ % of total planned subcontracting dollars under this contract will go to subcontractors who are veteran-owned small business concerns. Service-disabled veteran-owned small business concerns meet the definition of veteran-owned small business concerns, and offerors may include them within the subcontracting plan goal for veteran-owned small business concerns. A separate goal for service-disabled veteran-owned small business concerns is not required.

(iii) HUBZone Small Business Concerns: _____ % of total planned subcontracting dollars under this contract will go to subcontractors who are small business concerns located in a historically underutilized business zone which is an area located within one or more qualified census tracts, qualified nonmetropolitan counties, or lands within the external boundaries of an Indian reservation and appear on the List of Qualified HUBZone Small Business Concerns maintained by the SBA. (http://www.sba.gov/hubzone/).

(iv) Small Disadvantaged Business Concerns: _____% of total planned subcontracting dollars under this contract will go to subcontractors who are small concerns owned and controlled by socially and economically disadvantaged individuals. This percentage is included in the percentage shown under 1.(a)(i) above, as a subset.

(v) Women-Owned Small Business Concerns: _____% of total planned subcontracting dollars under this contract will go to subcontractors who are women-owned small business concerns. This percentage is included in the percentage shown under 1.(a)(i) above, as a subset.

(b) The following dollar values correspond to the percentage goals shown in (a) above.

(i) Total dollars planned to be subcontracted to small business concerns:
$_____.

(ii) Total dollars planned to be subcontracted to veteran-owned small business concerns: $_____.

(iii) Total dollars planned to be subcontracted to HUBZone small business concerns: $_____.

(iv) Total dollars planned to be subcontracted to small disadvantaged business concerns: $_____. This dollar amount is included in the amount shown under 1.(b)(i) above, as a subset.

(v) Total dollars planned to be subcontracted to women-owned small business concerns: $_____. This dollar amount is included in the amount shown under 1.(b)(i) above, as a subset.

(c) The total estimated dollar value of all planned subcontracting (to all types of business concerns) under this contract is $_____.

(d) The following principal products and/or services will be subcontracted under this contract, and the distribution among small, veteran-owned small, HUBZone small business, small disadvantaged, and women-owned small business concerns is as follows:

(Products/services planned to be subcontracted to small business concerns are identified by *, veteran-owned small business concerns by **, HUBZone small business concerns by ***, small disadvantaged business concerns by **** and women-owned small business concerns by *****)

_____

_____

_____

_____

_____

_____

(Attachment may be used if additional space is required)

(e) The following method was used in developing subcontract goals (i.e., statement explaining how the product and service areas to be subcontracted were established, how the areas to be subcontracted to small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned small business concerns were determined, and how small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned small business concerns capabilities were determined, to include identification of source lists utilized in making those determination).

(f) Indirect and over head costs [_____] have [_____] have not been included in the goals specified in 1(a) and 1(b).

(g) If "have" is checked, explain the method used in determining the proportionate share of indirect and overhead cost to be allocated as subcontracts to small business concerns, veteran-owned small, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns.

_____

_____

_____

_____

_____

2. The following individual will administer the subcontracting program:

Name: _____
Address & Telephone: _____
Telephone: _____

This individual's specific duties, as they relate to the firm's subcontracting program are as follows:

General overall responsibility for this company's Small Business Program, the development, preparation and execution of individual subcontracting plans and for monitoring performance relative to contractual subcontracting requirements contained in this plan, including but not limited to:

(a) Developing and maintaining bidders lists of small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned small business concerns from all possible sources.

(b) Ensuring that procurement packages are structured to permit small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned business concerns to participate to the maximum extent possible.

(c) Assuring inclusion of small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned business concerns in all solicitations for products or services which they are capable of providing.

(d) Reviewing solicitations to remove statements, clauses, etc., which may tend to restrict or prohibit small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned business participation.

(e) Ensuring periodic rotation of potential subcontractors on bidders lists.

(f) Ensuring that the bid proposal review board documents its reasons for rejecting low bids submitted by small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned business concerns.

(g) Ensuring the establishment and maintenance of records of solicitations and subcontract award activity.

(h) Attending or arranging for attendance of company counselors at Business Opportunity Workshops, Minority Business Enterprise Seminars, Trade Fairs, etc.

(i) Conducting or arranging for conduct of motivational training for purchasing personnel pursuant to the intent of P.O. 95-507.

(j) Monitoring attainment of proposed goals.

(k) Preparing and submitting periodic subcontracting reports required.

(l) Coordinating contractor's activities during the conduct of compliance reviews by Federal Agencies.

(m) Coordinating the conduct of contractor's activities involving its small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned business subcontracting program.

(n) Additions to (or deletions from) the duties specified above are as follows:

_____

_____

_____

_____

_____

3. The following efforts will be taken to assure that small, veteran-owned small, HUBZone, small, small disadvantaged, and women-owned business concerns will have an equitable opportunity to compete for subcontracts:

(a) Outreach efforts will be made as follows:

(i) Contacts with minority and small business trade associations

(ii) Contacts with business development organizations

(iii) Attendance at small and minority business procurement conferences

(iv) Sources will be requested from SBA's PASS system.

(b) The following internal efforts will be made to guide and encourage buyers:

(i) Workshops, seminars and training programs will be conducted

(ii) Activities will be monitored to evaluate compliance with this subcontracting plan.

(c) Small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned business concern source lists, guides and other data identifying small, veteran-owned small,

HUBZone small, small disadvantaged, and women-owned business concerns will be maintained and utilized by buyers in soliciting subcontracts.

(d) Additions to (or deletions from) the above listed efforts are as follows:

_____

_____

_____

_____

_____

4. The bidder (contractor) agrees that the clause entitled Utilization of Small, veteran-owned small, HUBZone Small, Small Disadvantaged, and Women-Owned Small Business Concerns will be included in all subcontracts which offer further subcontracting opportunities, and all subcontractors except small business concerns who receive subcontracts in excess of $500,000 will be required to adopt and comply with a subcontracting plan similar to this one. Such plans will be reviewed by comparing them with the provisions of Public Law 95-507, and assuring that all minimum requirements of an acceptable subcontracting plan have been satisfied. The acceptability of percentage goals shall be determined on a case-by-case basis depending on the supplies/services involved, the availability of potential small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned subcontractors, and prior experience. Once approved and implemented, plans will be monitored through the submission of periodic reports, and/or, as time and availability of funds permit, periodic visits to subcontractors facilities to review applicable records and subcontracting program progress.

5. The bidder (contractor) agrees to submit such periodic reports and cooperate in any studies or surveys as may be required by the contracting agency or the Small business Administration in order to determine the extent of compliance by the bidder with the subcontracting plan and with the clause entitled Utilization of Small, veteran-owned small, HUBZone Small, Small Disadvantaged, and Women-Owned Small Business Concerns, contained in the contract.

6. The bidder (contractor) agrees that he will maintain at least the following types of records to document compliance with this subcontracting plan:

(a) Small, veteran-owned small, HUBZone Small, Small Disadvantaged, and Women-Owned Business concern source lists, guides and other data identifying SB/HZSB/SDB/WO vendors.

(b) Organizations contacted for small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned business sources.

(c) On a contract-by-contract basis, records on all subcontract solicitations over $100,000, indicating on each solicitation (1) whether small business concerns were solicited, and if not, why not; (2) whether veteran-owned small business concerns were solicited, and if not, why not, (3) whether HUBZone small business concerns were solicited, and if not, why not; (4) whether small disadvantaged business concerns were solicited, and if not, why not; (5) whether women-owned business concerns were solicited and if not, why not; and (6) reasons for the failure of

solicited small, veteran-owned small, HUBZone small, small disadvantaged, or women-owned business concerns to receive the subcontract award.

(d) Records to support other outreach efforts: Contacts with Minority and Small Business Trade Associations, etc. Attendance at small and minority business procurement conferences and trade fairs.

(e) Records to support internal activities to guide and encourage buyers: Workshops, seminars, training programs, etc. Monitoring activities to evaluate compliance.

(f) On a contract-by-contract basis, records to support subcontract award data to include name and address or subcontractor .

(g) Records to be maintained in addition to the above are as follows:

_____

_____

_____

_____

Signed: _____
Typed Name: _____
Title: _____
Date: _____

Plan Accepted By: _____
Contracting Officer

Date: _____

NOTE TO CONTRACTING OFFICER: Upon incorporation of a plan into the contract, indicate herein the estimated dollar value of the contract:

$ _____.

SECTION 00700 Contract Clauses

CLAUSES INCORPORATED BY FULL TEXT

52.202-1 DEFINITIONS (MAY 2001) --ALTERNATE I (MAY 2001)

(a) Agency head or head of the agency means the Secretary (Attorney General, Administrator, Governor, Chairperson, or other chief official, as appropriate) of the agency, unless otherwise indicated, including any deputy or assistant chief official of the executive agency.

(b) "Commercial component" means any component that is a commercial item.

(c) Except as otherwise provided in this contract, the term "subcontracts" includes, but is not limited to, purchase orders and changes and modifications to purchase orders under this contract.

(d) Component means any item supplied to the Government as part of an end item or of another component, except that for use in 52.225-9, and 52.225-11 see the definitions in 52.225-9(a) and 52.225-11(a).

(e) Contracting Officer means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.

(f) Nondevelopmental item means--

(1) Any previously developed item of supply used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement;

(2) Any item described in paragraph (f)(1) of this definition that requires only minor modification or modifications of a type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or

(3) Any item of supply being produced that does not meet the requirements of paragraph (f)(1) or (f)(2) solely because the item is not yet in use.

(End of clause)

52.203-3 GRATUITIES (APR 1984)

(a) The right of the Contractor to proceed may be terminated by written notice if, after notice and hearing, the agency head or a designee determines that the Contractor, its agent, or another

representative--

(1) Offered or gave a gratuity (e.g., an entertainment or gift) to an officer, official, or employee of the Government; and

(2) Intended, by the gratuity, to obtain a contract or favorable treatment under a contract.

(b) The facts supporting this determination may be reviewed by any court having lawful jurisdiction.

(c) If this contract is terminated under paragraph (a) of this clause, the Government is entitled--

(1) To pursue the same remedies as in a breach of the contract; and

(2) In addition to any other damages provided by law, to exemplary damages of not less than 3 nor more than 10 times the cost incurred by the Contractor in giving gratuities to the person concerned, as determined by the agency head or a designee. (This subparagraph (c)(2) is applicable only if this contract uses money appropriated to the Department of Defense.)

(d) The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.203-5 COVENANT AGAINST CONTINGENT FEES (APR 1984)

(a) The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent fee.

(b) "Bona fide agency," as used in this clause, means an established commercial or selling agency, maintained by a contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds itself out as being able to obtain any Government contract or contracts through improper influence.

"Bona fide employee," as used in this clause, means a person, employed by a contractor and subject to the contractor's supervision and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds out as being able to obtain any Government contract or contracts through improper influence.

"Contingent fee," as used in this clause, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a Government contract.

"Improper influence," as used in this clause, means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government contract on any basis other than the merits of the matter.

(End of clause)

52.203-7 ANTI-KICKBACK PROCEDURES. (JUL 1995)

(a) Definitions.

"Kickback," as used in this clause, means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided, directly or indirectly, to any prime Contractor, prime Contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a subcontract relating to a prime contract.

"Person," as used in this clause, means a corporation, partnership, business association of any kind, trust, joint-stock company, or individual.

"Prime contract," as used in this clause, means a contract or contractual action entered into by the United States for the purpose of obtaining supplies, materials, equipment, or services of any kind.

"Prime Contractor," as used in this clause, means a person who has entered into a prime contract with the United States.

"Prime Contractor employee," as used in this clause, means any officer, partner, employee, or agent of a prime Contractor.

"Subcontract," as used in this clause, means a contract or contractual action entered into by a prime Contractor or subcontractor for the purpose of obtaining supplies, materials, equipment, or services of any kind under a prime contract.

"Subcontractor," as used in this clause, (1) means any person, other than the prime Contractor, who offers to furnish or furnishes any supplies, materials, equipment, or services of any kind under a prime contract or a subcontract entered into in connection with such prime contract, and (2) includes any person who offers to furnish or furnishes general supplies to the prime Contractor or a higher tier subcontractor.

"Subcontractor employee," as used in this clause, means any officer, partner, employee, or agent of a subcontractor.

(b) The Anti-Kickback Act of 1986 (41 U.S.C. 51-58) (the Act), prohibits any person from -

(1) Providing or attempting to provide or offering to provide any kickback;

(2) Soliciting, accepting, or attempting to accept any kickback; or

(3) Including, directly or indirectly, the amount of any kickback in the contract price charged by a prime Contractor to the United States or in the contract price charged by a subcontractor to a prime Contractor or higher tier subcontractor.

(c)(1) The Contractor shall have in place and follow reasonable procedures designed to prevent and detect possible violations described in paragraph (b) of this clause in its own operations and direct business relationships.

(2) When the Contractor has reasonable grounds to believe that a violation described in paragraph (b) of this clause may have occurred, the Contractor shall promptly report in writing the possible violation. Such reports shall be made to the inspector general of the contracting agency, the head of the contracting agency if the agency does not have an inspector general, or the Department of Justice.

(3) The Contractor shall cooperate fully with any Federal agency investigating a possible violation described in paragraph (b) of this clause.

(4) The Contracting Officer may (i) offset the amount of the kickback against any monies owed by the United States under the prime contract and/or (ii) direct that the Prime Contractor withhold, from sums owed a subcontractor under the prime contract, the amount of any kickback. The Contracting Officer may order the monies withheld under subdivision (c)(4)(ii) of this clause be paid over to the Government unless the Government has already offset those monies under subdivision (c)(4)(i) of this clause. In either case, the Prime Contractor shall notify the Contracting Officer when the monies are withheld.

(5) The Contractor agrees to incorporate the substance of this clause, including this subparagraph (c)(5) but excepting subparagraph (c)(1), in all subcontracts under this contract which exceed $100,000.

52.203-8 CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)

(a) If the Government receives information that a contractor or a person has engaged in conduct constituting a violation of subsection (a), (b), (c), or (d) of Section 27 of the Office of Federal Procurement Policy Act (41 U.S.C. 423) (the Act), as amended by section 4304 of the 1996 National Defense Authorization Act for Fiscal Year 1996 (Pub. L. 104-106), the Government may--

(1) Cancel the solicitation, if the contract has not yet been awarded or issued; or

(2) Rescind the contract with respect to which--

(i) The Contractor or someone acting for the Contractor has been convicted for an offense where the conduct constitutes a violation of subsection 27(a) or (b) of the Act for the purpose of either--

(A) Exchanging the information covered by such subsections for anything of value; or

(B) Obtaining or giving anyone a competitive advantage in the award of a Federal agency procurement contract; or

(ii) The head of the contracting activity has determined, based upon a preponderance of the evidence, that the Contractor or someone acting for the Contractor has engaged in conduct constituting an offense punishable under subsections 27(e)(1) of the Act.

(b) If the Government rescinds the contract under paragraph (a) of this clause, the Government is entitled to recover, in addition to any penalty prescribed by law, the amount expended under the contract.

(c) The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law, regulation, or under this contract.

(End of clause)

52.203-10 PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)

(a) The Government, at its election, may reduce the price of a fixed-price type contract and the total cost and fee under a cost-type contract by the amount of profit or fee determined as set forth in paragraph (b) of this clause if the head of the contracting activity or designee determines that there was a violation of subsection 27 (a), (b), or (c) of the Office of Federal Procurement Policy Act, as amended (41 U.S.C. 423), as implemented in section 3.104 of the Federal Acquisition Regulation.

(b) The price or fee reduction referred to in paragraph (a) of this clause shall be--

(1) For cost-plus-fixed-fee contracts, the amount of the fee specified in the contract at the time of award;

(2) For cost-plus-incentive-fee contracts, the target fee specified in the contract at the time of award, notwithstanding any minimum fee or "fee floor" specified in the contract;

(3) For cost-plus-award-fee contracts--

(i) The base fee established in the contract at the time of contract award;

(ii) If no base fee is specified in the contract, 30 percent of the amount of each award fee

otherwise payable to the Contractor for each award fee evaluation period or at each award fee determination point.

(4) For fixed-price-incentive contracts, the Government may--

(i) Reduce the contract target price and contract target profit both by an amount equal to the initial target profit specified in the contract at the time of contract award; or

(ii) If an immediate adjustment to the contract target price and contract target profit would have a significant adverse impact on the incentive price revision relationship under the contract, or adversely affect the contract financing provisions, the Contracting Officer may defer such adjustment until establishment of the total final price of the contract. The total final price established in accordance with the incentive price revision provisions of the contract shall be reduced by an amount equal to the initial target profit specified in the contract at the time of contract award and such reduced price shall be the total final contract price.

(5) For firm-fixed-price contracts, by 10 percent of the initial contract price or a profit amount determined by the Contracting Officer from records or documents in existence prior to the date of the contract award.

(c) The Government may, at its election, reduce a prime contractor's price or fee in accordance with the procedures of paragraph (b) of this clause for violations of the Act by its subcontractors by an amount not to exceed the amount of profit or fee reflected in the subcontract at the time the subcontract was first definitively priced.

(d) In addition to the remedies in paragraphs (a) and (c) of this clause, the Government may terminate this contract for default. The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.203-12 LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JUN 1997)

(a) Definitions.

"Agency," as used in this clause, means executive agency as defined in 2.101.

"Covered Federal action," as used in this clause, means any of the following Federal actions:

(1) The awarding of any Federal contract.

(2) The making of any Federal grant.

(3) The making of any Federal loan.

(4) The entering into of any cooperative agreement.

(5) The extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

"Indian tribe" and "tribal organization," as used in this clause, have the meaning provided in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) and include Alaskan Natives.

"Influencing or attempting to influence," as used in this clause, means making, with the intent to influence, any communication to or appearance before an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any covered Federal action.

"Local government," as used in this clause, means a unit of government in a State and, if chartered, established, or otherwise recognized by a State for the performance of a governmental duty, including a local public authority, a special district, an intrastate district, a council of governments, a sponsor group representative organization, and any other instrumentality of a local government.

"Officer or employee of an agency," as used in this clause, includes the following individuals who are employed by an agency:

(1) An individual who is appointed to a position in the Government under Title 5, United States Code, including a position under a temporary appointment.

(2) A member of the uniformed services, as defined in subsection 101(3), Title 37, United States Code.

(3) A special Government employee, as defined in section 202, Title 18, United States Code.

(4) An individual who is a member of a Federal advisory committee, as defined by the Federal Advisory Committee Act, Title 5, United States Code, appendix 2.

"Person," as used in this clause, means an individual, corporation, company, association, authority, firm, partnership, society, State, and local government, regardless of whether such entity is operated for profit, or not for profit. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Reasonable compensation," as used in this clause, means, with respect to a regularly employed officer or employee of any person, compensation that is consistent with the normal compensation for such officer or employee for work that is not furnished to, not funded by, or not furnished in cooperation with the Federal Government.

"Reasonable payment," as used in this clause, means, with respect to professional and other technical services, a payment in an amount that is consistent with the amount normally paid for such services in the private sector.

"Recipient," as used in this clause, includes the Contractor and all subcontractors. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Regularly employed," as used in this clause, means, with respect to an officer or employee of a person requesting or receiving a Federal contract, an officer or employee who is employed by such person for at least 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person for receipt of such contract. An officer or employee who is employed by such person for less than 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person shall be considered to be regularly employed as soon as he or she is employed by such person for 130 working days.

"State," as used in this clause, means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, a territory or possession of the United States, an agency or instrumentality of a State, and multi-State, regional, or interstate entity having governmental duties and powers.

(b) Prohibitions.

(1) Section 1352 of Title 31, United States Code, among other things, prohibits a recipient of a Federal contract, grant, loan, or cooperative agreement from using appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.

(2) The Act also requires Contractors to furnish a disclosure if any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

(3) The prohibitions of the Act do not apply under the following conditions:

(i) Agency and legislative liaison by own employees.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of a payment of reasonable compensation made to an officer or employee of

a person requesting or receiving a covered Federal action if the payment is for agency and legislative liaison activities not directly related to a covered Federal action.

(B) For purposes of subdivision (b)(3)(i)(A) of this clause, providing any information specifically requested by an agency or Congress is permitted at any time.

(C) The following agency and legislative liaison activities are permitted at any time where they are not related to a specific solicitation for any covered Federal action:

(1) Discussing with an agency the qualities and characteristics (including individual demonstrations) of the person's products or services, conditions or terms of sale, and service capabilities.

(2) Technical discussions and other activities regarding the application or adaptation of the person's products or services for an agency's use.

(D) The following agency and legislative liaison activities are permitted where they are prior to formal solicitation of any covered Federal action--

(1) Providing any information not specifically requested but necessary for an agency to make an informed decision about initiation of a covered Federal action;

(2) Technical discussions regarding the preparation of an unsolicited proposal prior to its official submission; and

(3) Capability presentations by persons seeking awards from an agency pursuant to the provisions of the Small Business Act, as amended by Pub. L. 95-507, and subsequent amendments.

(E) Only those services expressly authorized by subdivision (b)(3)(i)(A) of this clause are permitted under this clause.

(ii) Professional and technical services.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of--

(1) A payment of reasonable compensation made to an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or modification of a covered Federal action, if payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action.

(2) Any reasonable payment to a person, other than an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or

modification of a covered Federal action if the payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action. Persons other than officers or employees of a person requesting or receiving a covered Federal action include consultants and trade associations.

(B) For purposes of subdivision (b)(3)(ii)(A) of this clause, "professional and technical services" shall be limited to advice and analysis directly applying any professional or technical discipline. For example, drafting of a legal document accompanying a bid or proposal by a lawyer is allowable. Similarly, technical advice provided by an engineer on the performance or operational capability of a piece of equipment rendered directly in the negotiation of a contract is allowable. However, communications with the intent to influence made by a professional (such as a licensed lawyer) or a technical person (such as a licensed accountant) are not allowable under this section unless they provide advice and analysis directly applying their professional or technical expertise and unless the advice or analysis is rendered directly and solely in the preparation, submission or negotiation of a covered Federal action. Thus, for example, communications with the intent to influence made by a lawyer that do not provide legal advice or analysis directly and solely related to the legal aspects of his or her client's proposal, but generally advocate one proposal over another are not allowable under this section because the lawyer is not providing professional legal services. Similarly, communications with the intent to influence made by an engineer providing an engineering analysis prior to the preparation or submission of a bid or proposal are not allowable under this section since the engineer is providing technical services but not directly in the preparation, submission or negotiation of a covered Federal action.

(C) Requirements imposed by or pursuant to law as a condition for receiving a covered Federal award include those required by law or regulation and any other requirements in the actual award documents.

(D) Only those services expressly authorized by subdivisions (b)(3)(ii)(A)(1) and (2) of this clause are permitted under this clause.

(E) The reporting requirements of FAR 3.803(a) shall not apply with respect to payments of reasonable compensation made to regularly employed officers or employees of a person.

(c) Disclosure.

(1) The Contractor who requests or receives from an agency a Federal contract shall file with that agency a disclosure form, OMB standard form LLL, Disclosure of Lobbying Activities, if such person has made or has agreed to make any payment using nonappropriated funds (to include profits from any covered Federal action), which would be prohibited under subparagraph (b)(1) of this clause, if paid for with appropriated funds.

(2) The Contractor shall file a disclosure form at the end of each calendar quarter in which there occurs any event that materially affects the accuracy of the information contained in any

disclosure form previously filed by such person under subparagraph (c)(1) of this clause. An event that materially affects the accuracy of the information reported includes--

(i) A cumulative increase of $25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; or

(ii) A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or

(iii) A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.

(3) The Contractor shall require the submittal of a certification, and if required, a disclosure form by any person who requests or receives any subcontract exceeding $100,000 under the Federal contract.

(4) All subcontractor disclosure forms (but not certifications) shall be forwarded from tier to tier until received by the prime Contractor. The prime Contractor shall submit all disclosures to the Contracting Officer at the end of the calendar quarter in which the disclosure form is submitted by the subcontractor. Each subcontractor certification shall be retained in the subcontract file of the awarding Contractor.

(d) Agreement. The Contractor agrees not to make any payment prohibited by this clause.

(e) Penalties.

(1) Any person who makes an expenditure prohibited under paragraph (a) of this clause or who fails to file or amend the disclosure form to be filed or amended by paragraph (b) of this clause shall be subject to civil penalties as provided for by 31 U.S.C. 1352. An imposition of a civil penalty does not prevent the Government from seeking any other remedy that may be applicable.

(2) Contractors may rely without liability on the representation made by their subcontractors in the certification and disclosure form.

(f) Cost allowability. Nothing in this clause makes allowable or reasonable any costs which would otherwise be unallowable or unreasonable. Conversely, costs made specifically unallowable by the requirements in this clause will not be made allowable under any other provision.

(End of clause)

52.204-4 PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER (AUG 2000)

(a) Definitions. As used in this clause--

“Postconsumer material” means a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Postconsumer material is a part of the broader category of “recovered material.” For paper and paper products, postconsumer material means “postconsumer fiber” defined by the U.S. Environmental Protection Agency (EPA) as--

(1) Paper, paperboard, and fibrous materials from retail stores, office buildings, homes, and so forth, after they have passed through their end-usage as a consumer item, including: used corrugated boxes; old newspapers; old magazines; mixed waste paper; tabulating cards; and used cordage; or

(2) All paper, paperboard, and fibrous materials that enter and are collected from municipal solid waste; but not

(3) Fiber derived from printers' over-runs, converters' scrap, and over-issue publications.

“Printed or copied double-sided” means printing or reproducing a document so that information is on both sides of a sheet of paper.

“Recovered material,” for paper and paper products, is defined by EPA in its Comprehensive Procurement Guideline as “recovered fiber” and means the following materials:

(1) Postconsumer fiber; and

(2) Manufacturing wastes such as--

(i) Dry paper and paperboard waste generated after completion of the papermaking process (that is, those manufacturing operations up to and including the cutting and trimming of the paper machine reel into smaller rolls or rough sheets) including: envelope cuttings, bindery trimmings, and other paper and paperboard waste resulting from printing, cutting, forming, and other converting operations; bag, box, and carton manufacturing wastes; and butt rolls, mill wrappers, and rejected unused stock; and

(ii) Repulped finished paper and paperboard from obsolete inventories of paper and paperboard manufacturers, merchants, wholesalers, dealers, printers, converters, or others.

(b) In accordance with Section 101 of Executive Order 13101 of September 14, 1998, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition, the Contractor is encouraged to submit paper documents, such as offers, letters, or reports, that are printed or copied double-sided on recycled paper that meet minimum content standards specified in Section 505 of Executive Order 13101, when not using electronic commerce methods to submit information or data to the Government.

(c) If the Contractor cannot purchase high-speed copier paper, offset paper, forms bond, computer printout paper, carbonless paper, file folders, white wove envelopes, writing and office paper, book paper, cotton fiber paper, and cover stock meeting the 30 percent postconsumer

material standard for use in submitting paper documents to the Government, it should use paper containing no less than 20 percent postconsumer material. This lesser standard should be used only when paper meeting the 30 percent postconsumer material standard is not obtainable at a reasonable price or does not meet reasonable performance standards.

(End of clause)

52.209-6 PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT (JUL 1995)

(a) The Government suspends or debars Contractors to protect the Government's interests. The Contractor shall not enter into any subcontract in excess of the $25,000 with a Contractor that is debarred, suspended, or proposed for debarment unless there is a compelling reason to do so.

(b) The Contractor shall require each proposed first-tier subcontractor, whose subcontract will exceed $25,000, to disclose to the Contractor, in writing, whether as of the time of award of the subcontract, the subcontractor, or its principles, is or is not debarred, suspended, or proposed for debarment by the Federal Government.

(c) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is debarred, suspended, or proposed for debarment (see FAR 9.404 for information on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs). The notice must include the following:

(1) The name of the subcontractor.

(2) The Contractor's knowledge of the reasons for the subcontractor being on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(3) The compelling reason(s) for doing business with the subcontractor notwithstanding its inclusion on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(4) The systems and procedures the Contractor has established to ensure that it is fully protecting the Government's interests when dealing with such subcontractor in view of the specific basis for the party's debarment, suspension, or proposed debarment.

(End of clause)

52.211-6 BRAND NAME OR EQUAL (AUG 1999)

(a) If an item in this solicitation is identified as “brand name or equal,” the purchase description reflects the characteristics and level of quality that will satisfy the Government's needs. The

salient physical, functional, or performance characteristics that “equal” products must meet are specified in the solicitation.

(b) To be considered for award, offers of “equal” products, including “equal” products of the brand name manufacturer, must--

(1) Meet the salient physical, functional, or performance characteristic specified in this solicitation;

(2) Clearly identify the item by--

(i) Brand name, if any; and

(ii) Make or model number;
(3) Include descriptive literature such as illustrations, drawings, or a clear reference to previously furnished descriptive data or information available to the Contracting Officer; and

(4) Clearly describe any modifications the offeror plans to make in a product to make it conform to the solicitation requirements. Mark any descriptive material to clearly show the modifications.

(c) The Contracting Officer will evaluate “equal” products on the basis of information furnished by the offeror or identified in the offer and reasonably available to the Contracting Officer. The Contracting Officer is not responsible for locating or obtaining any information not identified in the offer.

(d) Unless the offeror clearly indicates in its offer that the product being offered is an “equal” product, the offeror shall provide the brand name product referenced in the solicitation.

(End of provision)

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

The Contractor shall be required to (a) commence work under this contract within 5 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 600 calendar days after receipt of the notice to proceed.* The time stated for completion shall include final cleanup of the premises.

*The Contracting Officer shall specify either a number of days after the date the contractor receives the notice to proceed, or a calendar date.

(End of clause)

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount of $1,830.00 for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(End of clause)

52.211-13 TIME EXTENSIONS (SEP 2000)

Time extensions for contract changes will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements related to the changed work and that the remaining contract completion dates for all other portions of the work will not be altered. The change order also may provide an equitable readjustment of liquidated damages under the new completion schedule.

(End of clause)

52.211-18 VARIATION IN ESTIMATED QUANTITY (APR 1984)

If the quantity of a unit-priced item in this contract is an estimated quantity and the actual quantity of the unit-priced item varies more than 15 percent above or below the estimated quantity, an equitable adjustment in the contract price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contractor may request, in writing, an extension of time, to be received by the Contracting Officer within 10 days from the beginning of the delay, or within such further period as may be granted by the Contracting Officer before the date of final settlement of the contract. Upon the receipt of a written request for an extension, the Contracting Officer shall ascertain the facts and make an adjustment for extending the completion date as, in the judgement of the Contracting Officer, is justified.

52.215-2 AUDIT AND RECORDS--NEGOTIATION (JUN 1999)

(a) As used in this clause, "records" includes books, documents, accounting procedures and practices, and other data, regardless of type and regardless of whether such items are in written form, in the form of computer data, or in any other form.

(b) Examination of costs. If this is a cost-reimbursement, incentive, time-and-materials, labor-hour, or price redeterminable contract, or any combination of these, the Contractor shall maintain and the Contracting Officer, or an authorized representative of the Contracting Officer, shall

have the right to examine and audit all records and other evidence sufficient to reflect properly all costs claimed to have been incurred or anticipated to be incurred directly or indirectly in performance of this contract. This right of examination shall include inspection at all reasonable times of the Contractor's plants, or parts of them, engaged in performing the contract.

(c) Cost or pricing data. If the Contractor has been required to submit cost or pricing data in connection with any pricing action relating to this contract, the Contracting Officer, or an authorized representative of the Contracting Officer, in order to evaluate the accuracy, completeness, and currency of the cost or pricing data, shall have the right to examine and audit all of the Contractor's records, including computations and projections, related to--

(1) The proposal for the contract, subcontract, or modification;

(2) The discussions conducted on the proposal(s), including those related to negotiating;

(3) Pricing of the contract, subcontract, or modification; or

(4) Performance of the contract, subcontract or modification.

(d) Comptroller General--(1) The Comptroller General of the United States, or an authorized representative, shall have access to and the right to examine any of the Contractor's directly pertinent records involving transactions related to this contract or a subcontract hereunder.

(2) This paragraph may not be construed to require the Contractor or subcontractor to create or maintain any record that the Contractor or subcontractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e) Reports. If the Contractor is required to furnish cost, funding, or performance reports, the Contracting Officer or an authorized representative of the Contracting Officer shall have the right to examine and audit the supporting records and materials, for the purpose of evaluating (1) the effectiveness of the Contractor's policies and procedures to produce data compatible with the objectives of these reports and (2) the data reported.

(f) Availability. The Contractor shall make available at its office at all reasonable times the records, materials, and other evidence described in paragraphs (a), (b), (c), (d), and (e) of this clause, for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in Subpart 4.7, Contractor Records Retention, of the Federal Acquisition Regulation (FAR), or for any longer period required by statute or by other clauses of this contract. In addition--

(1) If this contract is completely or partially terminated, the Contractor shall make available the records relating to the work terminated until 3 years after any resulting final termination settlement; and

(2) The Contractor shall make available records relating to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to this contract until such

appeals, litigation, or claims are finally resolved.

(g) The Contractor shall insert a clause containing all the terms of this clause, including this paragraph (g), in all subcontracts under this contract that exceed the simplified acquisition threshold, and--

(1) That are cost-reimbursement, incentive, time-and-materials, labor-hour, or price-redeterminable type or any combination of these;

(2) For which cost or pricing data are required; or

(3) That require the subcontractor to furnish reports as discussed in paragraph (e) of this clause.

The clause may be altered only as necessary to identify properly the contracting parties and the Contracting Officer under the Government prime contract.

(End of clause)

52.215-10 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA (OCT 1997)

(a) If any price, including profit or fee, negotiated in connection with this contract, or any cost reimbursable under this contract, was increased by any significant amount because--

(1) The Contractor or a subcontractor furnished cost or pricing data that were not complete, accurate, and current as certified in its Certificate of Current Cost or Pricing Data;

(2) A subcontractor or prospective subcontractor furnished the Contractor cost or pricing data that were not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data; or

(3) Any of these parties furnished data of any description that were not accurate, the price or cost shall be reduced accordingly and the contract shall be modified to reflect the reduction.

(b) Any reduction in the contract price under paragraph (a) of this clause due to defective data from a prospective subcontractor that was not subsequently awarded the subcontract shall be limited to the amount, plus applicable overhead and profit markup, by which--

(1) The actual subcontract; or

(2) The actual cost to the Contractor, if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor; provided, that the actual subcontract price was not itself affected by defective cost or pricing data.

(c)(1) If the Contracting Officer determines under paragraph (a) of this clause that a price or cost reduction should be made, the Contractor agrees not to raise the following matters as a defense:

(i) The Contractor or subcontractor was a sole source supplier or otherwise was in a superior bargaining position and thus the price of the contract would not have been modified even if accurate, complete, and current cost or pricing data had been submitted.

(ii) The Contracting Officer should have known that the cost or pricing data in issue were defective even though the Contractor or subcontractor took no affirmative action to bring the character of the data to the attention of the Contracting Officer.

(iii) The contract was based on an agreement about the total cost of the contract and there was no agreement about the cost of each item procured under the contract.

(iv) The Contractor or subcontractor did not submit a Certificate of Current Cost or Pricing Data.

(2)(i) Except as prohibited by subdivision (c)(2)(ii) of this clause, an offset in an amount determined appropriate by the Contracting Officer based upon the facts shall be allowed against the amount of a contract price reduction if--

(A) The Contractor certifies to the Contracting Officer that, to the best of the Contractor's knowledge and belief, the Contractor is entitled to the offset in the amount requested; and

(B) The Contractor proves that the cost or pricing data were available before the “as of” date specified on its Certificate of Current Cost or Pricing Data, and that the data were not submitted before such date.

(ii) An offset shall not be allowed if--

(A) The understated data were known by the Contractor to be understated before the “as of” date specified on its Certificate of Current Cost or Pricing Data; or

(B) The Government proves that the facts demonstrate that the contract price would not have increased in the amount to be offset even if the available data had been submitted before the “as of” date specified on its Certificate of Current Cost or Pricing Data.

(d) If any reduction in the contract price under this clause reduces the price of items for which payment was made prior to the date of the modification reflecting the price reduction, the Contractor shall be liable to and shall pay the United States at the time such overpayment is repaid--

(1) Simple interest on the amount of such overpayment to be computed from the date(s) of overpayment to the Contractor to the date the Government is repaid by the Contractor at the applicable underpayment rate effective for each quarter prescribed by the Secretary of the Treasury under 26 U.S.C. 6621(a)(2); and

A penalty equal to the amount of the overpayment, if the Contractor or subcontractor knowingly submitted cost or pricing data that were incomplete, inaccurate, or noncurrent.

52.215-11 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA--MODIFICATIONS (OCT 1997)

(a) This clause shall become operative only for any modification to this contract involving a pricing adjustment expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, except that this clause does not apply to any modification if an exception under FAR 15.403-1 applies.

(b) If any price, including profit or fee, negotiated in connection with any modification under this clause, or any cost reimbursable under this contract, was increased by any significant amount because (1) the Contractor or a subcontractor furnished cost or pricing data that were not complete, accurate, and current as certified in its Certificate of Current Cost or Pricing Data, (2) a subcontractor or prospective subcontractor furnished the Contractor cost or pricing data that were not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data, or (3) any of these parties furnished data of any description that were not accurate, the price or cost shall be reduced accordingly and the contract shall be modified to reflect the reduction. This right to a price reduction is limited to that resulting from defects in data relating to modifications for which this clause becomes operative under paragraph (a) of this clause.

(c) Any reduction in the contract price under paragraph (b) of this clause due to defective data from a prospective subcontractor that was not subsequently awarded the subcontract shall be limited to the amount, plus applicable overhead and profit markup, by which--

(1) The actual subcontract; or

(2) The actual cost to the Contractor, if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor; provided, that the actual subcontract price was not itself affected by defective cost or pricing data.

(d)(1) If the Contracting Officer determines under paragraph (b) of this clause that a price or cost reduction should be made, the Contractor agrees not to raise the following matters as a defense:

(i) The Contractor or subcontractor was a sole source supplier or otherwise was in a superior bargaining position and thus the price of the contract would not have been modified even if accurate, complete, and current cost or pricing data had been submitted.

(ii) The Contracting Officer should have known that the cost or pricing data in issue were defective even though the Contractor or subcontractor took no affirmative action to bring the character of the data to the attention of the Contracting Officer.

(iii) The contract was based on an agreement about the total cost of the contract and there was no agreement about the cost of each item procured under the contract.

(iv) The Contractor or subcontractor did not submit a Certificate of Current Cost or Pricing Data.

(2)(i) Except as prohibited by subdivision (d)(2)(ii) of this clause, an offset in an amount determined appropriate by the Contracting Officer based upon the facts shall be allowed against the amount of a contract price reduction if--

(A) The Contractor certifies to the Contracting Officer that, to the best of the Contractor's knowledge and belief, the Contractor is entitled to the offset in the amount requested; and

(B) The Contractor proves that the cost or pricing data were available before the "as of" date specified on its Certificate of Current Cost or Pricing Data, and that the data were not submitted before such date.

(ii) An offset shall not be allowed if--

(A) The understated data were known by the Contractor to be understated before the "as of" date specified on its Certificate of Current Cost or Pricing Data; or

(B) The Government proves that the facts demonstrate that the contract price would not have increased in the amount to be offset even if the available data had been submitted before the "as of" date specified on its Certificate of Current Cost or Pricing Data.

(e) If any reduction in the contract price under this clause reduces the price of items for which payment was made prior to the date of the modification reflecting the price reduction, the Contractor shall be liable to and shall pay the United States at the time such overpayment is repaid--

(1) Simple interest on the amount of such overpayment to be computed from the date(s) of overpayment to the Contractor to the date the Government is repaid by the Contractor at the applicable underpayment rate effective for each quarter prescribed by the Secretary of the Treasury under 26 U.S.C. 6621(a)(2); and

A penalty equal to the amount of the overpayment, if the Contractor or subcontractor knowingly submitted cost or pricing data that were incomplete, inaccurate, or noncurrent.

52.215-12 SUBCONTRACTOR COST OR PRICING DATA (OCT 1997)

(a) Before awarding any subcontract expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, on the date of agreement on price or the date of award, whichever is later; or before pricing any subcontract modification involving a pricing adjustment expected

to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, the Contractor shall require the subcontractor to submit cost or pricing data (actually or by specific identification in writing), unless an exception under FAR 15.403-1 applies.

(b) The Contractor shall require the subcontractor to certify in substantially the form prescribed in FAR 15.406-2 that, to the best of its knowledge and belief, the data submitted under paragraph (a) of this clause were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

(c) In each subcontract that exceeds the threshold for submission of cost or pricing data at FAR 15.403-4, when entered into, the Contractor shall insert either--

(1) The substance of this clause, including this paragraph (c), if paragraph (a) of this clause requires submission of cost or pricing data for the subcontract; or

(2) The substance of the clause at FAR 52.215-13, Subcontractor Cost or Pricing Data--Modifications.

52.215-13 SUBCONTRACTOR COST OR PRICING DATA--MODIFICATIONS (OCT 1997)

(a) The requirements of paragraphs (b) and (c) of this clause shall--

(1) Become operative only for any modification to this contract involving a pricing adjustment expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4; and

(2) Be limited to such modifications.

(b) Before awarding any subcontract expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, on the date of agreement on price or the date of award, whichever is later; or before pricing any subcontract modification involving a pricing adjustment expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4, the Contractor shall require the subcontractor to submit cost or pricing data (actually or by specific identification in writing), unless an exception under FAR 15.403-1 applies.

(c) The Contractor shall require the subcontractor to certify in substantially the form prescribed in FAR 15.406-2 that, to the best of its knowledge and belief, the data submitted under paragraph (b) of this clause were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

The Contractor shall insert the substance of this clause, including this paragraph (d), in each subcontract that exceeds the threshold for submission of cost or pricing data at FAR 15.403-4 on the date of agreement on price or the date of award, whichever is later.

52.215-15 PENSION ADJUSTMENTS AND ASSET REVERSIONS (DEC 1998)

(a) The Contractor shall promptly notify the Contracting Officer in writing when it determines that it will terminate a defined-benefit pension plan or otherwise recapture such pension fund assets.

(b) For segment closings, pension plan terminations, or curtailment of benefits, the adjustment amount shall be the amount measured, assigned, and allocated in accordance with 48 CFR 9904.413-50(c)(12) for contracts and subcontracts that are subject to Cost Accounting Standards (CAS) Board rules and regulations (48 CFR Chapter 99). For contracts and subcontracts that are not subject to CAS, the adjustment amount shall be the amount measured, assigned, and allocated in accordance with 48 CFR 9904.413-50(c)(12), except the numerator of the fraction at 48 CFR 9904.413-50(c)(12)(vi) shall be the sum of the pension plan costs allocated to all non-CAS-covered contracts and subcontracts that are subject to Federal Acquisition Regulation (FAR) Subpart 31.2 or for which cost or pricing data were submitted.

(c) For all other situations where assets revert to the Contractor, or such assets are constructively received by it for any reason, the Contractor shall, at the Government's option, make a refund or give a credit to the Government for its equitable share of the gross amount withdrawn. The Government's equitable share shall reflect the Government's participation in pension costs through those contracts for which cost or pricing data were submitted or that are subject to FAR Subpart 31.2.

(d) The Contractor shall include the substance of this clause in all subcontracts under this contract that meet the applicability requirement of FAR 15.408(g).

(End of clause)

52.215-17 WAIVER OF FACILITIES CAPITAL COST OF MONEY (OCT 1997)

The Contractor did not include facilities capital cost of money as a proposed cost of this contract. Therefore, it is an unallowable cost under this contract.

52.215-18 REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS (PRB) OTHER THAN PENSIONS (OCT 1997)

The Contractor shall promptly notify the Contracting Officer in writing when it determines that it will terminate or reduce a PRB plan. If PRB fund assets revert, or inure, to the Contractor or are constructively received by it under a plan termination or otherwise, the Contractor shall make a refund or give a credit to the Government for its equitable share as required by FAR 31.205-

6(o)(6). The Contractor shall include the substance of this clause in all subcontracts under this contract that meet the applicability requirements of FAR 15.408(j).

(End of clause)

52.215-19 NOTIFICATION OF OWNERSHIP CHANGES (OCT 1997)

(a) The Contractor shall make the following notifications in writing:

(1) When the Contractor becomes aware that a change in its ownership has occurred, or is certain to occur, that could result in changes in the valuation of its capitalized assets in the accounting records, the Contractor shall notify the Administrative Contracting Officer (ACO) within 30 days.

(2) The Contractor shall also notify the ACO within 30 days whenever changes to asset valuations or any other cost changes have occurred or are certain to occur as a result of a change in ownership.

(b) The Contractor shall--

(1) Maintain current, accurate, and complete inventory records of assets and their costs;

(2) Provide the ACO or designated representative ready access to the records upon request;

(3) Ensure that all individual and grouped assets, their capitalized values, accumulated depreciation or amortization, and remaining useful lives are identified accurately before and after each of the Contractor's ownership changes; and

(4) Retain and continue to maintain depreciation and amortization schedules based on the asset records maintained before each Contractor ownership change.

The Contractor shall include the substance of this clause in all subcontracts under this contract that meet the applicability requirement of FAR 15.408(k).

(End of clause)

52.215-21 REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA--MODIFICATIONS (OCT 1997)

(a) Exceptions from cost or pricing data. (1) In lieu of submitting cost or pricing data for modifications under this contract, for price adjustments expected to exceed the threshold set forth at FAR 15.403-4 on the date of the agreement on price or the date of the award, whichever is later, the Contractor may submit a written request for exception by submitting the information described in the following subparagraphs. The Contracting Officer may require additional supporting information, but only to the extent necessary to determine whether an exception should be granted, and whether the price is fair and reasonable--

(i) Identification of the law or regulation establishing the price offered. If the price is controlled under law by periodic rulings, reviews, or similar actions of a governmental body, attach a copy of the controlling document, unless it was previously submitted to the contracting office.

(ii) Information on modifications of contracts or subcontracts for commercial items. (A) If--

(1) The original contract or subcontract was granted an exception from cost or pricing data requirements because the price agreed upon was based on adequate price competition or prices set by law or regulation, or was a contract or subcontract for the acquisition of a commercial item; and

(2) The modification (to the contract or subcontract) is not exempted based on one of these exceptions, then the Contractor may provide information to establish that the modification would not change the contract or subcontract from a contract or subcontract for the acquisition of a commercial item to a contract or subcontract for the acquisition of an item other than a commercial item.

(B) For a commercial item exception, the Contractor shall provide, at a minimum, information on prices at which the same item or similar items have previously been sold that is adequate for evaluating the reasonableness of the price of the modification. Such information may include--

(1) For catalog items, a copy of or identification of the catalog and its date, or the appropriate pages for the offered items, or a statement that the catalog is on file in the buying office to which the proposal is being submitted. Provide a copy or describe current discount policies and price lists (published or unpublished), e.g., wholesale, original equipment manufacturer, or reseller. Also explain the basis of each offered price and its relationship to the established catalog price, including how the proposed price relates to the price of recent sales in quantities similar to the proposed quantities.

(2) For market-priced items, the source and date or period of the market quotation or other basis for market price, the base amount, and applicable discounts. In addition, describe the nature of the market.

(3) For items included on an active Federal Supply Service Multiple Award Schedule contract, proof that an exception has been granted for the schedule item.

(2) The Contractor grants the Contracting Officer or an authorized representative the right to examine, at any time before award, books, records, documents, or other directly pertinent records to verify any request for an exception under this clause, and the reasonableness of price. For items priced using catalog or market prices, or law or regulation , access does not extend to cost or profit information or other data relevant solely to the Contractor's determination of the prices to be offered in the catalog or marketplace.

(b) Requirements for cost or pricing data. If the Contractor is not granted an exception from the requirement to submit cost or pricing data, the following applies:

(1) The Contractor shall submit cost or pricing data and supporting attachments in accordance with Table 15-2 of FAR 15.408.

As soon as practicable after agreement on price, but before award (except for unpriced actions), the Contractor shall submit a Certificate of Current Cost or Pricing Data, as prescribed by FAR 15.406-2.

52.217-7 OPTION FOR INCREASED QUANTITY--SEPARATELY PRICED LINE ITEM (MAR 1989)

The Government may require the delivery of the numbered line item, identified in the Schedule as an option item, in the quantity and at the price stated in the Schedule. The Contracting Officer may exercise the option by written notice to the Contractor within _____. Delivery of added items shall continue at the same rate that like items are called for under the contract, unless the parties otherwise agree.

(End of clause)

52.219-4 NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (JAN 1999)

(a) Definition. HUBZone small business concern, as used in this clause, means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

(b) Evaluation preference. (1) Offers will be evaluated by adding a factor of 10 percent to the price of all offers, except--

(i) Offers from HUBZone small business concerns that have not waived the evaluation preference;

(ii) Otherwise successful offers from small business concerns;

(iii) Otherwise successful offers of eligible products under the Trade Agreements Act when the dollar threshold for application of the Act is exceeded (see 25.402 of the Federal Acquisition Regulation (FAR)); and

(iv) Otherwise successful offers where application of the factor would be inconsistent with a Memorandum of Understanding or other international agreement with a foreign government.

(2) The factor of 10 percent shall be applied on a line item basis or to any group of items on which award may be made. Other evaluation factors described in the solicitation shall be applied before application of the factor.

(3) A concern that is both a HUBZone small business concern and a small disadvantaged business concern will receive the benefit of both the HUBZone small business price evaluation preference and the small disadvantaged business price evaluation adjustment (see FAR clause 52.219-23). Each applicable price evaluation preference or adjustment shall be calculated independently against an offeror's base offer.

These individual preference amounts shall be added together to arrive at the total evaluated price for that offer.

(c) Waiver of evaluation preference. A HUBZone small business concern may elect to waive the evaluation preference, in which case the factor will be added to its offer for evaluation purposes. The agreements in paragraph (d) of this clause do not apply if the offeror has waived the evaluation preference.

___ Offeror elects to waive the evaluation preference.

(d) Agreement. A HUBZone small business concern agrees that in the performance of the contract, in the case of a contract for

(1) Services (except construction), at least 50 percent of the cost of personnel for contract performance will be spent for employees of the concern or employees of other HUBZone small business concerns;

(2) Supplies (other than procurement from a nonmanufacturer of such supplies), at least 50 percent of the cost of manufacturing, excluding the cost of materials, will be performed by the concern or other HUBZone small business concerns;

(3) General construction, at least 15 percent of the cost of the contract performance incurred for personnel will be will be spent on the concern's employees or the employees of other HUBZone small business concerns; or

(4) Construction by special trade contractors, at least 25 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns.

(e) A HUBZone joint venture agrees that in the performance of the contract, the applicable percentage specified in paragraph (d) of this clause will be performed by the HUBZone small business participant or participants.

(f) A HUBZone small business concern nonmanufacturer agrees to furnish in performing this contract only end items manufactured or produced by HUBZone small business manufacturer concerns. This paragraph does not apply in connection with construction or service contracts.

(End of clause)

52.219-8 UTILIZATION OF SMALL BUSINESS CONCERNS (OCT 2000)

(a) It is the policy of the United States that small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns shall have the maximum practicable opportunity to participate in performing contracts let by any Federal agency, including contracts and subcontracts for subsystems, assemblies, components, and related services for major systems. It is further the policy of the United States that its prime contractors establish procedures to ensure the timely payment of amounts due pursuant to the terms of their subcontracts with small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns.

(b) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with efficient contract performance. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the United States Small Business Administration or the awarding agency of the United States as may be necessary to determine the extent of the Contractor's compliance with this clause.

Definitions. As used in this contract--

HUBZone small business concern means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

Small business concern means a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

Small disadvantaged business concern means a small business concern that represents, as part of its offer that--

(1) It has received certification as a small disadvantaged business concern consistent with 13 CFR part 124, subpart B;

(2) No material change in disadvantaged ownership and control has occurred since its certification;

(3) Where the concern is owned by one or more individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(4) It is identified, on the date of its representation, as a certified small disadvantaged business in the database maintained by the Small Business Administration (PRO-Net).

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern--

(1) That is at least 51 percent owned by one or more women, or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as a small business concern, a veteran-owned small business concern, a service-disabled veteran-owned small business concern, a HUBZone small business concern, a small disadvantaged business concern, or a women-owned small business concern.

(End of clause)

52.219-9 SMALL BUSINESS SUBCONTRACTING PLAN (OCT 2001)

(a) This clause does not apply to small business concerns.

(b) Definitions. As used in this clause--

Commercial item means a product or service that satisfies the definition of commercial item in section 2.101 of the Federal Acquisition Regulation.

Commercial plan means a subcontracting plan (including goals) that covers the offeror's fiscal year and that applies to the entire production of commercial items sold by either the entire company or a portion thereof (e.g., division, plant, or product line).

Individual contract plan means a subcontracting plan that covers the entire contract period (including option periods), applies to a specific contract, and has goals that are based on the offeror's planned subcontracting in support of the specific contract, except that indirect costs incurred for common or joint purposes may be allocated on a prorated basis to the contract.

Master plan means a subcontracting plan that contains all the required elements of an individual contract plan, except goals, and may be incorporated into individual contract plans, provided the master plan has been approved.

Subcontract means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for performance of the contract or subcontract.

(c) The offeror, upon request by the Contracting Officer, shall submit and negotiate a subcontracting plan, where applicable, that separately addresses subcontracting with small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business concerns, small disadvantaged business, and women-owned small business concerns. If the offeror is submitting an individual contract plan, the plan must separately address subcontracting with small business, veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns, with a separate part for the basic contract and separate parts for each option (if any). The plan shall be included in and made a part of the resultant contract. The subcontracting plan shall be negotiated within the time specified by the Contracting Officer. Failure to submit and negotiate the subcontracting plan shall make the offeror ineligible for award of a contract.

(d) The offeror's subcontracting plan shall include the following:

(1) Goals, expressed in terms of percentages of total planned subcontracting dollars, for the use of small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns as subcontractors. Service-disabled veteran-owned small business concerns meet the definition of veteran-owned small business concerns, and offerors may include them within the subcontracting plan goal for veteran-owned small business concerns. A separate goal for service-disabled veteran-owned small business concerns is not required. The offeror shall include all subcontracts that contribute to contract performance, and may include a proportionate share of products and services that are normally allocated as indirect costs.

(2) A statement of--

(i) Total dollars planned to be subcontracted for an individual contract plan; or the offeror's total projected sales, expressed in dollars, and the total value of projected subcontracts to support the sales for a commercial plan;

(ii) Total dollars planned to be subcontracted to small business concerns;

(iii) Total dollars planned to be subcontracted to veteran-owned small business concerns;

(iv) Total dollars planned to be subcontracted to HUBZone small business concerns;

(v) Total dollars planned to be subcontracted to small disadvantaged business concerns; and

(vi) Total dollars planned to be subcontracted to women-owned small business concerns.

(3) A description of the principal types of supplies and services to be subcontracted, and an identification of the types planned for subcontracting to--

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(4) A description of the method used to develop the subcontracting goals in paragraph (d)(1) of this clause.

(5) A description of the method used to identify potential sources for solicitation purposes (e.g., existing company source lists, the Procurement Marketing and Access Network (PRO-Net) of the Small Business Administration (SBA), veterans service organizations, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or small, HUBZone, small disadvantaged, and women-owned small business trade associations). A firm may rely on the information contained in PRO-Net as an accurate representation of a concern's size and ownership characteristics for the purposes of maintaining a small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned small business source list. Use of PRO-Net as its source list does not relieve a firm of its responsibilities (e.g., outreach, assistance, counseling, or publicizing subcontracting opportunities) in this clause.

(6) A statement as to whether or not the offeror in included indirect costs in establishing subcontracting goals, and a description of the method used to determine the proportionate share of indirect costs to be incurred with—

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(7) The name of the individual employed by the offeror who will administer the offeror's subcontracting program, and a description of the duties of the individual.

(8) A description of the efforts the offeror will make to assure that small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business and women-owned small business concerns have an equitable opportunity to compete for subcontracts.

(9) Assurances that the offeror will include the clause of this contract entitled ``Utilization of Small Business Concerns'' in all subcontracts that offer further subcontracting opportunities, and that the offeror will require all subcontractors (except small business concerns) that receive subcontracts in excess of $500,000 ($1,000,000 for construction of any public facility) to adopt a subcontracting plan that complies with the requirements of this clause.

(10) Assurances that the offeror will--

(i) Cooperate in any studies or surveys as may be required;

(ii) Submit periodic reports so that the Government can determine the extent of compliance by the offeror with the subcontracting plan;

(iii) Submit Standard Form (SF) 294, Subcontracting Report for Individual Contracts, and/or SF 295, Summary Subcontract Report, in accordance with paragraph (j) of this clause. The reports shall provide information on subcontract awards to small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, small disadvantaged business concerns, women-owned small business concerns, and Historically Black Colleges and Universities and Minority Institutions. Reporting shall be in accordance with the instructions on the forms or as provided in agency regulations.

(iv) Ensure that its subcontractors agree to submit SF 294 and SF 295.

(11) A description of the types of records that will be maintained concerning procedures that have been adopted to comply with the requirements and goals in the plan, including establishing source lists; and a description of the offeror's efforts to locate small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns and award subcontracts to

them. The records shall include at least the following (on a plant-wide or company-wide basis, unless otherwise indicated)

(i) Source lists (e.g., PRO-Net), guides, and other data that identify small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns.

(ii) Organizations contacted in an attempt to locate sources that are small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, or women-owned small business concerns.

(iii) Records on each subcontract solicitation resulting in an award of more than $100,000, indicating--

(A) Whether small business concerns were solicited and, if not, why not;

(B) Whether veteran-owned small business concerns were solicited and, if not, why not;

(C) Whether HUBZone small business concerns were solicited and, if not, why not;

(D) Whether small disadvantaged business concerns were solicited and, if not, why not;

(E) Whether women-owned small business concerns were solicited and, if not, why not; and

(F) If applicable, the reason award was not made to a small business concern.

(iv) Records of any outreach efforts to contact--

(A) Trade associations;

(B) Business development organizations;

(C) Conferences and trade fairs to locate small, HUBZone small, small disadvantaged, and women-owned small business sources; and

(D) Veterans service organizations.

(v) Records of internal guidance and encouragement provided to buyers through--

(A) Workshops, seminars, training, etc.; and

(B) Monitoring performance to evaluate compliance with the program's requirements.

(vi) On a contract-by-contract basis, records to support award data submitted by the offeror to the Government, including the name, address, and business size of each subcontractor. Contractors having commercial plans need not comply with this requirement.

(e) In order to effectively implement this plan to the extent consistent with efficient contract performance, the Contractor shall perform the following functions:

(1) Assist small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation by such concerns. Where the Contractor's lists of potential small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business subcontractors are excessively long, reasonable effort shall be made to give all such small business concerns an opportunity to compete over a period of time.

(2) Provide adequate and timely consideration of the potentialities of small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns in all ``make-or-buy'' decisions.

(3) Counsel and discuss subcontracting opportunities with representatives of small business, veteran-owner small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business firms.

(4) Provide notice to subcontractors concerning penalties and remedies for misrepresentations of business status as small, veteran-owner small business, HUBZone small, small disadvantaged, or women-owned small business for the purpose of obtaining a subcontract that is to be included as part or all of a goal contained in the Contractor's subcontracting plan.

(f) A master plan on a plant or division-wide basis that contains all the elements required by paragraph (d) of this clause, except goals, may be incorporated by reference as a part of the subcontracting plan required of the offeror by this clause; provided--

(1) the master plan has been approved, (2) the offeror ensures that the master plan is updated as necessary and provides copies of the approved master plan, including evidence of its approval, to the Contracting Officer, and (3) goals and any deviations from the master plan deemed necessary by the Contracting Officer to satisfy the requirements of this contract are set forth in the individual subcontracting plan.

(g) A commercial plan is the preferred type of subcontracting plan for contractors furnishing commercial items. The commercial plan shall relate to the offeror's planned subcontracting generally, for both commercial and Government business, rather than solely to the Government contract. Commercial plans are also preferred for subcontractors that provide commercial items under a prime contract, whether or not the prime contractor is supplying a commercial item.

(h) Prior compliance of the offeror with other such subcontracting plans under previous contracts will be considered by the Contracting Officer in determining the responsibility of the offeror for award of the contract.

(i) The failure of the Contractor or subcontractor to comply in good faith with (1) the clause of this contract entitled "Utilization Of Small Business Concerns," or (2) an approved plan required by this clause, shall be a material breach of the contract.

(j) The Contractor shall submit the following reports:

(1) Standard Form 294, Subcontracting Report for Individual Contracts. This report shall be submitted to the Contracting Officer semiannually and at contract completion. The report covers subcontract award data related to this contract. This report is not required for commercial plans.

(2) Standard Form 295, Summary Subcontract Report. This report encompasses all of the contracts with the awarding agency. It must be submitted semi-annually for contracts with the Department of Defense and annually for contracts with civilian agencies. If the reporting activity is covered by a commercial plan, the reporting activity must report annually all subcontract awards under that plan. All reports submitted at the close of each fiscal year (both individual and commercial plans) shall include a breakout, in the Contractor's format, of subcontract awards, in whole dollars, to small disadvantaged business concerns by North American Industry Classification System (NAICS) Industry Subsector. For a commercial plan, the Contractor may obtain from each of its subcontractors a predominant NAICS Industry Subsector and report all awards to that subcontractor under its predominant NAICS Industry Subsector.

(End of clause)

52.219-16 LIQUIDATED DAMAGES-SUBCONTRACTING PLAN (JAN 1999)

(a) Failure to make a good faith effort to comply with the subcontracting plan, as used in this clause, means a willful or intentional failure to perform in accordance with the requirements of the subcontracting plan approved under the clause in this contract entitled "Small Business Subcontracting Plan," or willful or intentional action to frustrate the plan.

(b) Performance shall be measured by applying the percentage goals to the total actual subcontracting dollars or, if a commercial plan is involved, to the pro rata share of actual subcontracting dollars attributable to Government contracts covered by the commercial plan. If, at contract completion or, in the case of a commercial plan, at the close of the fiscal year for which the plan is applicable, the Contractor has failed to meet its subcontracting goals and the Contracting Officer decides in accordance with paragraph (c) of this clause that the Contractor failed to make a good faith effort to comply with its subcontracting plan, established in accordance with the clause in this contract entitled “Small Business Subcontracting Plan,” the Contractor shall pay the Government liquidated damages in an amount stated. The amount of probable damages attributable to the Contractor's failure to comply shall be an amount equal to the actual dollar amount by which the Contractor failed to achieve each subcontract goal.

(c) Before the Contracting Officer makes a final decision that the Contractor has failed to make such good faith effort, the Contracting Officer shall give the Contractor written notice specifying the failure and permitting the Contractor to demonstrate what good faith efforts have been made

and to discuss the matter. Failure to respond to the notice may be taken as an admission that no valid explanation exists. If, after consideration of all the pertinent data, the Contracting Officer finds that the Contractor failed to make a good faith effort to comply with the subcontracting plan, the Contracting Officer shall issue a final decision to that effect and require that the Contractor pay the Government liquidated damages as provided in paragraph (b) of this clause.

(d) With respect to commercial plans, the Contracting Officer who approved the plan will perform the functions of the Contracting Officer under this clause on behalf of all agencies with contracts covered by the commercial plan.

(e) The Contractor shall have the right of appeal, under the clause in this contract entitled Disputes, from any final decision of the Contracting Officer.

(f) Liquidated damages shall be in addition to any other remedies that the Government may have.

(End of clause)

52.219-25 SMALL DISADVANTAGED BUSINESS PARTICIPATION PROGRAM—DISADVANTAGED STATUS AND REPORTING (OCT 1999)

(a) Disadvantaged status for joint venture partners, team members, and subcontractors. This clause addresses disadvantaged status for joint venture partners, teaming arrangement members, and subcontractors and is applicable if this contract contains small disadvantaged business (SDB) participation targets. The Contractor shall obtain representations of small disadvantaged status from joint venture partners, teaming arrangement members, and subcontractors through use of a provision substantially the same as paragraph (b)(1)(i) of the provision at FAR 52.219-22, Small Disadvantaged Business Status. The Contractor shall confirm that a joint venture partner, team member, or subcontractor representing itself as a small disadvantaged business concern, is identified as a certified small disadvantaged business in the database maintained by the Small Business Administration (PRO-Net) or by contacting the SBA's Office of Small Disadvantaged Business Certification and Eligibility.

(b) Reporting requirement. If this contract contains SDB participation targets, the Contractor shall report on the participation of SDB concerns at contract completion, or as otherwise provided in this contract. Reporting may be on Optional Form 312, Small Disadvantaged Business Participation Report, or in the Contractor's own format providing the same information. This report is required for each contract containing SDB participation targets. If this contract contains an individual Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, reports may be submitted with the final Subcontracting Report for Individual Contracts (Standard Form 294) at the completion of the contract.

(End of clause)

52.222-1 NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (FEB 1997)

If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens

to delay the timely performance of this contract, the Contractor shall immediately give notice, including all relevant information, to the Contracting Officer.

52.222-3 CONVICT LABOR (AUG 1996)

The Contractor agrees not to employ in the performance of this contract any person undergoing a sentence of imprisonment which has been imposed by any court of a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or the Trust Territory of the Pacific Islands. This limitation, however, shall not prohibit the employment by the Contractor in the performance of this contract of persons on parole or probation to work at paid employment during the term of their sentence or persons who have been pardoned or who have served their terms. Nor shall it prohibit the employment by the Contractor in the performance of this contract of persons confined for violation of the laws of any of the States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or the Trust Territory of the Pacific Islands who are authorized to work at paid employment in the community under the laws of such jurisdiction, if--

(a)(1) The worker is paid or is in an approved work training program on a voluntary basis;

(2) Representatives of local union central bodies or similar labor union organizations have been consulted;

(3) Such paid employment will not result in the displacement of employed workers, or be applied in skills, crafts, or trades in which there is a surplus of available gainful labor in the locality, or impair existing contracts for services; and

(4) The rates of pay and other conditions of employment will not be less than those paid or provided for work of a similar nature in the locality in which the work is being performed; and

(b) The Attorney General of the United States has certified that the work-release laws or regulations of the jurisdiction involved are in conformity with the requirements of Executive Order 11755, as amended by Executive Orders 12608 and 12943.

(End of clause)

52.222-4 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - OVERTIME COMPENSATION. (SEP 2000)

(a) Overtime requirements. No Contractor or subcontractor employing laborers or mechanics (see Federal Acquisition Regulation 22.300) shall require or permit them to work over 40 hours in any workweek unless they are paid at least 1 and 1/2 times the basic rate of pay for each hour worked over 40 hours.

(b) Violation; liability for unpaid wages; liquidated damages. The responsible Contractor and subcontractor are liable for unpaid wages if they violate the terms in paragraph (a) of this clause. In addition, the Contractor and subcontractor are liable for liquidated damages payable to the Government. The Contracting Officer will assess liquidated damages at the rate of $10 per affected employee for each calendar day on which the employer required or permitted the employee to work in excess of the standard workweek of 40 hours without paying overtime wages required by the Contract Work Hours and Safety Standards Act.

(c) Withholding for unpaid wages and liquidated damages. The Contracting Officer will withhold from payments due under the contract sufficient funds required to satisfy any Contractor or subcontractor liabilities for unpaid wages and liquidated damages. If amounts withheld under the contract are insufficient to satisfy Contractor or subcontractor liabilities, the Contracting Officer will withhold payments from other Federal or Federally assisted contracts held by the same Contractor that are subject to the Contract Work Hours and Safety Standards Act.

(d) Payrolls and basic records.

(1) The Contractor and its subcontractors shall maintain payrolls and basic payroll records for all laborers and mechanics working on the contract during the contract and shall make them available to the Government until 3 years after contract completion. The records shall contain the name and address of each employee, social security number, labor classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records need not duplicate those required for construction work by Department of Labor regulations at 29 CFR 5.5(a)(3) implementing the Davis-Bacon Act.

(2) The Contractor and its subcontractors shall allow authorized representatives of the Contracting Officer or the Department of Labor to inspect, copy, or transcribe records maintained under paragraph (d)(1) of this clause. The Contractor or subcontractor also shall allow authorized representatives of the Contracting Officer or Department of Labor to interview employees in the workplace during working hours.

(e) Subcontracts. The Contractor shall insert the provisions set forth in paragraphs (a) through (d) of this clause in subcontracts exceeding $100,000 and require subcontractors to include these provisions in any lower tier subcontracts. The Contractor shall be responsible for compliance by any subcontractor or lower-tier subcontractor with the provisions set forth in paragraphs (a) through (d) of this clause.

(End of clause)

52.222-6 DAVIS-BACON ACT (FEB 1995)

(a) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona

fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (d) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period. Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (b) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(b)(1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii) The classification is utilized in the area by the construction industry.

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or

their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (b)(2) and (b)(3) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(c) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(d) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

52.222-7 WITHHOLDING OF FUNDS (FEB 1988)

The Contracting Officer shall, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other Federally assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

52.222-8 PAYROLLS AND BASIC RECORDS (FEB 1988)

(a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics

working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under paragraph (d) of the clause entitled Davis-Bacon Act, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b)(1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. The Prime Contractor is responsible for the submission of copies of payrolls by all subcontractors.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify--

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR Part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (b)(2) of this clause.

(4) The falsification of any of the certifications in this clause may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(c) The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit the Contracting Officer or representatives of the Contracting Officer or the Department of Labor to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

52.222-9 APPRENTICES AND TRAINEES (FEB 1988)

(a) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in this paragraph, shall be paid not less than the applicable wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or

a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(b) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

52.222-10 COMPLIANCE WITH COPELAND ACT REQUIREMENTS (FEB 1988)

The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.

52.222-11 SUBCONTRACTS (LABOR STANDARDS (FEB 1988)

(a) The Contractor or subcontractor shall insert in any subcontracts the clauses entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act-Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Withholding of Funds, Subcontracts (Labor Standards), Contract Termination-

Debarment, Disputes Concerning Labor Standards, Compliance with Davis-Bacon and Related Act Regulations, and Certification of Eligibility, and such other clauses as the Contracting Officer may, by appropriate instructions, require, and also a clause requiring subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses cited in this paragraph.

(b)(1) Within 14 days after award of the contract, the Contractor shall deliver to the Contracting Officer a completed Statement and Acknowledgment Form (SF 1413) for each subcontract, including the subcontractor's signed and dated acknowledgment that the clauses set forth in paragraph (a) of this clause have been included in the subcontract.

(2) Within 14 days after the award of any subsequently awarded subcontract the Contractor shall deliver to the Contracting Officer an updated completed SF 1413 for such additional subcontract.

52.222-12 CONTRACT TERMINATION--DEBARMENT (FEB 1988)

A breach of the contract clauses entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act--Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Subcontracts (Labor Standards), Compliance with Davis-Bacon and Related Act Regulations, or Certification of Eligibility may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 CFR 5.12.

52.222-13 COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS (FEB 1988)

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are hereby incorporated by reference in this contract.

52.222-14 DISPUTES CONCERNING LABOR STANDARDS (FEB 1988)

The United States Department of Labor has set forth in 29 CFR Parts 5, 6, and 7 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

52.222-15 CERTIFICATION OF ELIGIBILITY (FEB 1988)

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any

person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

52.222-21 PROHIBITION OF SEGREGATED FACILITIES (FEB 1999)

(a) Segregated facilities, as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(b) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in this contract.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

(End of clause)

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade

17.3%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is Philadelphia, PA; Gloucester and Camden Counties, NJ (SMSA 6160), Philadelphia, PA-NJ).

52.222-26 EQUAL OPPORTUNITY (FEB 1999)

(a) If, during any 12-month period (including the 12 months preceding the award of this

contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of $10,000, the Contractor shall comply with subparagraphs (b)(1) through (11) of this clause. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(b) During performing this contract, the Contractor agrees as follows:

(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. However, it shall not be a violation of this clause for the Contractor to extend a publicly announced preference in employment to Indians living on or near an Indian reservation, in connection with employment opportunities on or near an Indian reservation, as permitted by 41 CFR 60-1.5.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. The Contractor shall also file Standard Form 100 (EEO-1), or any successor form, as prescribed in 41 CFR part 60-1. Unless the Contractor has filed within the 12 months preceding the date of contract award, the Contractor shall, within 30 days after contract award, apply to either the regional Office of Federal Contract Compliance Programs (OFCCP) or the local office of the Equal Employment Opportunity Commission for the necessary forms.

(8) The Contractor shall permit access to its premises, during normal business hours, by the contracting agency or the OFCCP for the purpose of conducting on-site compliance evaluations

and complaint investigations. The Contractor shall permit the Government to inspect and copy any books, accounts, records (including computerized records), and other material that may be relevant to the matter under investigation and pertinent to compliance with Executive Order 11246, as amended, and rules and regulations that implement the Executive Order.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended; in the rules, regulations, and orders of the Secretary of Labor; or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of subparagraphs (b)(1) through (11) of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting officer may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

(End of clause)
52.222-26 EQUAL OPPORTUNITY (FEB 1999) ALTERNATE I (FEB 1999)

Notice. The following terms of this clause are waived for this contract: Contracting Officer shall list terms .

(a) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of $10,000, the Contractor shall comply with subparagraphs (b)(1) through (11) of this clause. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(b) During performing this contract, the Contractor agrees as follows:

(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. However, it shall not be a violation of this clause for the Contractor to extend a publicly announced preference in employment to Indians living on or near an Indian reservation, in connection with employment opportunities on or near

an Indian reservation, as permitted by 41 CFR 60-1.5.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. The Contractor shall also file Standard Form 100 (EEO-1), or any successor form, as prescribed in 41 CFR part 60-1. Unless the Contractor has filed within the 12 months preceding the date of contract award, the Contractor shall, within 30 days after contract award, apply to either the regional Office of Federal Contract Compliance Programs (OFCCP) or the local office of the Equal Employment Opportunity Commission for the necessary forms.

(8) The Contractor shall permit access to its premises, during normal business hours, by the contracting agency or the OFCCP for the purpose of conducting on-site compliance evaluations and complaint investigations. The Contractor shall permit the Government to inspect and copy any books, accounts, records (including computerized records), and other material that may be relevant to the matter under investigation and pertinent to compliance with Executive Order 11246, as amended, and rules and regulations that implement the Executive Order.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended; in the rules, regulations, and orders of the Secretary of

Labor; or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of subparagraphs (b)(1) through (11) of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting officer may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

(End of clause)

52.222-27 AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (FEB 1999)

(a) Definitions. "Covered area," as used in this clause, means the geographical area described in the solicitation for this contract.

"Deputy Assistant Secretary," as used in this clause, means Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, or a designee.

"Employer's identification number," as used in this clause, means the Federal Social Security number used on the employer's quarterly federal tax return, U.S. Treasury Department Form 941.

"Minority," as used in this clause, means--

(1) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

(2) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands);

(3) Black (all persons having origins in any of the black African racial groups not of Hispanic origin); and

(4) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race).

(b) If the Contractor, or a subcontractor at any tier, subcontracts a portion of the work involving

any construction trade, each such subcontract in excess of $10,000 shall include this clause and the Notice containing the goals for minority and female participation stated in the solicitation for this contract.

(c) If the Contractor is participating in a Hometown Plan (41 CFR 60-4) approved by the U.S. Department of Labor in a covered area, either individually or through an association, its affirmative action obligations on all work in the plan area (including goals) shall comply with the plan for those trades that have unions participating in the plan. Contractors must be able to demonstrate participation in, and compliance with, the provisions of the plan. Each Contractor or subcontractor participating in an approved plan is also required to comply with its obligations under the Equal Opportunity clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good-faith performance by other Contractors or subcontractors toward a goal in an approved plan does not excuse any Contractor's or subcontractor's failure to make good-faith efforts to achieve the plan's goals.

(d) The Contractor shall implement the affirmative action procedures in subparagraphs (g)(1) through (16) of this clause. The goals stated in the solicitation for this contract are expressed as percentages of the total hours of employment and training of minority and female utilization that the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where that work is actually performed. The Contractor is expected to make substantially uniform progress toward its goals in each craft.

(e) Neither the terms and conditions of any collective bargaining agreement, nor the failure by a union with which the Contractor has a collective bargaining agreement, to refer minorities or women shall excuse the Contractor's obligations under this clause, Executive Order 11246, as amended, or the regulations thereunder.

(f) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

(g) The Contractor shall take affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with this clause shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and implement affirmative action steps at least as extensive as the following:

(1) Ensure a working environment free of harassment, intimidation, and coercion at all sites and in all facilities where the Contractor's employees are assigned to work. The Contractor, if possible, will assign two or more women to each construction project. The Contractor shall ensure that foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific

attention to minority or female individuals working at these sites or facilities.

(2) Establish and maintain a current list of sources for minority and female recruitment. Provide written notification to minority and female recruitment sources and community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

(3) Establish and maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant, referrals of minorities or females from unions, recruitment sources, or community organizations, and the action taken with respect to each individual. If an individual was sent to the union hiring hall for referral and not referred back to the Contractor by the union or, if referred back, not employed by the Contractor, this shall be documented in the file, along with whatever additional actions the Contractor may have taken.

(4) Immediately notify the Deputy Assistant Secretary when the union or unions with which the Contractor has a collective bargaining agreement has not referred back to the Contractor a minority or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area that expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under subparagraph (g)(2) of this clause.

(6) Disseminate the Contractor's equal employment policy by--

(i) Providing notice of the policy to unions and to training, recruitment, and outreach programs, and requesting their cooperation in assisting the Contractor in meeting its contract obligations;

(ii) Including the policy in any policy manual and in collective bargaining agreements;

(iii) Publicizing the policy in the company newspaper, annual report, etc.;

(iv) Reviewing the policy with all management personnel and with all minority and female employees at least once a year; and

(v) Posting the policy on bulletin boards accessible to employees at each location where construction work is performed.

(7) Review, at least annually, the Contractor's equal employment policy and affirmative action obligations with all employees having responsibility for hiring, assignment, layoff, termination, or other employment decisions. Conduct review of this policy with all on-site supervisory personnel before initiating construction work at a job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter

discussed, and disposition of the subject matter.

(8) Disseminate the Contractor's equal employment policy externally by including it in any advertising in the news media, specifically including minority and female news media. Provide written notification to, and discuss this policy with, other Contractors and subcontractors with which the Contractor does or anticipates doing business.

(9) Direct recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than 1 month before the date for acceptance of applications for apprenticeship or training by any recruitment source, send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit minority persons and women. Where reasonable, provide after-school, summer, and vacation employment to minority and female youth both on the site and in other areas of the Contractor's workforce.

(11) Validate all tests and other selection requirements where required under 41 CFR 60-3.

(12) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities. Encourage these employees to seek or to prepare for, through appropriate training, etc., opportunities for promotion.

(13) Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the Contractor's obligations under this contract are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user rest rooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

(15) Maintain a record of solicitations for subcontracts for minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's equal employment policy and affirmative action obligations.

(h) The Contractor is encouraged to participate in voluntary associations that may assist in fulfilling one or more of the affirmative action obligations contained in subparagraphs (g)(1) through (16) of this clause. The efforts of a contractor association, joint contractor-union, contractor-community, or similar group of which the contractor is a member and participant may be asserted as fulfilling one or more of its obligations under subparagraphs (g)(1) through (16) of this clause, provided the Contractor--

(1) Actively participates in the group;

(2) Makes every effort to ensure that the group has a positive impact on the employment of minorities and women in the industry;

(3) Ensures that concrete benefits of the program are reflected in the Contractor's minority and female workforce participation;

(4) Makes a good-faith effort to meet its individual goals and timetables; and

(5) Can provide access to documentation that demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply is the Contractor's, and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

(i) A single goal for minorities and a separate single goal for women shall be established. The Contractor is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of Executive Order 11246, as amended, if a particular group is employed in a substantially disparate manner.

(j) The Contractor shall not use goals or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

(k) The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts under Executive Order 11246, as amended.

(l) The Contractor shall carry out such sanctions and penalties for violation of this clause and of the Equal Opportunity clause, including suspension, termination, and cancellation of existing subcontracts, as may be imposed or ordered under Executive Order 11246, as amended, and its implementing regulations, by the OFCCP. Any failure to carry out these sanctions and penalties as ordered shall be a violation of this clause and Executive Order 11246, as amended.

(m) The Contractor in fulfilling its obligations under this clause shall implement affirmative action procedures at least as extensive as those prescribed in paragraph (g) of this clause, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of Executive Order 11246, as amended, the implementing regulations, or this clause, the Deputy Assistant Secretary shall take action as prescribed in 41 CFR 60-4.8.

(n) The Contractor shall designate a responsible official to--

(1) Monitor all employment-related activity to ensure that the Contractor's equal employment policy is being carried out;

(2) Submit reports as may be required by the Government; and

(3) Keep records that shall at least include for each employee the name, address, telephone number, construction trade, union affiliation (if any), employee identification number, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, separate records are not required to be maintained.

Nothing contained herein shall be construed as a limitation upon the application of other laws that establish different standards of compliance or upon the requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

52.222-35 AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (APR 1998)

(a)) Definitions. As used in this clause--

All employment openings includes all positions except executive and top management, those positions that will be filled from within the contractor's organization, and positions lasting 3 days or less. This term includes full-time employment, temporary employment of more than 3 days' duration, and part-time employment.

Appropriate office of the State employment service system means the local office of the Federal-State national system of public employment offices with assigned responsibility to serve the area where the employment opening is to be filled, including the District of Columbia, Guam, the Commonwealth of Puerto Rico, and the Virgin Islands.

Positions that will be filled from within the Contractor's organization means employment openings for which no consideration will be given to persons outside the Contractor's organization (including any affiliates, subsidiaries, and parent companies) and includes any openings that the Contractor proposes to fill from regularly established “recall” lists. The exception does not apply to a particular opening once an employer decides to consider applicants outside of its organization.

Veteran of the Vietnam era means a person who--

(1) Served on active duty for a period of more than 180 days, any part of which occurred between August 5, 1964, and May 7, 1975, and was discharged or released therefrom with other than a dishonorable discharge; or

(2) Was discharged or released from active duty for a service-connected disability if any part of such active duty was performed between August 5, 1964, and May 7, 1975.

(b) General. (1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against the individual because the individual is a disabled veteran or a veteran of the Vietnam era. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability or veterans' status in all employment practices such as--

(i) Employment;

(ii) Upgrading;

(iii) Demotion or transfer;

(iv) Recruitment;

(v) Advertising;

(vi) Layoff or termination;

(vii) Rates of pay or other forms of compensation; and

(viii) Selection for training, including apprenticeship.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Vietnam Era Veterans' Readjustment Assistance Act of 1972 (the Act), as amended.

(c) Listing openings. (1) The Contractor agrees to list all employment openings existing at contract award or occurring during contract performance, at an appropriate office of the State employment service system in the locality where the opening occurs. These openings include those occurring at any Contractor facility, including one not connected with performing this contract. An independent corporate affiliate is exempt from this requirement.

(2) State and local government agencies holding Federal contracts of $10,000 or more shall also list all their employment openings with the appropriate office of the State employment service.

(3) The listing of employment openings with the State employment service system is required at least concurrently with using any other recruitment source or effort and involves the obligations of placing a bona fide job order, including accepting referrals of veterans and nonveterans. This listing does not require hiring any particular job applicant or hiring from any particular group of job applicants and is not intended to relieve the Contractor from any requirements of Executive orders or regulations concerning nondiscrimination in employment.

(4) Whenever the Contractor becomes contractually bound to the listing terms of this clause, it shall advise the State employment service system, in each State where it has establishments, of the name and location of each hiring location in the State. As long as the Contractor is

contractually bound to these terms and has so advised the State system, it need not advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(d) Applicability. This clause does not apply to the listing of employment openings that occur and are filled outside the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, and the Virgin Islands.

(e) Postings. (1) The Contractor agrees to post employment notices stating (i) the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era, and (ii) the rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. They shall be in a form prescribed by the Deputy Assistant Secretary for Federal Contract Compliance Programs, Department of Labor (Deputy Assistant Secretary), and provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Act, and is committed to take affirmative action to employ, and advance in employment, qualified disabled veterans and veterans of the Vietnam Era.

(f) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(g) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Deputy Assistant Secretary to enforce the terms, including action for noncompliance.

(End of clause)

52.222-35 AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS (APR 1998)--ALTERNATE I (APR 1984)

Notice: The following term(s) of this clause are waived for this contract: [List term(s)].

(a) Definitions.

"Appropriate office of the State employment service system," as used in this clause, means the local office of the Federal-State national system of public employment offices assigned to serve the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands.

"Openings that the Contractor proposes to fill from within its own organization," as used in this clause, means employment openings for which no one outside the Contractor's organization (including any affiliates, subsidiaries, and the parent companies) will be considered and includes any openings that the Contractor proposes to fill from regularly established "recall" lists.

"Openings that the Contractor proposes to fill under a customary and traditional employer-union hiring arrangement," as used in this clause, means employment openings that the Contractor proposes to fill from union halls, under their customary and traditional employer-union hiring relationship.

"Suitable employment openings," as used in this clause--

(1) Includes, but is not limited to, openings that occur in jobs categorized as--

(i) Production and nonproduction;

(ii) Plant and office;

(iii) Laborers and mechanics;

(iv) Supervisory and nonsupervisory;

(v) Technical; and

(vi) Executive, administrative, and professional positions compensated on a salary basis of less than $25,000 a year; and

(2) Includes full-time employment, temporary employment of over 3 days, and part-time employment, but not openings that the Contractor proposes to fill from within its own organization or under a customary and traditional employer-union hiring arrangement, nor openings in an educational institution that are restricted to students of that institution.

General. (1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against the individual because the individual is a special disabled or Vietnam Era veteran. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified special disabled and Vietnam Era veterans without discrimination based upon their disability or veterans' status in all employment practices such as--

(i) Employment;

(ii) Upgrading;

(iii) Demotion or transfer;

(iv) Recruitment;

(v) Advertising;

(vi) Layoff or termination;

(vii) Rates of pay or other forms of compensation; and

(viii) Selection for training, including apprenticeship.

The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Vietnam Era Veterans' Readjustment Assistance Act of 1972 (the Act), as amended.

(c) Listing openings. (1) The Contractor agrees to list all suitable employment openings existing at contract award or occurring during contract performance, at an appropriate office of the State employment service system in the locality where the opening occurs. These openings include those occurring at any Contractor facility, including one not connected with performing this contract. An independent corporate affiliate is exempt from this requirement.

(2) State and local government agencies holding Federal contracts of $10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service.

(3) The listing of suitable employment openings with the State employment service system is required at least concurrently with using any other recruitment source or effort and involves the obligations of placing a bona fide job order, including accepting referrals of veterans and nonveterans. This listing does not require hiring any particular job applicant or hiring from any particular group of job applicants and is not intended to relieve the Contractor from any requirements of Executive orders or regulations concerning nondiscrimination in employment.

(4) Whenever the Contractor becomes contractually bound to the listing terms of this clause, it shall advise the State employment service system, in each State where it has establishments, of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these terms and has so advised the State system, it need not advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(5) Under the most compelling circumstances, an employment opening may not be suitable for listing, including situations when (i) the Government's needs cannot reasonably be supplied, (ii) listing would be contrary to national security, or (iii) the requirement of listing would not be in the Government's interest.

(d) Applicability. (1) This clause does not apply to the listing of employment openings which occur and are filled outside the 50 States, the District of Columbia, Puerto Rico, Guam, Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands.

(2) The terms of paragraph (c) above of this clause do not apply to openings that the Contractor

proposes to fill from within its own organization or under a customary and traditional employer-union hiring arrangement. This exclusion does not apply to a particular opening once an employer decides to consider applicants outside of its own organization or employer-union arrangement for that opening.

(e) Postings. (1) The Contractor agrees to post employment notices stating (i) the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified special disabled veterans and veterans of the Vietnam era, and (ii) the rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. They shall be in a form prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor (Director), and provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Act, and is committed to take affirmative action to employ, and advance in employment, qualified special disabled and Vietnam Era veterans.

(f) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(g) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Director to enforce the terms, including action for noncompliance.

52.222-36 AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES (JUN 1998)

(a) General. (1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against any employee or applicant because of physical or mental disability. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified individuals with disabilities without discrimination based upon their physical or mental disability in all employment practices such as--

(i) Recruitment, advertising, and job application procedures;

(ii) Hiring, upgrading, promotion, award of tenure, demotion, transfer, layoff, termination, right of return from layoff, and rehiring;

(iii) Rates of pay or any other form of compensation and changes in compensation;

(iv) Job assignments, job classifications, organizational structures, position descriptions, lines of progression, and seniority lists;

(v) Leaves of absence, sick leave, or any other leave;

(vi) Fringe benefits available by virtue of employment, whether or not administered by the Contractor;

(vii) Selection and financial support for training, including apprenticeships, professional meetings, conferences, and other related activities, and selection for leaves of absence to pursue training;

(viii) Activities sponsored by the Contractor, including social or recreational programs; and

(ix) Any other term, condition, or privilege of employment.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Rehabilitation Act of 1973 (29 U.S.C. 793) (the Act), as amended.

(b) Postings. (1) The Contractor agrees to post employment notices stating--

(i) The Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified individuals with disabilities; and

(ii) The rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. The Contractor shall ensure that applicants and employees with disabilities are informed of the contents of the notice (e.g., the Contractor may have the notice read to a visually disabled individual, or may lower the posted notice so that it might be read by a person in a wheelchair). The notices shall be in a form prescribed by the Deputy Assistant Secretary for Federal Contract Compliance of the U.S. Department of Labor (Deputy Assistant Secretary) and shall be provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Act and is committed to take affirmative action to employ, and advance in employment, qualified individuals with physical or mental disabilities.

(c) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(d) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order in excess of $10,000 unless exempted by rules, regulations, or orders of the

Secretary. The Contractor shall act as specified by the Deputy Assistant Secretary to enforce the terms, including action for noncompliance.

(End of clause)

52.222-37 EMPLOYMENT REPORTS ON DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (JAN 1999)

(a) Unless the Contractor is a State or local government agency, the Contractor shall report at least annually, as required by the Secretary of Labor, on--

(1) The number of disabled veterans and the number of veterans of the Vietnam era in the workforce of the contractor by job category and hiring location; and

(2) The total number of new employees hired during the period covered by the report, and of that total, the number of disabled veterans, and the number of veterans of the Vietnam era.

(b) The above items shall be reported by completing the form entitled "Federal Contractor Veterans' Employment Report VETS-100."

(c) Reports shall be submitted no later than September 30 of each year beginning September 30, 1988.

(d) The employment activity report required by paragraph (a)(2) of this clause shall reflect total hires during the most recent 12-month period as of the ending date selected for the employment profile report required by paragraph (a)(1) of this clause. Contractors may select an ending date: (1) As of the end of any pay period during the period January through March 1st of the year the report is due, or (2) as of December 31, if the contractor has previous written approval from the Equal Employment Opportunity Commission to do so for purposes of submitting the Employer Information Report EEO-1 (Standard Form 100).

(e) The count of veterans reported according to paragraph (a) of this clause shall be based on voluntary disclosure. Each Contractor subject to the reporting requirements at 38 U.S.C. 4212 shall invite all disabled veterans and veterans of the Vietnam era who wish to benefit under the affirmative action program at 38 U.S.C. 4212 to identify themselves to the Contractor. The invitation shall state that the information is voluntarily provided; that the information will be kept confidential; that disclosure or refusal to provide the information will not subject the applicant or employee to any adverse treatment; and that the information will be used only in accordance with the regulations promulgated under 38 U.S.C. 4212.

(f) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary.

(End of clause)

52.223-6 DRUG-FREE WORKPLACE (MAY 2001)

(a) Definitions. As used in this clause --

"Controlled substance" means a controlled substance in schedules I through V of section 202 of the Controlled Substances Act (21 U.S.C. 812) and as further defined in regulation at 21 CFR 1308.11 - 1308.15.

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to deter- mine violations of the Federal or State criminal drug statutes.

"Criminal drug statute" means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, possession, or use of any controlled substance.

"Drug-free workplace" means the site(s) for the performance of work done by the Contractor in connection with a specific contract where employees of the Contractor are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance.

"Employee" means an employee of a Contractor directly engaged in the performance of work under a Government contract. "Directly engaged" is defined to include all direct cost employees and any other Contractor employee who has other than a minimal impact or involvement in contract performance.

"Individual" means an offeror/contractor that has no more than one employee including the offeror/contractor.

(b) The Contractor, if other than an individual, shall-- within 30 days after award (unless a longer period is agreed to in writing for contracts of 30 days or more performance duration), or as soon as possible for contracts of less than 30 days performance duration--

(1) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition;

(2) Establish an ongoing drug-free awareness program to inform such employees about--

(i) The dangers of drug abuse in the workplace;

(ii) The Contractor's policy of maintaining a drug-free workplace;

(iii) Any available drug counseling, rehabilitation, and employee assistance programs; and

(iv) The penalties that may be imposed upon employees for drug abuse violations occurring in

the workplace;

(3) Provide all employees engaged in performance of the contract with a copy of the statement required by subparagraph (b)(1) of this clause;

(4) Notify such employees in writing in the statement required by subparagraph (b)(1) of this clause that, as a condition of continued employment on this contract, the employee will--

(i) Abide by the terms of the statement; and

(ii) Notify the employer in writing of the employee's conviction under a criminal drug statute for a violation occurring in the workplace no later than 5 days after such conviction.

(5) Notify the Contracting Officer in writing within 10 days after receiving notice under subdivision (b)(4)(ii) of this clause, from an employee or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;

(6) Within 30 days after receiving notice under subdivision (b)(4)(ii) of this clause of a conviction, take one of the following actions with respect to any employee who is convicted of a drug abuse violation occurring in the workplace:

(i) Taking appropriate personnel action against such employee, up to and including termination; or

(ii) Require such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency; and

(7) Make a good faith effort to maintain a drug-free workplace through implementation of subparagraphs (b)(1) though (b)(6) of this clause.

(c) The Contractor, if an individual, agrees by award of the contract or acceptance of a purchase order, not to engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance while performing this contract.

(d) In addition to other remedies available to the Government, the Contractor's failure to comply with the requirements of paragraph (b) or (c) of this clause may, pursuant to FAR 23.506, render the Contractor subject to suspension of contract payments, termination of the contract for default, and suspension or debarment.

(End of clause)

52.223-14 TOXIC CHEMICAL RELEASE REPORTING (OCT 2000)

(a) Unless otherwise exempt, the Contractor, as owner or operator of a facility used in the performance of this contract, shall file by July 1 for the prior calendar year an annual Toxic

Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023(a) and (g)), and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106). The Contractor shall file, for each facility subject to the Form R filing and reporting requirements, the annual Form R throughout the life of the contract.

(b) A Contractor owned or operated facility used in the performance of this contract is exempt from the requirement to file an annual Form R if--

(1) The facility does not manufacture, process, or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

(2) The facility does not have 10 or more full-time employees as specified in section 313(b)(1)(A) of EPCRA, 42 U.S.C. 11023(b)(1)(A);

(3) The facility does not meet the reporting thresholds of toxic chemicals established under of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

(4) The facility does not fall within Standard Industrial Classification Code (SIC) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; or

(5) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

(c) If the Contractor has certified to an exemption in accordance with one or more of the criteria in paragraph (b) of this clause, and after award of the contract circumstances change so that any of its owned or operated facilities used in the performance of this contract is no longer exempt--

(1) The Contractor shall notify the Contracting Officer; and

(2) The Contractor, as owner or operator of a facility used in the performance of this contract that is no longer exempt, shall (i) submit a Toxic Chemical Release Inventory Form (Form R) on or before July 1 for the prior calendar year during which the facility becomes eligible; and (ii) continue to file the annual Form R for the life of the contract for such facility.

(d) The Contracting Officer may terminate this contract or take other action as appropriate, if the Contractor fails to comply accurately and fully with the EPCRA and PPA toxic chemical release filing and reporting requirements.

(e) Except for acquisitions of commercial items, as defined in FAR Part 2, the Contractor shall--

(1) For competitive subcontracts expected to exceed $100,000 (including all options), include a solicitation provision substantially the same as the provision at FAR 52.223-13, Certification of Toxic Chemical Release Reporting; and

(2) Include in any resultant subcontract exceeding $100,000 (including all options), the substance of this clause, except this paragraph (e).

52.225-11 BUY AMERICAN ACT--BALANCE OF PAYMENTS PROGRAM--CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (FEB 2000)

(a) Definitions. As used in this clause--

Component means any article, material, or supply incorporated directly into construction materials.

Construction material means an article, material, or supply brought to the construction site by the Contractor or subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the end product (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the end product.

Designated country means any of the following countries: Aruba, Austria, Bangladesh, Belgium, Benin, Bhutan, Botswana, Burkina Faso, Burundi, Canada, Cape Verde, Central African Republic, Chad, Comoros, Denmark.

Djibouti, Equatorial Guinea, Finland, France, Gambia, Germany, Greece, Guinea, Guinea-Bissau, Haiti, Hong Kong, Ireland, Israel, Italy, Japan.

Kiribati, Korea, Republic of, Lesotho, Liechtenstein, Luxembourg, Malawi, Maldives, Mali, Mozambique, Nepal, Netherlands, Niger, Norway, Portugal, Rwanda.

Sao Tome and Principe, Sierra Leone, Singapore, Somalia, Spain, Sweden, Switzerland, Tanzania U.R., Togo, Tuvalu, Uganda, United Kingdom, Vanuatu, Western Samoa, Yemen.

Designated country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different construction material distinct from the materials from which it was transformed.

Domestic construction material means--

(1) An unmanufactured construction material mined or produced in the United States; or

(2) A construction material manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic.

Foreign construction material means a construction material other than a domestic construction material.

North American Free Trade Agreement country means Canada or Mexico.

North American Free Trade Agreement country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a North American Free Trade Agreement (NAFTA) country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a NAFTA country into a new and different construction material distinct from the materials from which it was transformed.

United States means the 50 States and the District of Columbia, U.S. territories and possessions, Puerto Rico, the Northern Mariana Islands, and any other place subject to U.S. jurisdiction, but does not include leased bases.

(b) Construction materials. (1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) and the Balance of Payments Program by providing a preference for domestic construction material. In addition, the Contracting Officer has determined that the Trade Agreements Act and the North American Free Trade Agreement (NAFTA) apply to this acquisition. Therefore, the Buy American Act and Balance of Payments Program restrictions are waived for designated country and NAFTA country construction materials.

(2) The Contractor shall use only domestic, designated country, or NAFTA country construction material in performing this contract, except as provided in paragraphs (b)(3) and (b)(4) of this clause.

(3) The requirement in paragraph (b)(2) of this clause does not apply to the construction materials or components listed by the Government as follows: [Contracting Officer to list applicable excepted materials or indicate "none"]

(4) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(3) of this clause if the Government determines that--

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the restrictions of the Buy American Act is unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent. For determination of unreasonable cost under the Balance of Payments Program, the Contracting Officer will use a factor of 50 percent;

(ii) The application of the restriction of the Buy American Act or Balance of Payments Program to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act or Balance of Payments Program. (1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(4) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act or Balance of Payments Program applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(4)(i) of this
clause.

(3) Unless the Government determines that an exception to the Buy American Act or Balance of Payments Program applies, use of foreign construction material is noncompliant with the Buy American Act or Balance of Payments Program.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) \1\
Item 1:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....
Item 2:			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....

\1\ Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free
entry certificate is issued).

List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral,
attach summary.

Include other applicable supporting information.

(End of clause)

52.225-12 NOTICE OF BUY AMERICAN ACT REQUIREMENT-- CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (FEB 2000)

(a) Definitions. Construction material, designated country construction material, domestic construction material, foreign construction material, and NAFTA country construction material, as used in this provision, are defined in the clause of this solicitation entitled "Buy American Act--Balance of Payments Program--Construction Materials under Trade Agreements" (Federal Acquisition Regulation (FAR) clause 52.225-11).

(b) Requests for determination of inapplicability. An offeror requesting a determination regarding the inapplicability of the Buy American Act or Balance of Payments Program should submit the request to the Contracting Officer in time to allow a determination before submission of offers. The offeror shall include the information and applicable supporting data required by paragraphs (c) and (d) of FAR clause 52.225-11 in the request. If an offeror has not requested a determination regarding the inapplicability of the Buy American Act or Balance of Payments Program before submitting its offer, or has not received a response to a previous request, the offeror shall include the information and supporting data in the offer.

(c) Evaluation of offers. (1) The Government will evaluate an offer requesting exception to the requirements of the Buy American Act or Balance of Payments Program, based on claimed unreasonable cost of domestic construction materials, by adding to the offered price the appropriate percentage of the cost of such foreign construction material, as specified in paragraph (b)(4)(i) of FAR clause 52.225-11.

(2) If evaluation results in a tie between an offeror that requested the substitution of foreign construction material based on unreasonable cost and an offeror that did not request an exception, the Contracting Officer will award to the offeror that did not request an exception based on unreasonable cost.

(d) Alternate offers. (1) When an offer includes foreign construction material, other than designated country or NAFTA country construction material, that is not listed by the Government in this solicitation in paragraph (b)(3) of FAR clause 52.225-11, the offeror also may submit an alternate offer based on use of equivalent domestic, designated country, or NAFTA country construction material.

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of FAR clause 52.225-11 for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

(3) If the Government determines that a particular exception requested in accordance with paragraph (c) of FAR clause 52.225-11 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic, designated country, or NAFTA country construction material, and the offeror shall be required to furnish such domestic, designated country, or NAFTA country construction material. An offer based on use of the foreign construction material for which an exception was requested--

(i) Will be rejected as nonresponsive if this acquisition is conducted by sealed bidding; or

(ii) May be accepted if revised during negotiations.

(End of provision)

52.225-13 RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (JUL 2000)

(a) The Contractor shall not acquire, for use in the performance of this contract, any supplies or services originating from sources within, or that were located in or transported from or through, countries whose products are banned from importation into the United States under regulations of the Office of Foreign Assets Control, Department of the Treasury. Those countries are Cuba, Iran, Iraq, Libya, North Korea, Sudan, the territory of Afghanistan controlled by the Taliban, and Serbia (excluding the territory of Kosovo).

(b) The Contractor shall not acquire for use in the performance of this contract any supplies or services from entities controlled by the government of Iraq.

(c) The Contractor shall insert this clause, including this paragraph (c), in all subcontracts.

(End of clause)

52.226-1 UTILIZATION OF INDIAN ORGANIZATIONS AND INDIAN-OWNED ECONOMIC ENTERPRISES (JUN 2000)

(a) Definitions. As used in this clause:

"Indian" means any person who is a member of any Indian tribe, band, group, pueblo or community that is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs (BIA) in accordance with 25 U.S.C. 1452(c) and any ``Native" as defined in the Alaska Native Claims Settlement Act (43 U.S.C. 1601).

"Indian organization" means the governing body of any Indian tribe or entity established or recognized by the governing body of an Indian tribe for the purposes of 25 U.S.C., chapter 17.

"Indian-owned economic enterprise" means any Indian-owned (as determined by the Secretary of the Interior) commercial, industrial, or business activity established or organized for the purpose

of profit, provided that Indian ownership constitutea not less than 51 percent of the enterprise.

"Indian tribe" means any Indian tribe, band, group, pueblo or community, including native villages and native groups (including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, that is recognized by the Federal Government as eligible for services from BIA in accordance with 25 U.S.C. 1542(c).

"Interested party" means a prime contractor or an actual or prospective offeror whose direct economic interest would be affected by the award of a subcontract or by the failure to award a subcontract.

(b) The Contractor shall use its best efforts to give Indian organizations and Indian-owned economic enterprises (25 U.S.C. 1544) the maximum practicable opportunity to participate in the subcontracts it awards to the fullest extent consistent with efficient performance of its contract.

(1) The Contracting Officer and the Contractor, acting in good faith, may rely on the representation of an Indian organization or Indian-owned economic enterprise as to its eligibility, unless an
interested party challenges its status or the Contracting Officer has independent reason to question that status. In the event of a challenge to the representation of a subcontractor, the Contracting Officer will refer the matter to the U.S. Department of the Interior, Bureau of Indian Affairs (BIA), Attn: Chief, Division of
Contracting and Grants Administration, 1849 C Street, NW., MS 2626-MIB, Washington, DC 20240-4000.

The BIA will determine the eligibility and notify the Contracting Officer. No incentive payment will be made within 50 working days of subcontract award or while a challenge is pending. If a subcontractor is determined to be an ineligible participant, no incentive payment will be made under the Indian Incentive Program.

(2) The Contractor may request an adjustment under the Indian Incentive Program to the following:

(i) The estimated cost of a cost-type contract.

(ii) The target cost of a cost-plus-incentive-fee prime contract.

(iii) The target cost and ceiling price of a fixed-price incentive prime contract.

(iv) The price of a firm-fixed-price prime contract.

(3) The amount of the adjustment to the prime contract is 5 percent of the estimated cost, target cost, or firm-fixed-price included in the subcontract initially awarded to the Indian organization or Indian-owned economic enterprise.

(4) The Contractor has the burden of proving the amount claimed and must assert its request for an adjustment prior to completion of contract performance.

(c) The Contracting Officer, subject to the terms and conditions of the contract and the availability of funds, will authorize an incentive payment of 5 percent of the amount paid to the subcontractor. The Contracting Officer will seek funding in accordance with agency procedures.

(End of clause)

52.227-1 AUTHORIZATION AND CONSENT (JUL 1995)

(a) The Government authorizes and consents to all use and manufacture, in performing this contract or any subcontract at any tier, of any invention described in and covered by a United States patent (1) embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract or (2) used in machinery, tools, or methods whose use necessarily results from compliance by the Contractor or a subcontractor with (i) specifications or written provisions forming a part of this contract or (ii) specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a patent of the United States shall be determined solely by the provisions of the indemnity clause, if any, included in this contract or any subcontract hereunder (including any lower-tier subcontract), and the Government assumes liability for all other infringement to the extent of the authorization and consent hereinabove granted.

(b) The Contractor agrees to include, and require inclusion of, this clause, suitably modified to identify the parties, in all subcontracts at any tier for supplies or services (including construction, architect-engineer services, and materials, supplies, models, samples, and design or testing services expected to exceed the simplified acquisition threshold (however, omission of this clause from any subcontract, including those at or below the simplified acquisition threshold, does not affect this authorization and consent.)

52.227-2 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (AUG 1996)

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed under this contract, the Contractor shall furnish to the Government, when requested by the Contracting Officer, all evidence and information in

possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(c) The Contractor agrees to include, and require inclusion of, this clause in all subcontracts at any tier for supplies or services (including construction and architect-engineer subcontracts and those for material, supplies, models, samples, or design or testing services) expected to exceed the simplified acquisition threshold at (FAR) 2.101.to exceed the dollar amount set forth in 13.000 of the Federal Acquisition Regulation (FAR).

(End of clause)

52.227-4 PATENT INDEMNITY--CONSTRUCTION CONTRACTS (APR 1984)

Except as otherwise provided, the Contractor agrees to indemnify the Government and its officers, agents, and employees against liability, including costs and expenses, for infringement upon any United States patent (except a patent issued upon an application that is now or may hereafter be withheld from issue pursuant to a Secrecy Order under 35 U.S.C. 181) arising out of performing this contract or out of the use or disposal by or for the account of the Government of supplies furnished or work performed under this contract.

52.227-5 WAIVER OF INDEMNITY (APR 1984)

Any provision or clause of this contract to the contrary notwithstanding, the Government hereby authorizes and consents to the use and manufacture, solely in performing this contract, of any invention covered by the United States patents identified below and waives indemnification by the Contractor with respect to such patents:

[Contracting Officer identify the patents by number or by other means if more appropriate.]

52.228-1 BID GUARANTEE (SEP 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.

(c) The amount of the bid guarantee shall be _____ percent of the bid price or $_____, whichever is less.

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

52.228-5 INSURANCE--WORK ON A GOVERNMENT INSTALLATION (JAN 1997)

(a) The Contractor shall, at its own expense, provide and maintain during the entire performance of this contract, at least the kinds and minimum amounts of insurance required in the Schedule or elsewhere in the contract.

(b) Before commencing work under this contract, the Contractor shall notify the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective (1) for such period as the laws of the State in which this contract is to be performed prescribe, or (2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

(c) The Contractor shall insert the substance of this clause, including this paragraph (c), in subcontracts under this contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

(End of clause)

52.228-11 PLEDGES OF ASSETS (FEB 1992)

(a) Offerors shall obtain from each person acting as an individual surety on a bid guarantee, a performance bond, or a payment bond--

(1) Pledge of assets; and

(2) Standard Form 28, Affidavit of Individual Surety.

(b) Pledges of assets from each person acting as an individual surety shall be in the form of--

(1) Evidence of an escrow account containing cash, certificates of deposit, commercial or

Government securities, or other assets described in FAR 28.203-2 (except see 28.203-2(b)(2) with respect to Government securities held in book entry form) and/or;

(2) A recorded lien on real estate. The offeror will be required to provide--

(i) Evidence of title in the form of a certificate of title prepared by a title insurance company approved by the United States Department of Justice. This title evidence must show fee simple title vested in the surety along with any concurrent owners; whether any real estate taxes are due and payable; and any recorded encumbrances against the property, including the lien filed in favor of the Government as required by FAR 28.203-3(d);

(ii) Evidence of the amount due under any encumbrance shown in the evidence of title;

(iii) A copy of the current real estate tax assessment of the property or a current appraisal dated no earlier than 6 months prior to the date of the bond, prepared by a professional appraiser who certifies that the appraisal has been conducted in accordance with the generally accepted appraisal standards as reflected in the Uniform Standards of Professional Appraisal Practice, as promulgated by the Appraisal Foundation.

(End of clause)

52.228-14 IRREVOCABLE LETTER OF CREDIT (DEC 1999)

(a) "Irrevocable letter of credit" (ILC), as used in this clause, means a written commitment by a federally insured financial institution to pay all or part of a stated amount of money, until the expiration date of the letter, upon presentation by the Government (the beneficiary) of a written demand therefor. Neither the financial institution nor the offeror/Contractor can revoke or condition the letter of credit.

(b) If the offeror intends to use an ILC in lieu of a bid bond, or to secure other types of bonds such as performance and payment bonds, the letter of credit and letter of confirmation formats in paragraphs (e) and (f) of this clause shall be used.

(c) The letter of credit shall be irrevocable, shall require presentation of no document other than a written demand and the ILC (including confirming letter, if any), shall be issued/confirmed by an acceptable federally insured financial institution as provided in paragraph (d) of this clause, and--

(1) If used as a bid guarantee, the ILC shall expire no earlier than 60 days after the close of the bid acceptance period;

(2) If used as an alternative to corporate or individual sureties as security for a performance or payment bond, the offeror/Contractor may submit an ILC with an initial expiration date estimated to cover the entire period for which financial security is required or may submit an ILC with an initial expiration date that is a minimum period of one year from the date of issuance. The ILC shall provide that, unless the issuer provides the beneficiary written notice of non-

renewal at least 60 days in advance of the current expiration date, the ILC is automatically extended without amendment for one year from the expiration date, or any future expiration date, until the period of required coverage is completed and the Contracting Officer provides the financial institution with a written statement waiving the right to payment. The period of required coverage shall be:

(i) For contracts subject to the Miller Act, the later of--

(A) One year following the expected date of final payment;

(B) For performance bonds only, until completion of any warranty period; or

(C) For payment bonds only, until resolution of all claims filed against the payment bond during the one-year period following final payment.

(ii) For contracts not subject to the Miller Act, the later of--

(A) 90 days following final payment; or

(B) For performance bonds only, until completion of any warranty period.

(d) Only federally insured financial institutions rated investment grade or higher shall issue or confirm the ILC. The offeror/Contractor shall provide the Contracting Officer a credit rating that indicates the financial institution has the required rating(s) as of the date of issuance of the ILC. Unless the financial institution issuing the ILC had letter of credit business of less than $25 million in the past year, ILCs over $5 million must be confirmed by another acceptable financial institution that had letter of credit business of less than $25 million in the past year.

(e) The following format shall be used by the issuing financial institution to create an ILC:

_____

[Issuing Financial Institution's Letterhead or Name and Address]

Issue Date _____

IRREVOCABLE LETTER OF CREDIT NO. _____

Account party's name _____

Account party's address _____

For Solicitation No. _____(for reference only)

TO: [U.S. Government agency]

[U.S. Government agency's address]

1. We hereby establish this irrevocable and transferable Letter of Credit in your favor for one or more drawings up to United States $_____. This Letter of Credit is payable at [issuing financial institution's and, if any, confirming financial institution's] office at [issuing financial institution's address and, if any, confirming financial institution's address] and expires with our close of business on _____, or any automatically extended expiration date.

2. We hereby undertake to honor your or the transferee's sight draft(s) drawn on the issuing or, if any, the confirming financial institution, for all or any part of this credit if presented with this Letter of Credit and confirmation, if any, at the office specified in paragraph 1 of this Letter of Credit on or before the expiration date or any automatically extended expiration date.

3. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this Letter of Credit that it is deemed to be automatically extended without amendment for one year from the expiration date hereof, or any future expiration date, unless at least 60 days prior to any expiration date, we notify you or the transferee by registered mail, or other receipted means of delivery, that we elect not to consider this Letter of Credit renewed for any such additional period. At the time we notify you, we also agree to notify the account party (and confirming financial institution, if any) by the same means of delivery.

4. This Letter of Credit is transferable. Transfers and assignments of proceeds are to be effected without charge to either the beneficiary or the transferee/assignee of proceeds. Such transfer or assignment shall be only at the written direction of the Government (the beneficiary) in a form satisfactory to the issuing financial institution and the confirming financial institution, if any.

5. This Letter of Credit is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution, if any, otherwise state of issuing financial institution].

6. If this credit expires during an interruption of business of this financial institution as described in Article 17 of the UCP, the financial institution specifically agrees to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Issuing financial institution]

(f) The following format shall be used by the financial institution to confirm an ILC:

_____

[Confirming Financial Institution's Letterhead or Name and Address]

(Date) _____

Our Letter of Credit Advice Number _____

Beneficiary: _____ [U.S. Government agency]

Issuing Financial Institution: _____

Issuing Financial Institution's LC No.: _____

Gentlemen:

1. We hereby confirm the above indicated Letter of Credit, the original of which is attached, issued by _____ [name of issuing financial institution] for drawings of up to United States dollars _____/U.S. $_____ and expiring with our close of business on _____ [the expiration date], or any automatically extended expiration date.

2. Draft(s) drawn under the Letter of Credit and this Confirmation are payable at our office located at _____.

3. We hereby undertake to honor sight draft(s) drawn under and presented with the Letter of Credit and this Confirmation at our offices as specified herein.

4. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this confirmation that it be deemed automatically extended without amendment for one year from the expiration date hereof, or any automatically extended expiration date, unless:

(a) At least 60 days prior to any such expiration date, we shall notify the Contracting Officer, or the transferee and the issuing financial institution, by registered mail or other receipted means of delivery, that we elect not to consider this confirmation extended for any such additional period; or

(b) The issuing financial institution shall have exercised its right to notify you or the transferee, the account party, and ourselves, of its election not to extend the expiration date of the Letter of Credit.

5. This confirmation is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution].

6. If this confirmation expires during an interruption of business of this financial institution as described in Article 17 of the UCP, we specifically agree to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Confirming financial institution]

(g) The following format shall be used by the Contracting Officer for a sight draft to draw on the Letter of Credit:

SIGHT DRAFT

_____

[City, State]

(Date) _____

[Name and address of financial institution]

Pay to the order of _____ [Beneficiary Agency] _____ the sum of United States $_____. This draft is drawn under Irrevocable Letter of Credit No. _____.

_____

[Beneficiary Agency]

By: _____

(End of clause)

52.229-3 FEDERAL, STATE, AND LOCAL TAXES (JAN 1991)

(a) "Contract date," as used in this clause, means the date set for bid opening or, if this is a negotiated contract or a modification, the effective date of this contract or modification.

"All applicable Federal, State, and local taxes and duties," as used in this clause, means all taxes and duties, in effect on the contract date, that the taxing authority is imposing and collecting on the transactions or property covered by this contract.

"After-imposed Federal tax," as used in this clause, means any new or increased Federal excise tax or duty, or tax that was exempted or excluded on the contract date but whose exemption was later revoked or reduced during the contract period, on the transactions or property covered by this contract that the Contractor is required to pay or bear as the result of legislative, judicial, or administrative action taking effect after the contract date. It does not include social security tax

or other employment taxes.

"After-relieved Federal tax," as used in this clause, means any amount of Federal excise tax or duty, except social security or other employment taxes, that would otherwise have been payable on the transactions or property covered by this contract, but which the Contractor is not required to pay or bear, or for which the Contractor obtains a refund or drawback, as the result of legislative, judicial, or administrative action taking effect after the contract date.

(b) The contract price includes all applicable Federal, State, and local taxes and duties.

(c) The contract price shall be increased by the amount of any after-imposed Federal tax, provided the Contractor warrants in writing that no amount for such newly imposed Federal excise tax or duty or rate increase was included in the contract price, as a contingency reserve or otherwise.

(d) The contract price shall be decreased by the amount of any after-relieved Federal tax.

(e) The contract price shall be decreased by the amount of any Federal excise tax or duty, except social security or other employment taxes, that the Contractor is required to pay or bear, or does not obtain a refund of, through the Contractor's fault, negligence, or failure to follow instructions of the Contracting Officer.

(f) No adjustment shall be made in the contract price under this clause unless the amount of the adjustment exceeds $250.

(g) The Contractor shall promptly notify the Contracting Officer of all matters relating to any Federal excise tax or duty that reasonably may be expected to result in either an increase or decrease in the contract price and shall take appropriate action as the Contracting Officer directs.

(h) The Government shall, without liability, furnish evidence appropriate to establish exemption from any Federal, State, or local tax when the Contractor requests such evidence and a reasonable basis exists to sustain the exemption.

(End of clause)

52.230-2 COST ACCOUNTING STANDARDS (APR 1998)

(a) Unless the contract is exempt under 48 CFR 9903.201-1 and 9903.201-2, the provisions of 48 CFR Part 9903 are incorporated herein by reference and the Contractor, in connection with this contract, shall--

(1) (CAS-covered Contracts Only) By submission of a Disclosure Statement, disclose in writing the Contractor's cost accounting practices as required by 48 CFR 9903.202-1 through 9903.202-5, including methods of distinguishing direct costs from indirect costs and the basis used for allocating indirect costs. The practices disclosed for this contract shall be the same as the practices currently disclosed and applied on all other contracts and subcontracts being performed

by the Contractor and which contain a Cost Accounting Standards (CAS) clause. If the Contractor has notified the Contracting Officer that the Disclosure Statement contains trade secrets and commercial or financial information which is privileged and confidential, the Disclosure Statement shall be protected and shall not be released outside of the Government.

(2) Follow consistently the Contractor's cost accounting practices in accumulating and reporting contract performance cost data concerning this contract. If any change in cost accounting practices is made for the purposes of any contract or subcontract subject to CAS requirements, the change must be applied prospectively to this contract and the Disclosure Statement must be amended accordingly. If the contract price or cost allowance of this contract is affected by such changes, adjustment shall be made in accordance with subparagraph (a)(4) or (a)(5) of this clause, as appropriate.

(3) Comply with all CAS, including any modifications and interpretations indicated thereto contained in 48 CFR Part 9904, in effect on the date of award of this contract or, if the Contractor has submitted cost or pricing data, on the date of final agreement on price as shown on the Contractor's signed certificate of current cost or pricing data. The Contractor shall also comply with any CAS (or modifications to CAS) which hereafter become applicable to a contract or subcontract of the Contractor. Such compliance shall be required prospectively from the date of applicability to such contract or subcontract.

(4)(i) Agree to an equitable adjustment as provided in the Changes clause of this contract if the contract cost is affected by a change which, pursuant to subparagraph (a)(3) of this clause, the Contractor is required to make to the Contractor's established cost accounting practices.

(ii) Negotiate with the Contracting Officer to determine the terms and conditions under which a change may be made to a cost accounting practice, other than a change made under other provisions of subparagraph (a)(4) of this clause; provided that no agreement may be made under this provision that will increase costs paid by the United States.

(iii) When the parties agree to a change to a cost accounting practice, other than a change under subdivision (a)(4)(i) of this clause, negotiate an equitable adjustment as provided in the Changes clause of this contract.

(5) Agree to an adjustment of the contract price or cost allowance, as appropriate, if the Contractor or a subcontractor fails to comply with an applicable Cost Accounting Standard, or to follow any cost accounting practice consistently and such failure results in any increased costs paid by the United States. Such adjustment shall provide for recovery of the increased costs to the United States, together with interest thereon computed at the annual rate established under section 6621 of the Internal Revenue Code of 1986 (26 U.S.C. 6621) for such period, from the time the payment by the United States was made to the time the adjustment is effected. In no case shall the Government recover costs greater than the increased cost to the Government, in the aggregate, on the relevant contracts subject to the price adjustment, unless the Contractor made a change in its cost accounting practices of which it was aware or should have been aware at the time of price negotiations and which it failed to disclose to the Government.

(b) If the parties fail to agree whether the Contractor or a subcontractor has complied with an applicable CAS in 48 CFR 9904 or a CAS rule or regulation in 48 CFR 9903 and as to any cost adjustment demanded by the United States, such failure to agree will constitute a dispute under the Contract Disputes Act (41 U.S.C. 601).

(c) The Contractor shall permit any authorized representatives of the Government to examine and make copies of any documents, papers, or records relating to compliance with the requirements of this clause.

(d) The Contractor shall include in all negotiated subcontracts which the Contractor enters into, the substance of this clause, except paragraph (b), and shall require such inclusion in all other subcontracts, of any tier, including the obligation to comply with all CAS in effect on the subcontractor's award date or if the subcontractor has submitted cost or pricing data, on the date of final agreement on price as shown on the subcontractor's signed Certificate of Current Cost or Pricing Data. If the subcontract is awarded to a business unit which pursuant to 48 CFR 9903.201-2 is subject to other types of CAS coverage, the substance of the applicable clause set forth in subsection 30.201-4 of the Federal Acquisition Regulation shall be inserted. This requirement shall apply only to negotiated subcontracts in excess of $500,000, except that the requirement shall not apply to negotiated subcontracts otherwise exempt from the requirement to include a CAS clause as specified in 48 CFR 9903.201-1.

52.230-3 DISCLOSURE AND CONSISTENCY OF COST ACCOUNTING PRACTICES (APR 1998)

(a) The Contractor, in connection with this contract, shall--

(1) Comply with the requirements of 48 CFR 9904.401, Consistency in Estimating, Accumulating, and Reporting Costs; 48 CFR 9904.402, Consistency in Allocating Costs Incurred for the Same Purpose; 48 CFR 9904.405, Accounting for Unallowable Costs; and 48 CFR 9904.406, Cost Accounting Standard--Cost Accounting Period, in effect on the date of award of this contract as indicated in 48 CFR Part 9904.

(2) (CAS-covered Contracts Only) If it is a business unit of a company required to submit a Disclosure Statement, disclose in writing its cost accounting practices as required by 48 CFR 9903.202-1 through 9903.202-5. If the Contractor has notified the Contracting Officer that the Disclosure Statement contains trade secrets and commercial or financial information which is privileged and confidential, the Disclosure Statement shall be protected and shall not be released outside of the Government.

(3)(i) Follow consistently the Contractor's cost accounting practices. A change to such practices may be proposed, however, by either the Government or the Contractor, and the Contractor agrees to negotiate with the Contracting Officer the terms and conditions under which a change may be made. After the terms and conditions under which the change is to be made have been agreed to, the change must be applied prospectively to this contract, and the Disclosure Statement, if affected, must be amended accordingly.

(ii) The Contractor shall, when the parties agree to a change to a cost accounting practice and the Contracting Officer has made the finding required in 48 CFR 9903.201-6(b), that the change is desirable and not detrimental to the interests of the Government, negotiate an equitable adjustment as provided in the Changes clause of this contract. In the absence of the required finding, no agreement may be made under this contract clause that will increase costs paid by the United States.

(4) Agree to an adjustment of the contract price or cost allowance, as appropriate, if the Contractor or a subcontractor fails to comply with the applicable CAS or to follow any cost accounting practice, and such failure results in any increased costs paid by the United States. Such adjustment shall provide for recovery of the increased costs to the United States together with interest thereon computed at the annual rate of interest established under the Internal Revenue Code of 1986 (26 U.S.C. 6621), from the time the payment by the United States was made to the time the adjustment is effected.

(b) If the parties fail to agree whether the Contractor has complied with an applicable CAS, rule, or regulation as specified in 48 CFR 9903 and 9904 and as to any cost adjustment demanded by the United States, such failure to agree will constitute a dispute under the Contract Disputes Act (41 U.S.C. 601).

(c) The Contractor shall permit any authorized representatives of the Government to examine and make copies of any documents, papers, and records relating to compliance with the requirements of this clause.

(d) The Contractor shall include in all negotiated subcontracts, which the Contractor enters into, the substance of this clause, except paragraph (b), and shall require such inclusion in all other subcontracts of any tier, except that--

(1) If the subcontract is awarded to a business unit which pursuant to 48 CFR 9903.201-2 is subject to other types of CAS coverage, the substance of the applicable clause set forth in subsection 30.201-4 of the Federal Acquisition Regulation shall be inserted.

(2) This requirement shall apply only to negotiated subcontracts in excess of $500,000.

(3) The requirement shall not apply to negotiated subcontracts otherwise exempt from the requirement to include a CAS clause as specified in 48 CFR 9903.201-1.

52.230-6 ADMINISTRATION OF COST ACCOUNTING STANDARDS (NOV 1999)

For the purpose of administering the Cost Accounting Standards (CAS) requirements under this contract, the Contractor shall take the steps outlined in paragraphs (a) through (g) of this clause:

(a) Submit to the Contracting Officer a description of any cost accounting practice change, the total potential impact of the change on contracts containing a CAS clause, and a general dollar magnitude of the change which identifies the potential shift of costs between CAS-covered contracts by contract type (i.e., firm-fixed-price, incentive, cost-plus-fixed fee, etc.) and other

contractor business activity. As related to CAS-covered contracts, the analysis should identify the potential impact on funds of the various Agencies/Departments (i.e., Department of Energy, National Aeronautics and Space Administration, Army, Navy, Air Force, other Department of Defense, other Government) as follows:

(1) For any change in cost accounting practices required in accordance with subparagraph (a)(3) and subdivision (a)(4)(i) of the clause at FAR 52.230-2, Cost Accounting Standards; or subparagraph (a)(3) and subdivisions (a)(4)(i) or (a)(4)(iv) of the clause at FAR 52.230-5, Cost Accounting Standards-Educational Institution; within 60 days (or such other date as may be mutually agreed to) after award of a contract requiring this change.

(2) For any change in cost accounting practices proposed in accordance with subdivision (a)(4)(ii) or (iii) of the clauses at FAR 52.230-2, Cost Accounting Standards, and FAR 52.230-5, Cost Accounting Standards-Educational Institution; or with subparagraph (a)(3) of the clause at FAR 52.230-3, Disclosure and Consistency of Cost Accounting Practices, not less than 60 days (or such other date as may be mutually agreed to) before the effective date of the proposed change.

(3) For any failure to comply with an applicable CAS or to follow a disclosed practice (as contemplated by subparagraph (a)(5) at FAR 52.230-2, Cost Accounting Standards, and FAR 52.230-5, Cost Accounting
Standards-Educational Institution; or by subparagraph (a)(4) at FAR 52.230-3, Disclosure and Consistency of Cost Accounting Practices):

(i) Within 60 days (or such other date as may be mutually agreed to) after the date of agreement with the initial finding of noncompliance, or

(ii) In the event of Contractor disagreement with the initial finding of noncompliance, within 60 days of the date the Contractor is notified by the Contracting Officer of the determination of noncompliance.

(b) After an ACO, or cognizant Federal agency official, determination of materiality, submit a cost impact proposal in the form and manner specified by the Contracting Officer within 60 days (or such other date as may be mutually agreed to) after the date of determination of the adequacy and compliance of a change submitted pursuant to paragraph (a) of this clause. The cost impact proposal shall be in sufficient detail to permit evaluation, determination, and negotiation of the cost impact upon each separate CAS-covered contract and subcontract.

(1) Cost impact proposals submitted for changes in cost accounting practices required in accordance with subparagraph (a)(3) and subdivision (a)(4)(i) of the clause at FAR 52.230-2, Cost Accounting Standards; or subparagraph (a)(3) and subdivisions (a)(4)(i) or (a)(4)(iv) of the clause at FAR 52.230-5, Cost Accounting Standards-Educational Institution; shall identify the applicable standard or cost principle and all contracts and subcontracts containing the clauses entitled Cost Accounting Standards or Cost Accounting Standards-Educational Institution, which have an award date before the effective date of that standard or cost principle.

(2) Cost impact proposals submitted for any change in cost accounting practices proposed in accordance with subdivisions (a)(4) (ii) or (iii) of the clauses at FAR 52.230-2, Cost Accounting Standards, and FAR 52.230-5, Cost Accounting Standards-Educational Institution; or with subparagraph (a)(3) of the clause at FAR 52.230-3, Disclosure and Consistency of Cost Accounting Practices; shall identify all contracts and subcontracts containing the clauses at FAR 52.230-2, Cost Accounting Standards, FAR 52.230-5, Cost Accounting Standards-Educational Institution, and FAR 52.230-3, Disclosure and Consistency of Cost Accounting Practices.

(3) Cost impact proposals submitted for failure to comply with an applicable CAS or to follow a disclosed practice as contemplated by subparagraph (a)(5) of the clauses at FAR 52.230-2, Cost Accounting Standards, and FAR 52.230-5, Cost Accounting Standards-Educational Institution; or by subparagraph (a)(4) of the clause at FAR 52.230-3, Disclosure and Consistency of Cost Accounting Practices, shall identify the cost impact on each separate CAS covered contract from the date of failure to comply until the noncompliance is corrected.

(c) If the submissions required by paragraphs (a) and (b) of this clause are not submitted within the specified time, or any extension granted by the Contracting Officer, an amount not to exceed 10 percent of each subsequent amount determined payable related to the Contractor's CAS-covered prime contracts, up to the estimated general dollar magnitude of the cost impact, may be withheld until such time as the required submission has been provided in the form and manner specified by the Contracting Officer.

(d) Agree to appropriate contract and subcontract amendments to reflect adjustments established in accordance with subparagraphs (a)(4) and (a)(5) of the clauses at FAR 52.230-2 and 52.230-5 or with subparagraphs (a)(3) or (a)(4) of the Disclosure and Consistency of Cost Accounting Practices clause at FAR 52.230-3.

(e) For all subcontracts subject to the clauses at FAR 52.230-2, 52.230-3, or 52.230-5--

(1) So state in the body of the subcontract, in the letter of award, or in both (self-deleting clauses shall not be used);

(2) Include the substance of this clause in all negotiated subcontracts; and

(3) Within 30 days after award of the subcontract, submit the following information to the Contractor's cognizant contract administration office for transmittal to the contract administration office cognizant of the subcontractor's facility:

(i) Subcontractor's name and subcontract number.

(ii) Dollar amount and date of award.

(iii) Name of Contractor making the award.

(f) Notify the Contracting Officer in writing of any adjustments required to subcontracts under this contract and agree to an adjustment, based on them, to this contract price or estimated cost

and fee. This notice is due within 30 days after proposed subcontract adjustments are received and shall include a proposal for adjusting the higher tier subcontract or the prime contract appropriately.

(g) For subcontracts containing the clauses at FAR 52.230-2 or 52.230-5, require the subcontractor to comply with all Standards in effect on the date of award or of final agreement on price, as shown on the subcontractor's signed Certificate of Current Cost or Pricing Data, whichever is earlier.

52.232-5 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (MAY 1997)

(a) Payment of price. The Government shall pay the Contractor the contract price as provided in this contract.

(b) Progress payments. The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer.

(1) The Contractor's request for progress payments shall include the following substantiation:

(i) An itemization of the amounts requested, related to the various elements of work required by the contract covered by the payment requested.

(ii) A listing of the amount included for work performed by each subcontractor under the contract.

(iii) A listing of the total amount of each subcontract under the contract.

(iv) A listing of the amounts previously paid to each such subcontractor under the contract.

(v) Additional supporting data in a form and detail required by the Contracting Officer.

(2) In the preparation of estimates, the Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site also may be taken into consideration if--

(i) Consideration is specifically authorized by this contract; and

(ii) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract.

(c) Contractor certification. Along with each request for progress payments, the Contractor shall furnish the following certification, or payment shall not be made: (However, if the Contractor elects to delete paragraph (c)(4) from the certification, the certification is still acceptable.)

I hereby certify, to the best of my knowledge and belief, that--

(1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

(2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements and the requirements of chapter 39 of Title 31, United States Code;

(3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract; and

(4) This certification is not to be construed as final acceptance of a subcontractor's performance.

_____

(Name)

_____

(Title)

_____

(Date)

(d) Refund of unearned amounts. If the Contractor, after making a certified request for progress payments, discovers that a portion or all of such request constitutes a payment for performance by the Contractor that fails to conform to the specifications, terms, and conditions of this contract (hereinafter referred to as the "unearned amount"), the Contractor shall--

(1) Notify the Contracting Officer of such performance deficiency; and

(2) Be obligated to pay the Government an amount (computed by the Contracting Officer in the manner provided in paragraph (j) of this clause) equal to interest on the unearned amount from the 8th day after the date of receipt of the unearned amount until--

(i) The date the Contractor notifies the Contracting Officer that the performance deficiency has been corrected; or

(ii) The date the Contractor reduces the amount of any subsequent certified request for progress payments by an amount equal to the unearned amount.

(e) Retainage. If the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of 10 percent of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the contract, for which the price is stated separately in the contract, payment shall be made for the completed work without retention of a percentage.

(f) Title, liability, and reservation of rights. All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be construed as--

(1) Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or

(2) Waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(g) Reimbursement for bond premiums. In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full payment to the surety. The retainage provisions in paragraph (e) of this clause shall not apply to that portion of progress payments attributable to bond premiums.

(h) Final payment. The Government shall pay the amount due the Contractor under this contract after--

(1) Completion and acceptance of all work;

(2) Presentation of a properly executed voucher; and

(3) Presentation of release of all claims against
the Government arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned under the Assignment of Claims Act of 1940 (31 U.S.C. 3727 and 41 U.S.C. 15).

(i) Limitation because of undefinitized work. Notwithstanding any provision of this contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in FAR Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract

modifications issued pursuant to the Changes clause, or funding and other administrative changes.

(j) Interest computation on unearned amounts. In accordance with 31 U.S.C. 3903(c)(1), the amount payable under subparagraph (d)(2) of this clause shall be--

(1) Computed at the rate of average bond equivalent rates of 91-day Treasury bills auctioned at the most recent auction of such bills prior to the date the Contractor receives the unearned amount; and

(2) Deducted from the next available payment to the Contractor.

52.232-17 INTEREST (JUNE 1996)

(a) Except as otherwise provided in this contract under a Price Reduction for Defective Cost or Pricing Data clause or a Cost Accounting Standards clause, all amounts that become payable by the Contractor to the Government under this contract (net of any applicable tax credit under the Internal Revenue Code (26 U.S.C. 1481)) shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in Section 12 of the Contract Disputes Act of 1978 (Public Law 95-563), which is applicable to the period in which the amount becomes due, as provided in paragraph (b) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid. reproduce, prepare derivative works, distribute copies to the public, and (b) Amounts shall be due at the earliest of the following dates:

(1) The date fixed under this contract.

(2) The date of the first written demand for payment consistent with this contract, including any demand resulting from a default termination.

(3) The date the Government transmits to the Contractor a proposed supplemental agreement to confirm completed negotiations establishing the amount of debt.

(4) If this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or a negotiated pricing agreement not confirmed by contract modification.

(c) The interest charge made under this clause may be reduced under the procedures prescribed in 32.614-2 of the Federal Acquisition Regulation in effect on the date of this contract.

52.232-18 AVAILABILITY OF FUNDS (APR 1984)

Funds are not presently available for this contract. The Government's obligation under this contract is contingent upon the availability of appropriated funds from which payment for contract purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the Contracting Officer for this contract and until the Contractor receives notice of such availability, to be confirmed in writing by the Contracting Officer.

52.232-23 ASSIGNMENT OF CLAIMS (JAN 1986)

(a) The Contractor, under the Assignment of Claims Act, as amended, 31 U.S.C. 3727, 41 U.S.C. 15 (hereafter referred to as "the Act"), may assign its rights to be paid amounts due or to become due as a result of the performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency. The assignee under such an assignment may thereafter further assign or reassign its right under the original assignment to any type of financing institution described in the preceding sentence.

(b) Any assignment or reassignment authorized under the Act and this clause shall cover all unpaid amounts payable under this contract, and shall not be made to more than one party, except that an assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in the financing of this contract.

(c) The Contractor shall not furnish or disclose to any assignee under this contract any classified document (including this contract) or information related to work under this contract until the Contracting Officer authorizes such action in writing.

52.232-27 PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS (MAY 2001)

Notwithstanding any other payment terms in this contract, the Government will make invoice payments and contract financing payments under the terms and conditions specified in this clause. Payment shall be considered as being made on the day a check is dated or the date of an electronic funds transfer. Definitions of pertinent terms are set forth in sections 2.101 and 32.902 of the Federal Acquisition Regulation. All days referred to in this clause are calendar days, unless otherwise specified. (However, see subparagraph (a)(3) concerning payments due on Saturdays, Sundays, and legal holidays.)

(a) Invoice payments. (1) Types of invoice payments. For purposes of this clause, there are several types of invoice payments that may occur under this contract, as follows:

(i) Progress payments, if provided for elsewhere in this contract, based on Contracting Officer approval of the estimated amount and value of work or services performed, including payments for reaching milestones in any project:

(A) The due date for making such payments shall be 30 days after receipt of the payment request by the designated billing office. If the designated billing office fails to annotate the payment request with the actual date of receipt at the time of receipt, the payment due date shall be the 30th day after the date of the Contractor's payment request, provided a proper payment request is received and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(B) The due date for payment of any amounts retained by the Contracting Officer in accordance with the clause at 52.232-5, Payments Under Fixed-Price Construction Contracts, shall be as specified in the contract or, if not specified, 30 days after approval for release to the Contractor by the Contracting Officer.

(ii) Final payments based on completion and acceptance of all work and presentation of release of all claims against the Government arising by virtue of the contract, and payments for partial deliveries that have been accepted by the Government (e.g., each separate building, public work, or other division of the contract for which the price is stated separately in the contract):

(A) The due date for making such payments shall be either the 30th day after receipt by the designated billing office of a proper invoice from the Contractor, or the 30th day after Government acceptance of the work or services completed by the Contractor, whichever is later. If the designated billing office fails to annotate the invoice with the date of actual receipt at the time of receipt, the invoice payment due date shall be the 30th day after the date of the Contractor's invoice, provided a proper invoice is received and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(B) On a final invoice where the payment amount is subject to contract settlement actions (e.g., release of claims), acceptance shall be deemed to have occurred on the effective date of the contract settlement.

(2) Contractor's invoice. The Contractor shall prepare and submit invoices to the designated billing office specified in the contract. A proper invoice must include the items listed in subdivisions (a)(2)(i) through (a)(2)(ix) of this clause. If the invoice does not comply with these requirements, it shall be returned within 7 days after the date the designated billing office received the invoice, with a statement of the reasons why it is not a proper invoice. Untimely notification will be taken into account in computing any interest penalty owed the Contractor in the manner described in subparagraph (a)(4) of this clause.

(i) Name and address of the Contractor.

(ii) Invoice date. (The Contractor is encouraged to date invoices as close as possible to the date of mailing or transmission.)

(iii) Contract number or other authorization for work or services performed (including order number and contract line item number).

(iv) Description of work or services performed.

(v) Delivery and payment terms (e.g., prompt payment discount terms).

(vi) Name and address of Contractor official to whom payment is to be sent (must be the same as that in the contract or in a proper notice of assignment).

(vii) Name (where practicable), title, phone number, and mailing address of person to be notified in the event of a defective invoice.

(viii) For payments described in subdivision (a)(1)(i) of this clause, substantiation of the amounts requested and certification in accordance with the requirements of the clause at 52.232-5, Payments Under Fixed-Price Construction Contracts.

(ix) Any other information or documentation required by the contract.

(x) While not required, the Contractor is strongly encouraged to assign an identification number to each invoice.

(3) Interest penalty. An interest penalty shall be paid automatically by the designated payment office, without request from the Contractor, if payment is not made by the due date and the conditions listed in subdivisions (a)(3)(i) through (a)(3)(iii) of this clause are met, if applicable. However, when the due date falls on a Saturday, Sunday, or legal holiday when Federal Government offices are closed and Government business is not expected to be conducted, payment may be made on the following business day without incurring a late payment interest penalty.

(i) A proper invoice was received by the designated billing office.

(ii) A receiving report or other Government documentation authorizing payment was processed and there was no disagreement over quantity, quality, Contractor compliance with any contract term or condition, or requested progress payment amount.

(iii) In the case of a final invoice for any balance of funds due the Contractor for work or services performed, the amount was not subject to further contract settlement actions between the Government and the Contractor.

(4) Computing penalty amount. The interest penalty shall be at the rate established by the Secretary of the Treasury under section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) that is in effect on the day after the due date, except where the interest penalty is prescribed by other governmental authority (e.g., tariffs). This rate is referred to as the "Renegotiation Board Interest Rate," and it is published in the Federal Register semiannually on or about January 1 and July 1. The interest penalty shall accrue daily on the invoice principal payment amount approved by the Government until the payment date of such approved principal amount; and will be compounded in 30-day increments inclusive from the first day after the due date through the payment date. That is, interest accrued at the end of any 30-day period will be added to the approved invoice principal payment amount and will be subject to interest penalties if not paid in

the succeeding 30-day period. If the designated billing office failed to notify the Contractor of a defective invoice within the periods prescribed in subparagraph (a)(2) of this clause, the due date on the corrected invoice will be adjusted by subtracting from such date the number of days taken beyond the prescribed notification of defects period. Any interest penalty owed the Contractor will be based on this adjusted due date. Adjustments will be made by the designated payment office for errors in calculating interest penalties.

(i) For the sole purpose of computing an interest penalty that might be due the Contractor for payments described in subdivision (a)(1)(ii) of this clause, Government acceptance or approval shall be deemed to have occurred constructively on the 7th day after the Contractor has completed the work or services in accordance with the terms and conditions of the contract. In the event that actual acceptance or approval occurs within the constructive acceptance or approval period, the determination of an interest penalty shall be based on the actual date of acceptance or approval. Constructive acceptance or constructive approval requirements do not apply if there is a disagreement over quantity, quality, or Contractor compliance with a contract provision. These requirements also do not compel Government officials to accept work or services, approve Contractor estimates, perform contract administration functions, or make payment prior to fulfilling their responsibilities.

(ii) The following periods of time will not be included in the determination of an interest penalty:

(A) The period taken to notify the Contractor of defects in invoices submitted to the Government, but this may not exceed 7 days.

(B) The period between the defects notice and resubmission of the corrected invoice by the Contractor.

(C) For incorrect electronic funds transfer (EFT) information, in accordance with the EFT clause of this contract.

(iii) Interest penalties will not continue to accrue after the filing of a claim for such penalties under the clause at 52.233-1, Disputes, or for more than 1 year. Interest penalties of less than $1 need not be paid.

(iv) Interest penalties are not required on payment delays due to disagreement between the Government and the Contractor over the payment amount or other issues involving contract compliance, or on amounts temporarily withheld or retained in accordance with the terms of the contract. Claims involving disputes, and any interest that may be payable, will be resolved in accordance with the clause at 52.233-1, Disputes.

(5) Prompt payment discounts. An interest penalty also shall be paid automatically by the designated payment office, without request from the Contractor, if a discount for prompt payment is taken improperly. The interest penalty will be calculated on the amount of discount taken for the period beginning with the first day after the end of the discount period through the date when the Contractor is paid.

(6) Additional interest penalty. (i) If this contract was awarded on or after October 1, 1989, a penalty amount, calculated in accordance with subdivision (a)(6)(iii) of this clause, shall be paid in addition to the interest penalty amount if the Contractor--

(A) Is owed an interest penalty of $1 or more;

(B) Is not paid the interest penalty within 10 days after the date the invoice amount is paid; and

(C) Makes a written demand to the designated payment office for additional penalty payment, in accordance with subdivision (a)(6)(ii) of this clause, postmarked not later than 40 days after the date the invoice amount is paid.

(ii)(A) Contractors shall support written demands for additional penalty payments with the following data. No additional data shall be required. Contractors shall--

(1) Specifically assert that late payment interest is due under a specific invoice, and request payment of all overdue late payment interest penalty and such additional penalty as may be required;

(2) Attach a copy of the invoice on which the unpaid late payment interest was due; and

(3) State that payment of the principal has been received, including the date of receipt.

(B) Demands must be postmarked on or before the 40th day after payment was made, except that--

(1) If the postmark is illegible or nonexistent, the demand must have been received and annotated with the date of receipt by the designated payment office on or before the 40th day after payment was made; or

(2) If the postmark is illegible or nonexistent and the designated payment office fails to make the required annotation, the demand's validity will be determined by the date the Contractor has placed on the demand; provided such date is no later than the 40th day after payment was made.

(iii)(A) The additional penalty shall be equal to 100 percent of any original late payment interest penalty, except--

(1) The additional penalty shall not exceed $5,000;

(2) The additional penalty shall never be less than $25; and

(3) No additional penalty is owed if the amount of the underlying interest penalty is less than $1.

(B) If the interest penalty ceases to accrue in accordance with the limits stated in subdivision (a)(4)(iii) of this clause, the amount of the additional penalty shall be calculated on the amount of interest penalty that would have accrued in the absence of these limits, subject to the overall

limits on the additional penalty specified in subdivision (a)(6)(iii)(A) of this clause.

(C) For determining the maximum and minimum additional penalties, the test shall be the interest penalty due on each separate payment made for each separate contract. The maximum and minimum additional penalty shall not be based upon individual invoices unless the invoices are paid separately. Where payments are consolidated for disbursing purposes, the maximum and minimum additional penalty determination shall be made separately for each contract therein.

(D) The additional penalty does not apply to payments regulated by other Government regulations (e.g., payments under utility contracts subject to tariffs and regulation).

(b) Contract financing payments. (1) Due dates for recurring financing payments. If this contract provides for contract financing, requests for payment shall be submitted to the designated billing office as specified in this contract or as directed by the Contracting Officer. Contract financing payments shall be made on the [insert day as prescribed by Agency head; if not prescribed, insert 30th day] day after receipt of a proper contract financing request by the designated billing office. In the event that an audit or other review of a specific financing request is required to ensure compliance with the terms and conditions of the contract, the designated payment office is not compelled to make payment by the due date specified.

(2) Due dates for other contract financing. For advance payments, loans, or other arrangements that do not involve recurring submissions of contract financing requests, payment shall be made in accordance with the corresponding contract terms or as directed by the Contracting Officer.

(3) Interest penalty not applicable. Contract financing payments shall not be assessed an interest penalty for payment delays.

(c) Subcontract clause requirements. The Contractor shall include in each subcontract for property or services (including a material supplier) for the purpose of performing this contract the following:

(1) Prompt payment for subcontractors. A payment clause that obligates the Contractor to pay the subcontractor for satisfactory performance under its subcontract not later than 7 days from receipt of payment out of such amounts as are paid to the Contractor under this contract.

(2) Interest for subcontractors. An interest penalty clause that obligates the Contractor to pay to the subcontractor an interest penalty for each payment not made in accordance with the payment clause--

(i) For the period beginning on the day after the required payment date and ending on the date on which payment of the amount due is made; and

(ii) Computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty.

(3) Subcontractor clause flowdown. A clause requiring each subcontractor to include a payment clause and an interest penalty clause conforming to the standards set forth in subparagraphs (c)(1) and (c)(2) of this clause in each of its subcontracts, and to require each of its subcontractors to include such clauses in their subcontracts with each lower-tier subcontractor or supplier.

(d) Subcontract clause interpretation. The clauses required by paragraph (c) of this clause shall not be construed to impair the right of the Contractor or a subcontractor at any tier to negotiate, and to include in their subcontract, provisions that--

(1) Retainage permitted. Permit the Contractor or a subcontractor to retain (without cause) a specified percentage of each progress payment otherwise due to a subcontractor for satisfactory performance under the subcontract without incurring any obligation to pay a late payment interest penalty, in accordance with terms and conditions agreed to by the parties to the subcontract, giving such recognition as the parties deem appropriate to the ability of a subcontractor to furnish a performance bond and a payment bond;

(2) Withholding permitted. Permit the Contractor or subcontractor to make a determination that part or all of the subcontractor's request for payment may be withheld in accordance with the subcontract agreement; and

(3) Withholding requirements. Permit such withholding without incurring any obligation to pay a late payment penalty if--

(i) A notice conforming to the standards of paragraph (g) of this clause previously has been furnished to the subcontractor; and

(ii) A copy of any notice issued by a Contractor pursuant to subdivision (d)(3)(i) of this clause has been furnished to the Contracting Officer.

(e) Subcontractor withholding procedures. If a Contractor, after making a request for payment to the Government but before making a payment to a subcontractor for the subcontractor's performance covered by the payment request, discovers that all or a portion of the payment otherwise due such subcontractor is subject to withholding from the subcontractor in accordance with the subcontract agreement, then the Contractor shall--

(1) Subcontractor notice. Furnish to the subcontractor a notice conforming to the standards of paragraph (g) of this clause as soon as practicable upon ascertaining the cause giving rise to a withholding, but prior to the due date for subcontractor payment;

(2) Contracting Officer notice. Furnish to the Contracting Officer, as soon as practicable, a copy of the notice furnished to the subcontractor pursuant to subparagraph (e)(1) of this clause;

(3) Subcontractor progress payment reduction. Reduce the subcontractor's progress payment by an amount not to exceed the amount specified in the notice of withholding furnished under

subparagraph (e)(1) of this clause;

(4) Subsequent subcontractor payment. Pay the subcontractor as soon as practicable after the correction of the identified subcontract performance deficiency, and--

(i) Make such payment within--

(A) Seven days after correction of the identified subcontract performance deficiency (unless the funds therefor must be recovered from the Government because of a reduction under subdivision (e)(5)(i)) of this clause; or

(B) Seven days after the Contractor recovers such funds from the Government; or

(ii) Incur an obligation to pay a late payment interest penalty computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contracts Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty;

(5) Notice to Contracting Officer. Notify the Contracting Officer upon--

(i) Reduction of the amount of any subsequent certified application for payment; or

(ii) Payment to the subcontractor of any withheld amounts of a progress payment, specifying--

(A) The amounts withheld under subparagraph (e)(1) of this clause; and

(B) The dates that such withholding began and ended; and

(6) Interest to Government. Be obligated to pay to the Government an amount equal to interest on the withheld payments (computed in the manner provided in 31 U.S.C. 3903(c)(1)), from the 8th day after receipt of the withheld amounts from the Government until--

(i) The day the identified subcontractor performance deficiency is corrected; or

(ii) The date that any subsequent payment is reduced under subdivision (e)(5)(i) of this clause.

(f) Third-party deficiency reports. (1) Withholding from subcontractor. If a Contractor, after making payment to a first-tier subcontractor, receives from a supplier or subcontractor of the first-tier subcontractor (hereafter referred to as a "second-tier subcontractor") a written notice in accordance with section 2 of the Act of August 24, 1935 (40 U.S.C. 270b, Miller Act), asserting a deficiency in such first-tier subcontractor's performance under the contract for which the Contractor may be ultimately liable, and the Contractor determines that all or a portion of future payments otherwise due such first-tier subcontractor is subject to withholding in accordance with the subcontract agreement, the Contractor may, without incurring an obligation to pay an interest penalty under subparagraph (e)(6) of this clause--

(i) Furnish to the first-tier subcontractor a notice conforming to the standards of paragraph (g) of this clause as soon as practicable upon making such determination; and

(ii) Withhold from the first-tier subcontractor's next available progress payment or payments an amount not to exceed the amount specified in the notice of withholding furnished under subdivision (f)(1)(i) of this clause.

(2) Subsequent payment or interest charge. As soon as practicable, but not later than 7 days after receipt of satisfactory written notification that the identified subcontract performance deficiency has been corrected, the Contractor shall--

(i) Pay the amount withheld under subdivision (f)(1)(ii) of this clause to such first-tier subcontractor; or

(ii) Incur an obligation to pay a late payment interest penalty to such first-tier subcontractor computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contracts Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty.

(g) Written notice of subcontractor withholding. A written notice of any withholding shall be issued to a subcontractor (with a copy to the Contracting Officer of any such notice issued by the Contractor), specifying--

(1) The amount to be withheld;

(2) The specific causes for the withholding under the terms of the subcontract; and

(3) The remedial actions to be taken by the subcontractor in order to receive payment of the amounts withheld.

(h) Subcontractor payment entitlement. The Contractor may not request payment from the Government of any amount withheld or retained in accordance with paragraph (d) of this clause until such time as the Contractor has determined and certified to the Contracting Officer that the subcontractor is entitled to the payment of such amount.

(i) Prime-subcontractor disputes. A dispute between the Contractor and subcontractor relating to the amount or entitlement of a subcontractor to a payment or a late payment interest penalty under a clause included in the subcontract pursuant to paragraph (c) of this clause does not constitute a dispute to which the United States is a party. The United States may not be interpleaded in any judicial or administrative proceeding involving such a dispute.

(j) Preservation of prime-subcontractor rights. Except as provided in paragraph (i) of this clause, this clause shall not limit or impair any contractual, administrative, or judicial remedies otherwise available to the Contractor or a subcontractor in the event of a dispute involving late payment or nonpayment by the Contractor or deficient subcontract performance or

nonperformance by a subcontractor.

(k) Non-recourse for prime contractor interest penalty. The Contractor's obligation to pay an interest penalty to a subcontractor pursuant to the clauses included in a subcontract under paragraph (c) of this clause shall not be construed to be an obligation of the United States for such interest penalty. A cost-reimbursement claim may not include any amount for reimbursement of such interest penalty.

52.232-33 PAYMENT BY ELECTRONIC FUNDS TRANSFER—CENTRAL CONTRACTOR REGISTRATION (MAY 1999)

(a) Method of payment. (1) All payments by the Government under this contract shall be made by electronic funds transfer (EFT), except as provided in paragraph (a)(2) of this clause. As used in this clause, the term “EFT” refers to the funds transfer and may also include the payment information transfer.

(2) In the event the Government is unable to release one or more payments by EFT, the Contractor agrees to either--

(i) Accept payment by check or some other mutually agreeable method of payment; or

(ii) Request the Government to extend the payment due date until such time as the Government can make payment by EFT (but see paragraph (d) of this clause).

(b) Contractor's EFT information. The Government shall make payment to the Contractor using the EFT information contained in the Central Contractor Registration (CCR) database. In the event that the EFT information changes, the Contractor shall be responsible for providing the updated information to the CCR database.

(c) Mechanisms for EFT payment. The Government may make payment by EFT through either the Automated Clearing House (ACH) network, subject to the rules of the National Automated Clearing House Association, or the Fedwire Transfer System. The rules governing Federal payments through the ACH are contained in 31 CFR part 210.

(d) Suspension of payment. If the Contractor's EFT information in the CCR database is incorrect, then the Government need not make payment to the Contractor under this contract until correct EFT information is entered into the CCR database; and any invoice or contract financing request shall be deemed not to be a proper invoice for the purpose of prompt payment under this contract. The prompt payment terms of the contract regarding notice of an improper invoice and delays in accrual of interest penalties apply.

(e) Contractor EFT arrangements. If the Contractor has identified multiple payment receiving points (i.e., more than one remittance address and/or EFT information set) in the CCR database, and the Contractor has not notified the Government of the payment receiving point applicable to

this contract, the Government shall make payment to the first payment receiving point (EFT information set or remittance address as applicable) listed in the CCR database.

(f) Liability for uncompleted or erroneous transfers. (1) If an uncompleted or erroneous transfer occurs because the Government used the Contractor's EFT information incorrectly, the Government remains responsible for--

(i) Making a correct payment;

(ii) Paying any prompt payment penalty due; and

(iii) Recovering any erroneously directed funds.

(2) If an uncompleted or erroneous transfer occurs because the Contractor's EFT information was incorrect, or was revised within 30 days of Government release of the EFT payment transaction instruction to the Federal Reserve System, and--

(i) If the funds are no longer under the control of the payment office, the Government is deemed to have made payment and the Contractor is responsible for recovery of any erroneously directed funds; or

(ii) If the funds remain under the control of the payment office, the Government shall not make payment, and the provisions of paragraph (d) of this clause shall apply.

(g) EFT and prompt payment. A payment shall be deemed to have been made in a timely manner in accordance with the prompt payment terms of this contract if, in the EFT payment transaction instruction released to the Federal Reserve System, the date specified for settlement of the payment is on or before the prompt payment due date, provided the specified payment date is a valid date under the rules of the Federal Reserve System.

(h) EFT and assignment of claims. If the Contractor assigns the proceeds of this contract as provided for in the assignment of claims terms of this contract, the Contractor shall require as a condition of any such assignment, that the assignee shall register in the CCR database and shall be paid by EFT in accordance with the terms of this clause. In all respects, the requirements of this clause shall apply to the assignee as if it were the Contractor. EFT information that shows the ultimate recipient of the transfer to be other than the Contractor, in the absence of a proper assignment of claims acceptable to the Government, is incorrect EFT information within the meaning of paragraph (d) of this clause.

(i) Liability for change of EFT information by financial agent. The Government is not liable for errors resulting from changes to EFT information made by the Contractor's financial agent.

(j) Payment information. The payment or disbursing office shall forward to the Contractor available payment information that is suitable for transmission as of the date of release of the EFT instruction to the Federal Reserve System. The Government may request the Contractor to designate a desired format and method(s) for delivery of payment information from a list of

formats and methods the payment office is capable of executing. However, the Government does not guarantee that any particular format or method of delivery is available at any particular payment office and retains the latitude to use the format and delivery method most convenient to the Government. If the Government makes payment by check in accordance with paragraph (a) of this clause, the Government shall mail the payment information to the remittance address contained in the CCR database.

(End of Clause)

52.233-1 DISPUTES. (DEC 1998)

(a) This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613).

(b) Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause.

(c) "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. A claim arising under a contract, unlike a claim relating to that contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $100,000 is not a claim under the Act until certified as required by subparagraph (d)(2) of this clause. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(d)(1) A claim by the Contractor shall be made in writing and, unless otherwise stated in this contract, submitted within 6 years after accrual of the claim to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2)(i) The contractors shall provide the certification specified in subparagraph (d)(2)(iii) of this clause when submitting any claim -

(A) Exceeding $100,000; or

(B) Regardless of the amount claimed, when using -

(1) Arbitration conducted pursuant to 5 U.S.C. 575-580; or

(2) Any other alternative means of dispute resolution (ADR) technique that the agency elects to handle in accordance with the Administrative Dispute Resolution Act (ADRA).

(ii) The certification requirement does not apply to issues in controversy that have not been submitted as all or part of a claim.

(iii) The certification shall state as follows: "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable; and that I am duly authorized to certify the claim on behalf of the Contractor.

(3) The certification may be executed by any person duly authorized to bind the Contractor with respect to the claim.

(e) For Contractor claims of $100,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $100,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

(g) If the claim by the Contractor is submitted to the Contracting Officer or a claim by the Government is presented to the Contractor, the parties, by mutual consent, may agree to use alternative disput resolution (ADR). If the Contractor refuses an offer for ADR, the Contractor shall inform the Contracting Officer, in writing, of the Contractor's specific reasons for rejecting the request.

(h) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (certified, if required); or (2) the date that payment otherwise would be due, if that date is later, until the date of payment. With regard to claims having defective certifications, as defined in (FAR) 48 CFR 33.201, interest shall be paid from the date that the Contracting Officer initially receives the claim. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

(i) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under the contract, and comply with any decision of the Contracting Officer.

(End of clause)

52.233-3 PROTEST AFTER AWARD (AUG. 1996)

(a) Upon receipt of a notice of protest (as defined in FAR 33.101) or a determination that a protest is likely (see FAR 33.102(d)), the Contracting Officer may, by written order to the

Contractor, direct the Contractor to stop performance of the work called for by this contract. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage. Upon receipt of the final decision in the protest, the Contracting Officer shall either--

(1) Cancel the stop-work order; or

(2) Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the Government, clause of this contract.

(b) If a stop-work order issued under this clause is canceled either before or after a final decision in the protest, the Contractor shall resume work. The Contracting Officer shall make an equitable adjustment in the delivery schedule or contract price, or both, and the contract shall be modified, in writing, accordingly, if--

(1) The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of this contract; and

(2) The Contractor asserts its right to an adjustment within 30 days after the end of the period of work stoppage; provided, that if the Contracting Officer decides the facts justify the action, the Contracting Officer may receive and act upon a proposal at any time before final payment under this contract.

(c) If a stop-work order is not canceled and the work covered by the order is terminated for the convenience of the Government, the Contracting Officer shall allow reasonable costs resulting from the stop-work order in arriving at the termination settlement.

(d) If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer shall allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

(e) The Government's rights to terminate this contract at any time are not affected by action taken under this clause.

(f) If, as the result of the Contractor's intentional or negligent misstatement, misrepresentation, or miscertification, a protest related to this contract is sustained, and the Government pays costs, as provided in FAR 33.102(b)(2) or 33.104(h)(1), the Government may require the Contractor to reimburse the Government the amount of such costs. In addition to any other remedy available, and pursuant to the requirements of Subpart 32.6, the Government may collect this debt by offsetting the amount against any payment due the Contractor under any contract between the Contractor and the Government.

52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least 30 percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

52.236-2 DIFFERING SITE CONDITIONS (APR 1984)

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of

(1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or

(2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

52.236-3 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984)

(a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to

(1) conditions bearing upon transportation, disposal, handling, and storage of materials;

(2) the availability of labor, water, electric power, and roads;

(3) uncertainties of weather, river stages, tides, or similar physical conditions at the site;

(4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government.

(b) The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

52.236-5 MATERIAL AND WORKMANSHIP (APR 1984)

(a) All equipment, material, and articles incorporated into the work covered by this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.

(b) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. When directed to do so, the Contractor shall submit samples for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

(c) All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may require, in writing, that the Contractor remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable.

52.236-6 SUPERINTENDENCE BY THE CONTRACTOR (APR 1984)

At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the worksite a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

52.236-7 PERMITS AND RESPONSIBILITIES (NOV 1991)

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.

52.236-8 OTHER CONTRACTS (APR 1984)

The Government may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with Government employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by Government employees.

52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS (APR 1984)

(a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

(b) The Contractor shall protect from damage all existing improvements and utilities

(1) at or near the work site, and

(2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

52.236-10 OPERATIONS AND STORAGE AREAS (APR 1984)

(a) The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

(b) Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

(c) The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

52.236-11 USE AND POSSESSION PRIOR TO COMPLETION (APR 1984)

(a) The Government shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the Government intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use shall not be deemed an acceptance of any work under the contract.

(b) While the Government has such possession or use, the Contractor shall be relieved of the

responsibility for the loss of or damage to the work resulting from the Government's possession or use, notwithstanding the terms of the clause in this contract entitled "Permits and Responsibilities." If prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

52.236-12 CLEANING UP (APR 1984)

The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. Before completing the work, the Contractor shall remove from the work and premises any rubbish, tools, scaffolding, equipment, and materials that are not the property of the Government. Upon completing the work, the Contractor shall leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer.

52.236-13 ACCIDENT PREVENTION (NOV 1991)

(a) The Contractor shall provide and maintain work environments and procedures which will

(1) safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities;

(2) avoid interruptions of Government operations and delays in project completion dates; and

(3) control costs in the performance of this contract.

(b) For these purposes on contracts for construction or dismantling, demolition, or removal of improvements, the Contractor shall-

(1) Provide appropriate safety barricades, signs, and signal lights;

(2) Comply with the standards issued by the Secretary of Labor at 29 CFR Part 1926 and 29 CFR Part 1910; and

(3) Ensure that any additional measures the Contracting Officer determines to be reasonably necessary for the purposes are taken.

(c) If this contract is for construction or dismantling, demolition or removal of improvements with any Department of Defense agency or component, the Contractor shall comply with all pertinent provisions of the latest version of U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, in effect on the date of the solicitation.

(d) Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety

of the public or Government personnel, the Contracting Officer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this clause.

(e) The Contractor shall insert this clause, including this paragraph (e), with appropriate changes in the designation of the parties, in subcontracts.

52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS (APR 1984)

(a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

(b) The Contractor shall enter the actual progress on the chart as directed by the Contracting Officer, and upon doing so shall immediately deliver three copies of the annotated schedule to the Contracting Officer. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

52.236-17 LAYOUT OF WORK (APR 1984)

The Contractor shall lay out its work from Government established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

52.236-21 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FEB 1997)

(a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(b) Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", of the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by," or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(c) Where "as shown," as indicated", "as detailed", or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place," that is "furnished and installed".

(d) Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements, and (2) the installation (i.e., fit, and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the contractor to explain in detail specific portions of the work required by the contract. The Government may duplicate, use, and disclose in any manner and

for any purpose shop drawings delivered under this contract.

(e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.

(f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation, the Contracting Officer shall issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

(g) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the Contracting Officer and one set will be returned to the Contractor.

52.236-26 PRECONSTRUCTION CONFERENCE (FEB 1995)

If the Contracting Officer decides to conduct a preconstruction conference, the successful offeror will be notified and will be required to attend. The Contracting Officer's notification will include specific details regarding the date, time, and location of the conference, any need for attendance by subcontractors, and information regarding the items to be discussed.

52.242-13 BANKRUPTCY (JUL 1995)

In the event the Contractor enters into proceedings relating to bankruptcy, whether voluntary or involuntary, the Contractor agrees to furnish, by certified mail or electronic commerce method authorized by the contract, written notification of the bankruptcy to the Contracting Officer responsible for administering the contract. This notification shall be furnished within five days of the initiation of the proceedings relating to bankruptcy filing. This notification shall include the date on which the bankruptcy petition was filed, the identity of the court in which the bankruptcy petition was filed, and a listing of Government contract numbers and contracting offices for all Government contracts against which final payment has not been made. This obligation remains in effect until final payment under this contract.

(End of clause)

52.242-14 SUSPENSION OF WORK (APR 1984)

(a) The Contracting Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the Government.

(b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified in this contract (or within a reasonable time if not specified), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by the unreasonable suspension, delay, or interruption, and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this contract. (c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

52.243-4 CHANGES (AUG 1987)

(a) The Contracting Officer may, at any time, without notice to the sureties, if any, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract, including changes--

(1) In the specifications (including drawings and designs);

(2) In the method or manner of performance of the work;

(3) In the Government-furnished facilities, equipment, materials, services, or site; or

(4) Directing acceleration in the performance of the work.

(b) Any other written or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating

(1) the date, circumstances, and source of the order and

(2) that the Contractor regards the order as a change order.

(c) Except as provided in this clause, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for an adjustment based on defective specifications, no adjustment for any change under paragraph (b) of this clause shall be made for any costs incurred more than 20 days before the Contractor gives written notice as required. In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.

(e) The Contractor must assert its right to an adjustment under this clause within 30 days after

(1) receipt of a written change order under paragraph (a) of this clause or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting to the Contracting Officer a written statement describing the general nature and amount of the proposal, unless this period is extended by the Government. The statement of proposal for adjustment may be included in the notice under paragraph (b) above.

(f) No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

52.244-2 SUBCONTRACTS (AUG 1998)

(a) Definitions. As used in this clause--

Approved purchasing system means a Contractor's purchasing system that has been reviewed and approved in accordance with Part 44 of the Federal Acquisition Regulation (FAR).

Consent to subcontract means the Contracting Officer's written consent for the Contractor to enter into a particular subcontract.

Subcontract means any contract, as defined in FAR Subpart 2.1, entered into by a subcontractor to furnish supplies or services for performance of the prime contract or a subcontract. It includes, but is not limited to, purchase orders, and changes and modifications to purchase orders.

(b) This clause does not apply to subcontracts for special test equipment when the contract contains the clause at FAR 52.245-18, Special Test Equipment.

(c) When this clause is included in a fixed-price type contract, consent to subcontract is required only on unpriced contract actions (including unpriced modifications or unpriced delivery orders), and only if required in accordance with paragraph (d) or (e) of this clause.

(d) If the Contractor does not have an approved purchasing system, consent to subcontract is required for any subcontract that--

(1) Is of the cost-reimbursement, time-and-materials, or labor-hour type; or

(2) Is fixed-price and exceeds--

(i) For a contract awarded by the Department of Defense, the Coast Guard, or the National Aeronautics and Space Administration, the greater of the simplified acquisition threshold or 5 percent of the total estimated cost of the contract; or

(ii) For a contract awarded by a civilian agency other than the Coast Guard and the National Aeronautics and Space Administration, either the simplified acquisition threshold or 5 percent of the total estimated cost of the contract.

(e) If the Contractor has an approved purchasing system, the Contractor nevertheless shall obtain the Contracting Officer's written consent before placing the following subcontracts:

(f)(1) The Contractor shall notify the Contracting Officer reasonably in advance of placing any subcontract or modification thereof for which consent is required under paragraph (c), (d), or (e) of this clause, including the following information:

(i) A description of the supplies or services to be subcontracted.

(ii) Identification of the type of subcontract to be used.

(iii) Identification of the proposed subcontractor.

(iv) The proposed subcontract price.

(v) The subcontractor's current, complete, and accurate cost or pricing data and Certificate of Current Cost or Pricing Data, if required by other contract provisions.

(vi) The subcontractor's Disclosure Statement or Certificate relating to Cost Accounting Standards when such data are required by other provisions of this contract.

(vii) A negotiation memorandum reflecting--

(A) The principal elements of the subcontract price negotiations;

(B) The most significant considerations controlling establishment of initial or revised prices;

(C) The reason cost or pricing data were or were not required;

(D) The extent, if any, to which the Contractor did not rely on the subcontractor's cost or pricing data in determining the price objective and in negotiating the final price;

(E) The extent to which it was recognized in the negotiation that the subcontractor's cost or pricing data were not accurate, complete, or current; the action taken by the Contractor and the subcontractor; and the effect of any such defective data on the total price negotiated;

(F) The reasons for any significant difference between the Contractor's price objective and the price negotiated; and

(G) A complete explanation of the incentive fee or profit plan when incentives are used. The explanation shall identify each critical performance element, management decisions used to quantify each incentive element, reasons for the incentives, and a summary of all trade-off possibilities considered.

(2) The Contractor is not required to notify the Contracting Officer in advance of entering into any subcontract for which consent is not required under paragraph (c), (d), or (e) of this clause.

(g) Unless the consent or approval specifically provides otherwise, neither consent by the Contracting Officer to any
subcontract nor approval of the Contractor's purchasing system shall constitute a determination--

(1) Of the acceptability of any subcontract terms or conditions;

(2) Of the allowability of any cost under this contract; or

(3) To relieve the Contractor of any responsibility for performing this contract.

(h) No subcontract or modification thereof placed under this contract shall provide for payment on a cost-plus-a-percentage-of-cost basis, and any fee payable under cost-reimbursement type subcontracts shall not exceed the fee limitations in FAR 15.404-4(c)(4)(i).

(i) The Contractor shall give the Contracting Officer immediate written notice of any action or suit filed and prompt notice of any claim made against the Contractor by any subcontractor or vendor that, in the opinion of the Contractor, may result in litigation related in any way to this contract, with respect to which the Contractor may be entitled to reimbursement from the Government.

(j) The Government reserves the right to review the Contractor's purchasing system as set forth in FAR Subpart 44.3.

(k) Paragraphs (d) and (f) of this clause do not apply to the following subcontracts, which were evaluated during negotiations:

(End of clause)

52.244-5 COMPETITION IN SUBCONTRACTING (DEC 1996)

(a) The Contractor shall select subcontractors (including suppliers) on a competitive basis to the maximum practical extent consistent with the objectives and requirements of the contract.

(b) If the Contractor is an approved mentor under the Department of Defense Pilot Mentor-Protege Program (Pub. L. 101–510, section 831 as amended), the Contractor may award subcontracts under this contract on a noncompetitive basis to its proteges.

52.246-12 INSPECTION OF CONSTRUCTION (AUG 1996)

(a) Definition. "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of components.

(b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government. All work shall be conducted under the general direction of the Contracting Officer and is subject to Government inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.

(c) Government inspections and tests are for the sole benefit of the Government and do not--

(1) Relieve the Contractor of responsibility for providing adequate quality control measures;

(2) Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;

(3) Constitute or imply acceptance; or

(4) Affect the continuing rights of the Government after acceptance of the completed work under paragraph (i) of this section.

(d) The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization.

(e) The Contractor shall promptly furnish, at no increase in contract price, all facilities, labor,

and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The Government may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The Government shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

(f) The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(g) If the Contractor does not promptly replace or correct rejected work, the Government may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor or (2) terminate for default the Contractor's right to proceed.

(h) If, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.

(i) Unless otherwise specified in the contract, the Government shall accept, as promptly as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the Government's rights under any warranty or guarantee.

52.246-21 WARRANTY OF CONSTRUCTION (MAR 1994)

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.
(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice;

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(End of clause)

52.247-63 PREFERENCE FOR U.S.-FLAG AIR CARRIERS (JAN 1997)

(a) "International air transportation," as used in this clause, means transportation by air between a place in the United States and a place outside the United States or between two places both of which are outside the United States.

"United States," as used in this clause, means the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, and possessions of the United States.

“U.S.-flag air carrier”, as used in this clause, means an air carrier holding a certificate under 49 U.S.C. Chapter 411.

(b) Section 5 of the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. 40118) (Fly America Act) requires that all Federal agencies and Government contractors and subcontractors use U.S.-flag air carriers for U.S. Government-financed international air transportation of personnel (and their personal effects) or property, to the extent that service by those carriers is available. It requires the Comptroller General of the United States, in the absence of satisfactory proof of the necessity for foreign-flag air transportation, to disallow expenditures from funds, appropriated or otherwise established for the account of the United States, for international air transportation secured aboard a foreign-flag air carrier if a U.S.-flag air carrier is available to provide such services.

(c) The Contractor agrees, in performing work under this contract, to use U.S.-flag air carriers for international air transportation of personnel (and their personal effects) or property to the extent that service by those carriers is available.

(d) In the event that the Contractor selects a carrier other than a U.S.-flag air carrier for international air transportation, the Contractor shall include a statement on vouchers involving such transportation essentially as follows:

STATEMENT OF UNAVAILABILITY OF U.S.-FLAG AIR CARRIERS

International air transportation of persons (and their personal effects) or property by U.S.-flag air carrier was not available or it was necessary to use foreign-flag air carrier service for the following reasons (see section 47.403 of the Federal Acquisition Regulation): [State reasons]:

_____

(End of statement)

(e) The Contractor shall include the substance of this clause, including this paragraph (e), in each subcontract or purchase under this contract that may involve international air transportation.

52.248-3 VALUE ENGINEERING--CONSTRUCTION (FEB 2000)

(a) General. The Contractor is encouraged to develop, prepare, and submit value engineering change proposals (VECP's) voluntarily. The Contractor shall share in any instant contract savings realized from accepted VECP's, in accordance with paragraph (f) below.

(b) Definitions. "Collateral costs," as used in this clause, means agency costs of operation, maintenance, logistic support, or Government-furnished property.

"Collateral savings," as used in this clause, means those measurable net reductions resulting from a VECP in the agency's overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.

"Contractor's development and implementation costs," as used in this clause, means those costs the Contractor incurs on a VECP specifically in developing, testing, preparing, and submitting the VECP, as well as those costs the Contractor incurs to make the contractual changes required by Government acceptance of a VECP.

"Government costs," as used in this clause, means those agency costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistic support. The term does not include the normal administrative costs of processing the VECP.

"Instant contract savings," as used in this clause, means the estimated reduction in Contractor cost of performance resulting from acceptance of the VECP, minus allowable Contractor's development and implementation costs, including subcontractors' development and implementation costs (see paragraph (h) below).

"Value engineering change proposal (VECP)" means a proposal that--

(1) Requires a change to this, the instant contract, to implement; and

(2) Results in reducing the contract price or estimated cost without impairing essential functions or characteristics; provided, that it does not involve a change--

(i) In deliverable end item quantities only; or

(ii) To the contract type only.

(c) VECP preparation. As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change is affected by contractually required configuration management or similar procedures, the instructions in those procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following:

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effect of the change on the end item's performance.

(2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revisions.

(3) A separate, detailed cost estimate for

(i) the affected portions of the existing contract requirement and

(ii) the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (h) below.

(4) A description and estimate of costs the Government may incur in implementing the VECP, such as test and evaluation and operating and support costs.

(5) A prediction of any effects the proposed change would have on collateral costs to the agency.

(6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.

(7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

(d) Submission. The Contractor shall submit VECP's to the Resident Engineer at the worksite, with a copy to the Contracting Officer.

(e) Government action.

(1) The Contracting Officer will notify the Contractor of the status of the VECP within 45 calendar days after the contracting office receives it. If additional time is required, the Contracting Officer will notify the Contractor within the 45-day period and provide the reason for the delay and the expected date of the decision. The Government will process VECP's expeditiously; however, it shall not be liable for any delay in acting upon a VECP.

If the VECP is not accepted, the Contracting Officer will notify the Contractor in writing, explaining the reasons for rejection. The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Government. The Contracting Officer may require that the Contractor provide written notification before undertaking significant expenditures for VECP effort.

Any VECP may be accepted, in whole or in part, by the Contracting Officer's award of a modification to this contract citing this clause. The Contracting Officer may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a contract modification applies a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The decision to accept or reject all or part of any VECP is a unilateral decision made solely at the discretion of the Contracting Officer.

(f) Sharing.

(1) Rates. The Government's share of savings is determined by subtracting Government costs from instant contract savings and multiplying the result by

(i) 45 percent for fixed-price contracts or

(ii) 75 percent for cost-reimbursement contracts.

(2) Payment. Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a modification to this contract to--

(i) Accept the VECP;

(ii) Reduce the contract price or estimated cost by the amount of instant contract savings; and

(iii) Provide the Contractor's share of savings by adding the amount calculated to the contract price or fee.

(g) Collateral savings. If a VECP is accepted, the Contracting Officer will increase the instant contract amount by 20 percent of any projected collateral savings determined to be realized in a typical year of use after subtracting any Government costs not previously offset. However, the Contractor's share of collateral savings will not exceed the contract's firm-fixed-price or estimated cost, at the time the VECP is accepted, or $100,000, whichever is greater. The Contracting Officer is the sole determiner of the amount of collateral savings.

(h) Subcontracts. The Contractor shall include an appropriate value engineering clause in any subcontract of $50,000 or more and may include one in subcontracts of lesser value. In computing any adjustment in this contract's price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Government under this contract, but shall exclude any value engineering incentive payments to a subcontractor. The Contractor may choose any arrangement for subcontractor value engineering incentive payments; provided, that these payments shall not reduce the Government's share of the savings resulting from the VECP.

(i) Data. The Contractor may restrict the Government's right to use any part of a VECP or the supporting data by marking the following legend on the affected parts:

"These data, furnished under the Value Engineering-- Construction clause of contract . . . . . , shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a value engineering change proposal submitted under the clause. This restriction does not limit the Government's right to use information contained in these data if it has been obtained or is otherwise available from the Contractor or from another source without limitations." If a VECP is accepted, the Contractor hereby grants the Government unlimited rights in the VECP and supporting data, except that, with respect to data qualifying and submitted as limited rights technical data, the Government shall have the rights specified in the contract modification implementing the VECP and shall appropriately mark the

data. (The terms "unlimited rights" and "limited rights" are defined in Part 27 of the Federal Acquisition Regulation.)

(End of clause)

52.249-2 TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE) (SEP 1996) - ALTERNATE I (SEP 1996)

(a) The Government may terminate performance of work under this contract in whole or, from time to time, in part if the Contracting Officer determines that a termination is in the Government's interest. The Contracting Officer shall terminate by delivering to the Contractor a Notice of Termination specifying the extent of termination and the effective date.

(b) After receipt of a Notice of Termination, and except as directed by the Contracting Officer, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due under this clause:

(1) Stop work as specified in the notice.

(2) Place no further subcontracts or orders (referred to as subcontracts in this clause) for materials, services, or facilities, except as necessary to complete the continued portion of the contract.

(3) Terminate all subcontracts to the extent they relate to the work terminated.

(4) Assign to the Government, as directed by the Contracting Officer, all right, title, and interest of the Contractor under the subcontracts terminated, in which case the Government shall have the right to settle or to pay any termination settlement proposal arising out of those terminations.

(5) With approval or ratification to the extent required by the Contracting Officer, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts; the approval or ratification will be final for purposes of this clause.

(6) As directed by the Contracting Officer, transfer title and deliver to the Government (i) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated, and (ii) the completed or partially completed plans, drawings, information, and other property that, if the contract had been completed, would be required to be furnished to the Government.

(7) Complete performance of the work not terminated.

(8) Take any action that may be necessary, or that the Contracting Officer may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which the Government has or may acquire an interest.

(9) Use its best efforts to sell, as directed or authorized by the Contracting Officer, any property of the types referred to in subparagraph (b)(6) of this clause; provided, however, that the Contractor (i) is not required to extend credit to any purchaser and (ii) may acquire the property under the conditions prescribed by, and at prices approved by, the Contracting Officer. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Government under this contract, credited to the price or cost of the work, or paid in any other manner directed by the Contracting Officer.

(c) The Contractor shall submit complete termination inventory schedules no later than 120 days from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 120-day period.

(d) After expiration of the plant clearance period as defined in Subpart 45.6 of the Federal Acquisition Regulation, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Contracting Officer. The Contractor may request the Government to remove those items or enter into an agreement for their storage. Within 15 days, the Government will accept title to those items and remove them or enter into a storage agreement. The Contracting Officer may verify the list upon removal of the items, or if stored, within 45 days from submission of the list, and shall correct the list, as necessary, before final settlement.

(e) After termination, the Contractor shall submit a final termination settlement proposal to the Contracting Officer in the form and with the certification prescribed by the Contracting Officer. The Contractor shall submit the proposal promptly, but no later than 1 year from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 1-year period. However, if the Contracting Officer determines that the facts justify it, a termination settlement proposal may be received and acted on after 1 year or any extension. If the Contractor fails to submit the proposal within the time allowed, the Contracting Officer may determine, on the basis of information available, the amount, if any, due the Contractor because of the termination and shall pay the amount determined.

(f) Subject to paragraph (e) of this clause, the Contractor and the Contracting Officer may agree upon the whole or any part of the amount to be paid or remaining to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. However, the agreed amount, whether under this paragraph (g) or paragraph (g) of this clause, exclusive of costs shown in subparagraph (g)(3) of this clause, may not exceed the total contract price as reduced by (1) the amount of payments previously made and (2) the contract price of work not terminated. The contract shall be modified, and the Contractor paid the agreed amount. Paragraph (g) of this clause shall not limit, restrict, or affect the amount that may be agreed upon to be paid under this paragraph.

(g) If the Contractor and Contracting Officer fail to agree on the whole amount to be paid the Contractor because of the termination of work, the Contracting Officer shall pay the Contractor the amounts determined as follows, but without duplication of any amounts agreed upon under paragraph (f) of this clause:

(1) For contract work performed before the effective date of termination, the total (without duplication of any items) of--

(i) The cost of this work;

(ii) The cost of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of the contract if not included in subdivision (g)(1)(i) of this clause; and

(iii) A sum, as profit on subdivision (g)(1)(i) of this clause, determined by the Contracting Officer under 49.202 of the Federal Acquisition Regulation, in effect on the date of this contract, to be fair and reasonable; however, if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, the Contracting Officer shall allow no profit under this subdivision (iii) and shall reduce the settlement to reflect the indicated rate of loss.

(2) The reasonable costs of settlement of the work terminated, including--

(i) Accounting, legal, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and supporting data;

(ii) The termination and settlement of subcontracts (excluding the amounts of such settlements); and

(iii) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.

(h) Except for normal spoilage, and except to the extent that the Government expressly assumed the risk of loss, the Contracting Officer shall exclude from the amounts payable to the Contractor under paragraph (g) of this clause, the fair value, as determined by the Contracting Officer, of property that is destroyed, lost, stolen, or damaged so as to become undeliverable to the Government or to a buyer.

(i) The cost principles and procedures of Part 31 of the Federal Acquisition Regulation, in effect on the date of this contract, shall govern all costs claimed, agreed to, or determined under this clause.

(j) The Contractor shall have the right of appeal, under the Disputes clause, from any determination made by the Contracting Officer under paragraph (e), (g), or (l) of this clause, except that if the Contractor failed to submit the termination settlement proposal or request for equitable adjustment within the time provided in paragraph (e) or (l), respectively, and failed to request a time extension, there is no right of appeal.

(k) In arriving at the amount due the Contractor under this clause, there shall be deducted--

(1) All unliquidated advance or other payments to the Contractor under the terminated portion of this contract;

(2) Any claim which the Government has against the Contractor under this contract; and

(3) The agreed price for, or the proceeds of sale of, materials, supplies, or other things acquired by the Contractor or sold under the provisions of this clause and not recovered by or credited to the Government.

(l) If the termination is partial, the Contractor may file a proposal with the Contracting Officer for an equitable adjustment of the price(s) of the continued portion of the contract. The Contracting Officer shall make any equitable adjustment agreed upon. Any proposal by the Contractor for an equitable adjustment under this clause shall be requested within 90 days from the effective date of termination unless extended in writing by the Contracting Officer.

(m)(1) The Government may, under the terms and conditions it prescribes, make partial payments and payments against costs incurred by the Contractor for the terminated portion of the contract, if the Contracting Officer believes the total of these payments will not exceed the amount to which the Contractor will be entitled.

(2) If the total payments exceed the amount finally determined to be due, the Contractor shall repay the excess to the Government upon demand, together with interest computed at the rate established by the Secretary of the Treasury under 50 U.S.C. App. 1215(b)(2). Interest shall be computed for the period from the date the excess payment is received by the Contractor to the date the excess is repaid. Interest shall not be charged on any excess payment due to a reduction in the Contractor's termination settlement proposal because of retention or other disposition of termination inventory until 10 days after the date of the retention or disposition, or a later date determined by the Contracting Officer because of the circumstances.

(n) Unless otherwise provided in this contract or by statute, the Contractor shall maintain all records and documents relating to the terminated portion of this contract for 3 years after final settlement. This includes all books and other evidence bearing on the Contractor's costs and expenses under this contract. The Contractor shall make these records and documents available to the Government, at the Contractor's office, at all reasonable times, without any direct charge. If approved by the Contracting Officer, photographs, microphotographs, or other authentic reproductions may be maintained instead of original records and documents.

52.249-10 DEFAULT (FIXED-PRICE CONSTRUCTION) (APR 1984)

(a) If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract including any extension, or fails to complete the work within this time, the Government may, by written notice to the Contractor, terminate the right to proceed with the work (or the separable part of the work) that has been delayed. In this event, the Government may take over the work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on

the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Government resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the Government in completing the work.

(b) The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause, if--

(1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include

(i) acts of God or of the public enemy,

(ii) acts of the Government in either its sovereign or contractual capacity,

(iii) acts of another Contractor in the performance of a contract with the Government,

(iv) fires,

(v) floods,

(vi) epidemics,

(vii) quarantine restrictions,

(viii) strikes,

(ix) freight embargoes,

(x) unusually severe weather, or delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any delay (unless extended by the Contracting Officer), notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, the time for completing the work shall be extended. The findings of the Contracting Officer shall be final and conclusive on the parties, but subject to appeal under the Disputes clause.

(c) If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Government.

The rights and remedies of the Government in this clause are in addition to any other rights and

remedies provided by law or under this contract.

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

[Insert one or more Internet addresses]

52.253-1 COMPUTER GENERATED FORMS (JAN 1991)

(a) Any data required to be submitted on a Standard or Optional Form prescribed by the Federal Acquisition Regulation (FAR) may be submitted on a computer generated version of the form, provided there is no change to the name, content, or sequence of the data elements on the form, and provided the form carries the Standard or Optional Form number and edition date.

(b) Unless prohibited by agency regulations, any data required to be submitted on an agency unique form prescribed by an agency supplement to the FAR may be submitted on a computer generated version of the form provided there is no change to the name, content, or sequence of the data elements on the form and provided the form carries the agency form number and edition date.

(c) If the Contractor submits a computer generated version of a form that is different than the required form, then the rights and obligations of the parties will be determined based on the content of the required form.

252.201-7000 CONTRACTING OFFICER'S REPRESENTATIVE (DEC 1991)

(a) "Definition. Contracting officer's representative" means an individual designated in accordance with subsection 201.602-2 of the Defense Federal Acquisition Regulation Supplement and authorized in writing by the contracting officer to perform specific technical or administrative functions.

(b) If the Contracting Officer designates a contracting officer's representative (COR), the Contractor will receive a copy of the written designation. It will specify the extent of the COR's authority to act on behalf of the contracting officer. The COR is not authorized to make any commitments or changes that will affect price, quality, quantity, delivery, or any other term or condition of the contract.

(End of clause)

252.203-7001 PROHIBITION ON PERSONS CONVICTED OF FRAUD OR OTHER DEFENSE-CONTRACT-RELATED FELONIES (MAR 1999)

(a) Definitions. As used in this clause—

(1) "Arising out of a contract with the DoD" means any act in connection with—

(i) Attempting to obtain;

(ii) Obtaining, or

(iii) Performing a contract or first-tier subcontract of any agency, department, or component of the Department of Defense (DoD).

(2) "Conviction of fraud or any other felony" means any conviction for fraud or a felony in violation of state or Federal criminal statutes, whether entered on a verdict or plea, including a plea of *nolo contendere*, for which sentence has been imposed.

(3) "Date of conviction" means the date judgment was entered against the individual.

(b) Any individual who is convicted after September 29, 1988, of fraud or any other felony arising out of a contract with the DoD is prohibited from serving--

(1) In a management or supervisory capacity on any DoD contract or first-tier subcontract;

(2) On the board of directors of any DoD contractor or first-tier subcontractor;

(3) As a consultant, agent, or representative for any DoD contractor or first-tier subcontractor; or

(4) In any other capacity with the authority to influence, advise, or control the decisions of any DoD contractor or subcontractor with regard to any DoD contract or first-tier subcontract.

(c) Unless waived, the prohibition in paragraph (b) of this clause applies for not less than 5 years from the date of conviction.

(d) 10 U.S.C. 2408 provides that a defense contractor or first-tier subcontractor shall be subject to a criminal penalty of not more than $500,000 if convicted of knowingly—

(1) Employing a person under a prohibition specified in paragraph (b) of this clause; or

(2) Allowing such a person to serve on the board of directors of the contractor or first-tier subcontractor.

(e) In addition to the criminal penalties contained in 10 U.S.C. 2408, the Government may consider other available remedies, such as—

(1) Suspension or debarment;

(2) Cancellation of the contract at no cost to the Government; or

(3) Termination of the contract for default.

(f) The Contractor may submit written requests for waiver of the prohibition in paragraph (b) of this clause to the Contracting Officer. Requests shall clearly identify—

(1) The person involved;

(2) The nature of the conviction and resultant sentence or punishment imposed;

(3) The reasons for the requested waiver; and

(4) An explanation of why a waiver is in the interest of national security.

(g) The Contractor agrees to include the substance of this clause, appropriately modified to reflect the identity and relationship of the parties, in all first-tier subcontracts exceeding the simplified acquisition threshold in Part 2 of the Federal Acquisition Regulation, except those for commercial items or components.

(h) Pursuant to 10 U.S.C. 2408(c), defense contractors and subcontractors may obtain information as to whether a particular person has been convicted of fraud or any other felony arising out of a contract with the DoD by contacting The Office of Justice Programs, The Denial of Federal Benefits Office, U.S. Department of Justice, telephone (202) 616-3507.

(End of clause)

252.203-7002 DISPLAY OF DOD HOTLINE POSTER (DEC 1991)

(a) The Contractor shall display prominently in common work areas within business segments performing work under Department of Defense (DoD) contracts, DoD Hotline Posters prepared by the DoD Office of the Inspector General.

(b) DoD Hotline Posters may be obtained from the DoD Inspector General, ATTN: Defense Hotline, 400 Army Navy Drive, Washington, DC 22202-2884.

(c) The Contractor need not comply with paragraph (a) of this clause if it has established a mechanism, such as a hotline, by which employees may report suspected instances of improper conduct, and instructions that encourage employees to make such reports.

(End of clause)

252.204-7003 CONTROL OF GOVERNMENT PERSONNEL WORK PRODUCT (APR 1992)

The Contractor's procedures for protecting against unauthorized disclosure of information shall not require Department of Defense employees or members of the Armed Forces to relinquish control of their work products, whether classified or not, to the contractor.

(End of clause)

252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION.(NOV 2001)

(a) Definitions.

As used in this clause--

(1) Central Contractor Registration (CCR) database means the primary DoD repository for contractor information required for the conduct of business with DoD.

(2) Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet Information Services to identify unique business entities.

(3) Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by Dun and Bradstreet plus a 4-digit suffix that may be assigned by a parent (controlling) business concern. This 4-digit suffix may be assigned at the discretion of the parent business concern for such purposes as identifying subunits or affiliates of the parent business concern.

(4) Registered in the CCR database means that all mandatory information, including the DUNS number or the DUNS+4 number, if applicable, and the corresponding Commercial and Government Entity (CAGE) code, is in the CCR database; the DUNS number and the CAGE code have been validated; and all edits have been successfully completed.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee must be registered in the CCR database prior to award, during performance, and through final payment of any contract resulting from this solicitation, except for awards to foreign vendors for work to be performed outside the United States.

(2) The offeror shall provide its DUNS or, if applicable, its DUNS+4 number with its offer, which will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(3) Lack of registration in the CCR database will make an offeror ineligible for award.

(4) DoD has established a goal of registering an applicant in the CCR database within 48 hours after receipt of a complete and accurate application via the Internet. However, registration of an applicant submitting an application through a method other than the Internet may take up to 30 days. Therefore, offerors that are not registered should consider applying for registration immediately upon receipt of this solicitation.

(c) The Contractor is responsible for the accuracy and completeness of the data within the CCR, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to confirm on an annual basis that its information in the CCR database is accurate and complete.

(d) Offerors and contractors may obtain information on registration and annual confirmation requirements by calling 1-888-227-2423, or via the Internet at http://www.ccr.com.

(End of clause)

252.205-7000 PROVISION OF INFORMATION TO COOPERATIVE AGREEMENT HOLDERS (DEC 1991)

(a) Definition.

"Cooperative agreement holder" means a State or local government; a private, nonprofit organization; a tribal organization (as defined in section 4(c) of the Indian Self-Determination and Education Assistance Act (Pub. L. 93-268; 25 U.S.C. 450 (c))); or an economic enterprise (as defined in section 3(e) of the Indian Financing Act of 1974 (Pub. L. 93-362; 25 U.S.C. 1452(e))) whether such economic enterprise is organized for profit or nonprofit purposes; which has an agreement with the Defense Logistics Agency to furnish procurement technical assistance to business entities.

(b) The Contractor shall provide cooperative agreement holders, upon their request, with a list of those appropriate employees or offices responsible for entering into subcontracts under defense contracts. The list shall include the business address, telephone number, and area of responsibility of each employee or office.

(c) The Contractor need not provide the listing to a particular cooperative agreement holder more frequently than once a year.

(End of clause)

252.209-7000 ACQUISITION FROM SUBCONTRACTORS SUBJECT TO ONSITE INSPECTION UNDER THE INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY (NOV 1995)

(a) The Contractor shall not deny consideration for a subcontract award under this contract to a potential subcontractor subject to on-site inspection under the INF Treaty, or a similar treaty, solely or in part because of the actual or potential presence of Soviet inspectors at the subcontractor's facility, unless the decision is approved by the Contracting Officer.

(b) The Contractor shall incorporate this clause, including this paragraph (b), in all solicitations and contracts exceeding the simplified acquisition threshold in part 13 of the Federal Acquisition Regulation, except those for commercial items.

252.209-7003 COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS (MAR 1998)

By submission of its offer, the offeror represents that, if it is subject to the reporting requirements of 37 U.S.C. 4212(d) (i.e., the VETS-100 report required by Federal Acquisition Regulation clause 52.222-37, Employment Reports on Disabled Veterans and Veterans of the Vietnam Era), it has submitted the most recent report required by 38 U.S.C. 4212(d).

252.209-7004 SUBCONTRACTING WITH FIRMS THAT ARE OWNED OR CONTROLLED BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) Unless the Government determines that there is a compelling reason to do so, the Contractor shall not enter into any subcontract in excess of $25,000 with a firm, or subsidiary of a firm, that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country.

(b) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country. The notice must include the name of the proposed subcontractor notwithstanding its inclusion on the List of Parties Excluded From Federal Procurement and Nonprocurement Programs.

252.215-7000 PRICING ADJUSTMENTS (DEC 1991)

The term "pricing adjustment," as used in paragraph (a) of the clauses entitled "Price Reduction for Defective Cost or Pricing Data - Modifications," "Subcontractor Cost or Pricing Data," and "Subcontractor Cost or Pricing Data - Modifications," means the aggregate increases and/or decreases in cost plus applicable profits.

252.219-7003 SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (DOD CONTRACTS) (APR. 1996)

This clause supplements the Federal Acquisition Regulation 52.219-9, Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, clause of this contract.

(a) *Definitions. Historically black colleges and universities,* as used in this clause, means institutions determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. The term also means any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

Minority institutions, as used in this clause, means institutions meeting the requirements of section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1135d-5(3)). The term also

includes Hispanic-serving institutions as defined in section 316(b)(1) of such Act (20 U.S.C. 1059c(b)(1)).

(b) Except for company or division-wide commercial items subcontracting plans, the term *small disadvantaged business*, when used in the FAR 52.219-9 clause, includes historically black colleges and universities and minority institutions, in addition to small disadvantaged business concerns.

(c) Work under the contract or its subcontracts shall be credited toward meeting the small disadvantaged business concern goal required by paragraph (d) of the FAR 52.219-9 clause when:

(1) It is performed on Indian lands or in joint venture with an Indian tribe or a tribally-owned corporation, and

(2) It meets the requirements of 10 U.S.C. 2323a.

(d) Subcontracts awarded to workshops approved by the Committee for Purchase from People Who are Blind or Severely Disabled (41 U.S.C. 46-48), may be counted toward the Contractor's small business subcontracting goal.

(e) A mentor firm, under the Pilot Mentor-Protege Program established under Section 831 of Pub. L. 101-510, as amended, may count toward its small disadvantaged business goal, subcontracts awarded--

(f) The master plan approval referred to in paragraph (f) of the FAR 52.219-9 clause is approval by the Contractor's cognizant contract administration activity.

(g) In those subcontracting plans which specifically identify small, small disadvantaged, and women-owned small businesses, the Contractor shall notify the Administrative Contracting Officer of any substitutions of firms that are not small, small disadvantaged, or women-owned small businesses for the firms listed in the subcontracting plan. Notifications shall be in writing and shall occur within a reasonable period of time after award of the subcontract. Contractor-specified formats shall be acceptable.

(End of clause)

252.219-7004 SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED BUSINESS SUBCONTRACTING PLAN (TEST PROGRAM) (JUN 1997)

(a) *Definition. Subcontract*, as used in this clause, means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for performance of the contract or subcontract.

(b) The Offeror's comprehensive small business subcontracting plan and its successors, which are authorized by and approved under the test program of Section 834 of Pub. L. 101-189, as amended by Section 7103 of Pub. L. 103-355, shall be included in and made a part of the resultant contract. Upon expulsion from the test program or expiration of the test program, the Contractor shall negotiate an individual subcontracting plan for all future contracts that meet the requirements of Section 211 of Pub. L. 95-507.

(c) The Contractor shall submit Standard Form (SF) 295, Summary Subcontract Report, in accordance with the instructions on the form, except—

(1) One copy of the SF 295 and attachments shall be submitted to Director, Small and Disadvantaged Business Utilization, Office of the Deputy Under Secretary of Defense (International and Commercial Programs), 3061 Defense Pentagon, Room 2A338, Washington, DC 20301-3061; and

(2) Item 14, Remarks, shall be completed to include semi-annual cumulative—

(i) Small business, small disadvantaged business, and women-owned small business goals; and

(ii) Small business and small disadvantaged business goals, actual accomplishments, and percentages for each of the two designated industry categories.

(d) The failure of the Contractor or subcontractor to comply in good faith with (1) the clause of this contract entitled "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns," or (2) an approved plan required by this clause, shall be a material breach of the contract.

(End of clause)

252.222-7000 RESTRICTIONS ON EMPLOYMENT OF PERSONNEL (MAR 2000)

(a) The Contractor shall employ, for the purpose of performing that portion of the contract work in , individuals who are residents thereof and who, in the case of any craft or trade, possess or would be able to acquire promptly the necessary skills to perform the contract.

(b) The Contractor shall insert the substance of this clause, including this paragraph (b), in each subcontract awarded under this contract.

(End of clause)

252.223-7004 DRUG-FREE WORK FORCE (SEP 1988)

(a) Definitions.

(1) "Employee in a sensitive position," as used in this clause, means an employee who has been granted access to classified information; or employees in other positions that the Contractor

determines involve national security; health or safety, or functions other than the foregoing requiring a high degree of trust and confidence.

(2) "Illegal drugs," as used in this clause, means controlled substances included in Schedules I and II, as defined by section 802(6) of title 21 of the United States Code, the possession of which is unlawful under chapter 13 of that Title. The term "illegal drugs" does not mean the use of a controlled substance pursuant to a valid prescription or other uses authorized by law.

(b) The Contractor agrees to institute and maintain a program for achieving the objective of a drug-free work force. While this clause defines criteria for such a program, contractors are encouraged to implement alternative approaches comparable to the criteria in paragraph (c) that are designed to achieve the objectives of this clause.

(c) Contractor programs shall include the following, or appropriate alternatives:

(1) Employee assistance programs emphasizing high level direction, education, counseling, rehabilitation, and coordination with available community resources;

(2) Supervisory training to assist in identifying and addressing illegal drug use by Contractor employees;

(3) Provision for self-referrals as well as supervisory referrals to treatment with maximum respect for individual confidentiality consistent with safety and security issues;

(4) Provision for identifying illegal drug users, including testing on a controlled and carefully monitored basis. Employee drug testing programs shall be established taking account of the following:

(i) The Contractor shall establish a program that provides for testing for the use of illegal drugs by employees in sensitive positions. The extent of and criteria for such testing shall be determined by the Contractor based on considerations that include the nature of the work being performed under the contract, the employee's duties, and efficient use of Contractor resources, and the risks to health, safety, or national security that could result from the failure of an employee adequately to discharge his or her position.

(ii) In addition, the Contractor may establish a program for employee drug testing--

(A) When there is a reasonable suspicion that an employee uses illegal drugs; or

(B) When an employees has been involved in an accident or unsafe practice;

(C) As part of or as a follow-up to counseling or rehabilitation for illegal drug use;

(D) As part of a voluntary employee drug testing program.

(iii) The Contractor may establish a program to test applicants for employment for illegal drug use.

(iv) For the purpose of administering this clause, testing for illegal drugs may be limited to those substances for which testing is prescribed by section 2..1 of subpart B of the "Mandatory Guidelines for Federal Workplace Drug Testing Programs" (53 FR 11980 (April 11, 1988), issued by the Department of Health and Human Services.

(d) Contractors shall adopt appropriate personnel procedures to deal with employees who are found to be using drugs illegally. Contractors shall not allow any employee to remain on duty or perform in a sensitive position who is found to use illegal drugs until such times as the Contractor, in accordance with procedures established by the Contractor, determines that the employee may perform in such a position.

(e) The provisions of this clause pertaining to drug testing program shall not apply to the extent that are inconsistent with state or local law, or with an existing collective bargaining agreement; provided that with respect to the latter, the Contractor agrees those issues that are in conflict will be a subject of negotiation at the next collective bargaining session.

(End of clause)

252.225-7012 PREFERENCE FOR CERTAIN DOMESTIC COMMODITIES (AUG 2000)

(a) The Contractor agrees to deliver under this contract only such of the following articles that have been grown, reprocessed, reused, or produced in the United States, its possessions, or Puerto Rico --

(1) Food;

(2) Clothing;

(3) Tents, tarpaulins, or covers;

(4) Cotton and other natural fiber products;

(5) Woven silk or woven silk blends;

(6) Spun silk yarn for cartridge cloth;

(7) Synthetic fabric, and coated synthetic fabric, including all textile fibers and yarns that are for use in such fabrics;

(8) Canvas products;

(9) Wool (whether in the form of fiber or yarn or contained in fabrics, materials, or manufactured articles); or

(10) Any item of individual equipment (Federal supply Classification 8465) manufactured from or containing such fibers, yarns, fabrics, or materials.

(b) This clause does not apply --

(1) To supplies listed in FAR section 25.104(a), or other supplies for which the Government has determined that a satisfactory quality and sufficient quantity cannot be acquired as and when needed at U.S. market prices;

(2) To foods which have been manufactured or processed in the United States, its possessions, or Puerto Rico;

(3) To chemical warfare protective clothing produced in the countries listed in subsection 225.872-1 of the Defense FAR Supplement; or

(4) To fibers and yarns that are for use in synthetic fabric or coated synthetic fabric (but does apply to the synthetic or coated synthetic fabric itself), if--

(i) The fabric is to be used as a component of an end item that is not a textile product. Examples of textile products, made in whole or in part of fabric, include--

(a) Draperies, floor coverings, furnishings, and bedding (Federal Supply Group 72, Household and Commercial Furnishings and Appliances);

(B) Items made in whole or in part of fabric in Federal Supply Group 83, Textile/leather/furs/apparel/ findings/tents/flags, or Federal Supply Group 84, Clothing, Individual Equipment and Insignia;

(C) Upholstered seats (whether for household, office, or other use); and

(D) Parachutes (Federal Supply Class 1670); or

(ii) The fibers and yarns are para-aramid fibers and yarns manufactured in the Netherlands.

(End of clause)

252.225-7031 SECONDARY ARAB BOYCOTT OF ISRAEL (JUN 1992)

(a) Definitions. As used in this clause--

(1) "Foreign person" means any person other than a United States person as defined in Section 16(2) of the Export Administration Act of 1979 (50 U.S.C. App. Sec 2415).

(2) "United States person" is defined in Section 16(2) of the Export Administration Act of 1979 and means any United States resident or national (other than an individual resident outside the United States and employed by other than a United States person), any domestic concern (including any permanent domestic establishment of any foreign

concern), and any foreign subsidiary or affiliate (including any permanent foreign establishment) of any domestic concern which is controlled in fact by such domestic concerns, as determined under regulations of the President.

(b) Certification. By submitting this offer, the Offeror, if a foreign person, company or entity, certifies that it--

(1) Does not comply with the Secondary Arab Boycott of Israel; and

(2) Is not taking or knowingly agreeing to take any action, with respect to the Secondary Boycott of Israel by Arab countries, which 50 U.S.C. App. Sec 2407(a) prohibits a United States person from taking.

(End of clause)

252.231-7000 SUPPLEMENTAL COST PRINCIPLES (DEC 1991)

When the allowability of costs under this contract is determined in accordance with part 31 of the Federal Acquisition Regulation (FAR), allowability shall also be determined in accordance with part 231 of the Defense FAR Supplement, in effect on the date of this contract.

252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991)

(a) The Contractor shall furnish a price breakdown, itemized as required and within the time specified by the Contracting Officer, with any proposal for a contract modification.

(b) The price breakdown --

(1) Must include sufficient detail to permit an analysis of profit, and of all costs for --

(i) Material;

(ii) Labor;

(iii) Equipment;

(iv) Subcontracts; and

(v) Overhead; and

(2) Must cover all work involved in the modification, whether the work was deleted, added, or changed.

(c) The Contractor shall provide similar price breakdowns to support any amounts claimed for subcontracts.

(d) The Contractor's proposal shall include a justification for any time extension proposed.

252.236-7001 CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (AUG 2000)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified on the following index of drawings:

Title	File	Drawing No.

(End of clause)

252.236-7002 OBSTRUCTION OF NAVIGABLE WATERWAYS. (DEC 1991)

(a) The Contractor shall --

(1) Promptly recover and remove any material, plant, machinery, or appliance which the contractor loses, dumps, throws overboard, sinks, or misplaces, and which, in the opinion of the Contracting Officer, may be dangerous to or obstruct navigation;

(2) Give immediate notice, with description and locations of any such obstructions, to the Contracting Officer; and

(3) When required by the Contracting Officer, mark or buoy such obstructions until the same are removed.

(b) The Contracting Officer may --

(1) Remove the obstructions by contract or otherwise should the Contractor refuse, neglect, or delay compliance with paragraph (a) of this clause; and

(2) Deduct the cost of removal from any monies due or to become due to the Contractor; or

(3) Recover the cost of removal under the Contractor's bond.

(c) The Contractor's liability for the removal of a vessel wrecked or sunk without fault or negligence is limited to that provided in sections 15, 19, and 20 of the River and Harbor Act of March 3, 1899 (33 U.S.C. 410 et. seq.).

252.236-7004 PAYMENT FOR MOBILIZATION AND DEMOBILIZATION. (DEC 1991)

(a) The Government will pay all costs for the mobilization and demobilization of all of the Contractor's plant and equipment at the contract lump sum price for this item.

(1) 60 percent of the lump sum price upon completion of the contractor's mobilization at the work site.

(2) The remaining 40 percent upon completion of demobilization.

(b) The Contracting Officer may require the Contractor to furnish cost data to justify this portion of the bid if the Contracting Officer believes that the percentages in paragraphs (a) (1) and (2) of this clause do not bear a reasonable relation to the cost of the work in this contract.

(1) Failure to justify such price to the satisfaction of the Contracting Officer will result in payment, as determined by the Contracting Officer, of --

(i) Actual mobilization costs at completion of mobilization;

(ii) Actual demobilization costs at completion of demobilization; and

(iii) The remainder of this item in the final payment under this contract.

(2) The Contracting Officer's determination of the actual costs in paragraph (b)(1) of this clause is not subject to appeal.

252.236-7005 AIRFIELD SAFETY PRECAUTIONS. (DEC 1991)

(a) Definitions. As used in this clause --

(1) "Landing areas means" --

(i) The primary surfaces, comprising the surface of the runway, runway shoulders, and lateral safety zones. The length of each primary surface is the same as the runway length. The width of each primary surface is 2,000 feet (1,000 feet on each side of the runway centerline);

(ii) The "clear zone" beyond the ends of each runway, i.e., the extension of the primary surface for a distance of 1,000 feet beyond each end of each runway;

(iii) All taxiways, plus the lateral clearance zones along each side for the length of the taxiways (the outer edge of each lateral clearance zone is laterally 250 feet from the far or opposite edge of the taxiway, e.g., a 75-foot-wide taxiway would have a combined width of taxiway and lateral clearance zones of 425 feet); and

(iv) All aircraft parking aprons, plus the area 125 feet in width extending beyond each edge all around the aprons.

(2) "Safety precaution" areas means those portions of approach-departure clearance zones and transitional zones where placement of objects incident to contract performance might result in vertical projections at or above the approach-departure clearance, or the transitional surface.

(i) "The approach-departure clearance surface" is an extension of the primary surface and the clear zone at each end of each runway, for a distance of 50,000 feet, first along an inclined (glide angle) and then along a horizontal plane, both flaring symmetrically about the runway centerline extended.

(A) The inclined plane (glide angle) begins in the clear zone 200 feet past the end of the runway (and primary surface) at the same elevation as the end of the runway. It continues upward at a slope of 50:1 (1 foot vertically for each 50 feet horizontally) to an elevation of 500 feet above the established airfield elevation. At that point the plane becomes horizontal, continuing at that same uniform elevation to a point 50,000 feet longitudinally from the beginning of the inclined plane (glide angle) and ending there.

(B) The width of the surface at the beginning of the inclined plane (glide angle) is the same as the width of the clear zone. It then flares uniformly, reaching the maximum width of 16,000 feet at the end.

(ii) The "approach-departure clearance zone" is the ground area under the approach-departure clearance surface.

(iii) The "transitional surface" is a sideways extension of all primary surfaces, clear zones, and approach-departure clearance surfaces along inclined planes.

(A) The inclined plane in each case begins at the edge of the surface.

(B) The slope of the incline plane is 7:1 (1 foot vertically for each 7 feet horizontally). It continues to the point of intersection with the --

(1) Inner horizontal surface (which is the horizontal plane 150 feet above the established airfield elevation); or

(2) Outer horizontal surface (which is the horizontal plane 500 feet above the established airfield elevation), whichever is applicable.

(iv) The "transitional zone" is the ground area under the transitional surface. (It adjoins the primary surface, clear zone, and approach-departure clearance zone.)

(b) General. (1) The Contractor shall comply with the requirements of this clause while --

(i) Operating all ground equipment (mobile or stationary);

(ii) Placing all materials; and

(iii) Performing all work, upon and around all airfields.

(2) The requirements of this clause are in addition to any other safety requirements of this contract.

(c) The Contractor shall -

(1) Report to the Contracting Officer before initiating any work;

(2) Notify the Contracting Officer of proposed changes to locations and operations;

(3) Not permit either its equipment or personnel to use any runway for purposes other than aircraft operation without permission of the Contracting Officer, unless the runway is -

(i) Closed by order of the Contracting Officer; and

(ii) Marked as provided in paragraph (d)(2) of this clause;

(4) Keep all paved surfaces, such as runways, taxiways, and hardstands, clean at all times and, specifically, free from small stones which might damage aircraft propellers or jet aircraft;

(5) Operate mobile equipment according to the safety provisions of this clause, while actually performing work on the airfield. At all other times, the Contractor shall remove all mobile

equipment to locations -

(i) Approved by the Contracting Officer;

(ii) At a distance of at least 750 feet from the runway centerline, plus any additional distance; and

(iii) Necessary to ensure compliance with the other provisions of this clause; and

(6) Not open a trench unless material is on hand and ready for placing in the trench. As soon as practicable after material has been placed and work approved, the Contractor shall backfill and compact trenches as required by the contract. Meanwhile, all hazardous conditions shall be marked and lighted in accordance with the other provisions of this clause.

(d) Landing areas. The Contractor shall -

(1) Place nothing upon the landing areas without the authorization of the Contracting Officer;

(2) Outline those landing areas hazardous to aircraft, using (unless otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated low-intensity red flasher lights by night;

(3) Obtain, at an airfield where flying is controlled, additional permission from the control tower operator every time before entering any landing area, unless the landing area is marked as hazardous in accordance with paragraph (d)(2) of this clause;

(4) Identify all vehicles it operates in landing areas by means of a flag on a staff attached to, and flying above, the vehicle. The flag shall be three feet square, and consist of a checkered pattern of international orange and white squares of 1 foot on each side (except that the flag may vary up to ten percent from each of these dimensions);

(5) Mark all other equipment and materials in the landing areas, using the same marking devices as in paragraph (d)(2) of this clause; and

(6) Perform work so as to leave that portion of the landing area which is available to aircraft free from hazards, holes, piles of material, and projecting shoulders that might damage an airplane tire.

(e) Safety precaution areas. The Contractor shall -

(1) Place nothing upon the safety precaution areas without authorization of the Contracting Officer;

(2) Mark all equipment and materials in safety precaution areas, using (unless otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated, low-intensity red flasher lights by night; and

(3) Provide all objects placed in safety precaution areas with a red light or red lantern at night, if the objects project above the approach-departure clearance surface or above the transitional surface.

252.242-7000 POSTAWARD CONFERENCE (DEC 1991)

The Contractor agrees to attend any postaward conference convened by the contracting activity or contract administration office in accordance with Federal Acquisition Regulation subpart 42.5.

(End of clause)

252.243-7001 PRICING OF CONTRACT MODIFICATIONS (DEC 1991)

When costs are a factor in any price adjustment under this contract, the contract cost principles and procedures in FAR part 31 and DFARS part 231, in effect on the date of this contract, apply.

252.243-7002 REQUESTS FOR EQUITABLE ADJUSTMENT (MAR 1998)

(a) The amount of any request for equitable adjustment to contract terms shall accurately reflect the contract adjustment for which the Contractor believes the Government is liable. The request shall include only costs for performing the change, and shall not include any costs that already have been reimbursed or that have been separately claimed. All indirect costs included in the request shall be properly allocable to the change in accordance with applicable acquisition regulations.

(b) In accordance with 10 U.S.C. 2410(a), any request for equitable adjustment to contract terms that exceeds the simplified acquisition threshold shall bear, at the time of submission, the following certificate executed by an individual authorized to certify the request on behalf of the Contractor:

I certify that the request is made in good faith, and that the supporting data are accurate and complete to the best of my knowledge and belief.

(Official's Name)

(Title)

(c) The certification in paragraph (b) of this clause requires full disclosure of all relevant facts, including--

(1) Cost or pricing data if required in accordance with subsection 15.403-4 of the Federal Acquisition Regulation (FAR); and

(2) Information other than cost or pricing data, in accordance with subsection 15.403-3 of the FAR, including actual cost data and data to support any estimated costs, even if cost or pricing data are not required.

(d) The certification requirement in paragraph (b) of this clause does not apply to----

(1) Requests for routine contract payments; for example, requests for payment for accepted supplies and services, routine vouchers under a cost-reimbursement type contract, or progress payment invoices; or

(2) Final adjustment under an incentive provision of the contract.

252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAR 2000)

(a) Definitions. As used in this clause --

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense" (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) "Supplies" includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if--

(i) This contract is a construction contract; or

(ii) The supplies being transported are--

(A) Noncommercial items; or

(B) Commercial items that--

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it contracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that --

(1) U.S.-flag vessels are not available for timely shipment;

(2) The freight charges are inordinately excessive or unreasonable; or

(3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum --

(1) Type, weight, and cube of cargo;

(2) Required shipping date;

(3) Special handling and discharge requirements;

(4) Loading and discharge points;

(5) Name of shipper and consignee;

(6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Division of National Cargo, Office of Market Development, Maritime Administration, U.S. Department of Transportation, Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information --

(1) Prime contract number;

(2) Name of vessel;

(3) Vessel flag of registry;

(4) Date of loading;

(5) Port of loading;

(6) Port of final discharge;

(7) Description of commodity;

(8) Gross weight in pounds and cubic feet if available;

(9) Total ocean freight in U.S. dollars; and

(10) Name of the steamship company.

(f) The Contractor agrees to provide with its final invoice under this contract a representation that to the best of its knowledge and belief --

(1) No ocean transportation was used in the performance of this contract;

(2) Ocean transportation was used and only U.S.-flag vessels were used for all ocean shipments under the contract;

(3) Ocean transportation was used, and the Contractor had the written consent of the Contracting Officer for all non-U.S.-flag ocean transportation; or

(4) Ocean transportation was used and some or all of the shipments were made on non-U.S.-flag vessels without the written consent of the Contracting Officer. The Contractor shall describe these shipments in the following format:

ITEM DESCRIPTION	CONTRACT LINE ITEMS	QUANTITY

TOTAL_____

(g) If the final invoice does not include the required representation, the Government will reject and return it to the Contractor as an improper invoice for the purposes of the Prompt Payment clause of this contract. In the event there has been unauthorized use of non-U.S.-flag vessels in the performance of this contract, the Contracting Officer is entitled to equitably adjust the contract, based on the unauthorized use.

(h) The Contractor shall include this clause, including this paragraph (h), in all subcontractors under this contract that--

(1) Exceed the simplified acquisition threshold in Part 2 of the Federal Acquisition Regulation; and

(2) Are for a type of supplies described in paragraph (b)(3) of this clause.

(End of clause)

252.247-7024 NOTIFICATION OF TRANSPORTATION OF SUPPLIES BY SEA (MAR 2000)

(a) The Contractor has indicated by the response to the solicitation provision, Representation of Extent of Transportation by Sea, that it did not anticipate transporting by sea any supplies. If, however, after the award of this contract, the Contractor learns that supplies, as defined in the Transportation of Supplies by Sea clause of this contract, will be transported by sea, the Contractor --

(1) Shall notify the Contracting Officer of that fact; and

(2) Hereby agrees to comply with all the terms and conditions of the Transportation of Supplies by Sea clause of this contract.

(b) The Contractor shall include this clause; including this paragraph (b), revised as necessary to reflect the relationship of the contracting parties--

(1) In all subcontracts under this contract, if this contract is a construction contract; or

(2) If this contract is not a construction contract, in all subcontracts under this contract that are for--

(i) Noncommercial items; or

(ii) Commercial items that--

(A) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it subcontracts for f.o.b. destination shipment);

(B) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(C) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(End of clause)

252.248-7000 PREPARATION OF VALUE ENGINEERING CHANGE PROPOSALS (MAY 1994)

Prepare value engineering change proposals, for submission pursuant to the value engineering clause of this contract, in the format prescribed by the version of MIL-STD-973 in effect on the date of contract award.

(End of clause)

TABLE OF CONTENTS

SPECIAL CONTRACT REQUIREMENTS

00800 PROPOSAL SUBMISSION REQUIREMENTS AND INSTRUCTIONS

00802 CONTRACT ADMINISTRATION DATA

00805 EVALUATION OF PROPOSALS

00810 SPECIAL CONTRACT REQUIREMENTS

00815 WAGE RATES

00835 REGIONS FOR THE CONSTRUCTION EQUIPMENT OWNERSHIP AND OPERATIONS EXPENSE SCHEDULE

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 00800

PROPOSAL SUBMISSION REQUIREMENTS AND INSTRUCTIONS

Who May Submit: Proposals may be submitted by: firms formally organized entities or construction contractors that have associated specifically for this project, or any other interested parties. In the first and latter case, the association may be a joint venture or a subcontractor.

Any legally organized offeror may submit a proposal provided that the requirements specified in this Section are met.

General Requirements: The intent of this one-step solicitation is to solicit proposals for the Construction of the Alterations to the Lift Bridge, Philadelphia Naval Business Center.

In order to effectively and equitably evaluate all proposals, the Source Selection Board must receive information sufficiently detailed to clearly indicate the proposed materials, equipment, and methods of fabrication and construction.

In addition to the performance documents specifically specified, the offerors must provide a price proposal and other data specified hereinafter. Offerors must coordinate proposal documents with the data described for Evaluation of Proposals. Specific proposal requirements are described below.

Provide original and ten (10) copies.

Written portions 8-1/2" x 11" format.

Where to Submit: Offerors shall submit proposal packages to the Corps of Engineers at the address shown in Block 8 of Standard Form 1442.

Submission Deadline: Proposals shall be received no later than the time and date specified in Block 13 of Standard Form 1442.

Proposal Requirements and Submission Format: The proposals shall be submitted in separate volumes, as defined below. The proposals sought by this solicitation shall contain the following categories of information. Offerors must coordinate the proposals with Section 00805, Evaluation of Proposals, which outlines the evaluation procedures.

I. PERFORMANCE CAPABILITY

VOLUME I. This information shall be submitted in a separate three-ring binder labeled: Volume I - Performance Capability. This category consists of the contractor organization, specific personnel, specialized experience, quality control plan, schedule, and subcontracting plan. Provide the original and ten (10) copies in 8-1/2" x 11" format. Schedules may be provided separately, but shall be bound and clearly labeled.

A. Organization. The offeror shall fully identify its proposed organization. If there is a joint venture or contractor-subcontractor association of firms, offeror shall identify the individual firms and briefly describe the nature of the association. Identify the person authorized to negotiate. Present data in an organization chart to establish responsibility and authority for the construction of the project. The proposed organization shall provide a sole source of responsibility and shall establish responsibility for support of on-site management of the construction. Indicate what parts of the project will be performed by in-house forces and the extent and type of subcontracting contemplated. Provide names of subcontractors teamed up for this project, if established. The prime contractor must perform 25 percent of the work with its own organization in accordance with FAR Clause, (52.236-0001) PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984).

B. Specific Personnel. Identify personnel to be assigned to the project. Include resumes of principal managers and technical personnel who will be directly responsible for the day-to-day construction activities. Include as a minimum the construction project manager; the Certified Industrial Hygienist; the quality control manager; and the construction superintendent. Indicate whether each individual has had a significant part in any of the project examples cited. If reassignment of personnel is considered possible, provide the names and resumes of the alternative professional in each assignment.

C. Specialized Experience on Similar Type Work and Project Experience. To demonstrate experience, offerors shall provide:

1. Examples of projects for the last five (5) years in which the offeror has been involved which are similar in type and scope to this project.

2. Examples for the last five (5) years of projects in which the offeror has been involved.

   For all examples cited, provide references with contact names and telephone numbers. Each example should indicate the general scope, the offeror's role in the project (prime, subcontractor, or as joint venturer, identifying the offeror's role in the joint venture), location, cost, extent and type of subcontracting, and date of completion of the project. Include the offeror's assigned performance evaluation for project cited (e.g., outstanding, satisfactory or unsatisfactory). Provide an explanation, if unsatisfactory. If offeror represents the combining of two or more companies for the purpose of this RFP, then each company must list individual, as well as collaborative, project examples. Where applicable, explain facts, with an assessment of liquidated damages, for failure in meeting completion dates. The Government reserves the right to verify performance evaluations by reviewing the Corps of Engineers Construction Contractor Appraisal Support System (CCASS) or to interview owners.

3. Provide a matrix cross-referencing the participation of Specific Personnel identified in B with the projects listed in C.1 and C.2.

D. Plan for Quality Control. Offeror shall submit preliminary plans for quality control. The preliminary plan shall be expanded, after contract award, to comply with Construction Specification 01451 - Contractor Quality Control. Offerors are expected to develop a formal program of monitoring and ensuring a high level of construction quality. Preliminary plans shall address, as a minimum, the following items, as applicable to each plan (not evaluated as individual subfactors):

1. A clear identification of the personnel responsible for quality control and a clear policy establishing their authority.

2. A specific description of the tasks and functions of the quality control personnel.

3. A specific policy establishing schedules for the performance of quality control tasks.

4. A policy for reporting quality control to the Contracting Officer.

5. The names of the testing laboratories to be used and the procedures for test data reporting.

6. A material storage and protection plan.

7. A policy for tracking deficiencies from identification by Quality Control (QC) or Quality Assurance (QA) through the correction re-inspection by QC or verification by QA.

8. Procedures for maintaining up-to-date plans and specifications on the job site and for preparation and submittal of as-builts.

E. Schedule. This category consists of the construction schedules. Provide the original and ten (10) copies in 8-1/2" x 11" format. Schedules or diagrams may be provided separately in a size that is easily read, but shall be bound and clearly labeled as Volume I.

1 Logic and Reasonableness: Offeror shall submit a plan for planning and scheduling the construction. The schedule will be evaluated for logic and reasonableness and the offeror's understanding of the project. Offeror shall propose in calendar days the plan for completion of the total project. **Proposals exceeding 600 calendar days are not acceptable.** Offeror's scheduling capability and planning organization are to be presented together with a detailed schedule to depict preliminary planning through construction. The preliminary plan will, after contract award, be replaced with a final schedule as required in the Construction Special Clause, Contractor Prepared Network Analysis System. However, the initial total proposed time for completion will be used to determine the contract time. The schedule for construction shall be task oriented, indicating dates expressed in calendar days after notice to proceed by which milestones are to be achieved. Offeror may use a critical path or other method of his choice; however, schedules shall be graphically represented so that the Contracting Officer can easily monitor progress. The Government will include in the contract provisions for liquidated damages for each calendar day by which the contractor exceeds the contracted schedule.

The offeror must demonstrate that he has the capability and flexibility to plan and schedule the complete project to meet the proposed completion date. Any constraints on the schedules presented (e.g., labor or material availability, weather, etc.) shall be clearly identified. Project completion schedules, inclusive of time allowed for Government reviews, will be reviewed to determine reasonableness.

F. Subcontracting Plan. Large Business offerors shall submit a subcontracting plan in accordance with Contract Clauses 52.219-8 and 52.219-9, and RFP paragraph, NOTICE OF SMALL, SMALL DISADVANTAGED AND WOMEN OWNED BUSINESS SUBCONTRACTING PROGRAM. In addition, include at least three (3) years of past performance reports that reflect realistic and challenging goals and rate of achievement.

II. PRO FORMA REQUIREMENTS

VOLUME II. This information shall be submitted in an envelope labeled: Volume II - Pro Forma Requirements. This category consists of representations and certifications bonds, Standard Form 1442, and proposal bid schedule. Provide the original and six (6) copies.

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 00802

CONTRACT ADMINISTRATION DATA

00802-1 ACCOUNTING AND APPROPRIATION DATA:

Charge: To be furnished at time of award

00802-2 ADMINISTRATION IS RETAINED BY THE CONTRACTING OFFICER:

U.S. Army Engineer District, Philadelphia
Attn: CENAP-CT-C (DeTITTA)
Wanamaker Building, Room 643
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390
(215)656-6775

00802-3 PAYMENT BY:

U.S. Army Corps of Engineers Finance Center
5710 Integrity Drive
Millington, TN 38054-5005
(901) 874-8556

00802-4 BILLING ADDRESS:
Invoice shall be forwarded as follows:

TO: U.S. Army Engineer District, Philadelphia
Attn: CENAP-EC-C
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 00805

EVALUATION OF PROPOSALS

1. GENERAL

The preceding part outlines and defines the proposal submission requirements and instructions. Responsive proposals will be evaluated by a Source Selection Evaluation Board (SSEB) composed of representatives of the U.S. Coast Guard and the Corps of Engineers. The SSEB will utilize technical personnel in the evaluation process as necessary.

The SSEB will evaluate the proposals using the significant factors described in Section 00800.

2. EVALUATION PROCESS

The evaluation process essentially consists of three parts: proposal compliance review, performance evaluation, and price evaluation.

A. Proposal Compliance Review: All proposals will first be reviewed to determine if they contain all the information as required in the Request for Proposal (RFP). A proposal may be determined to be unacceptable if required information is missing, deficient, or if the proposal deviates from or does not meet the requirements stated in the RFP. The SSEB will prepare a list of proposals determined to be unacceptable and will identify the reasons for this determination. Unacceptable proposals will not be considered for further evaluation or selection. At the discretion of the Source Selection Authority (SSA), offerors whose proposals are unacceptable may be given the opportunity to submit missing information. Submittal of the missing information would be required within a time specified by the SSA.

B. Only proposals that have been determined to be responsive during the Proposal Compliance Review will be evaluated for performance and price. The evaluations will be based on a weighted system. Performance Capability will be weighted 50% and the Price will be weighted 50%. Performance Capability sub-factors are weighted (as a percent of the factor Performance Capability: Organization 45%, Quality Control Plan 20%, Schedule 20%, Subcontractor Plan 15%).

C. The Price Evaluation will be conducted independently from the Performance Capability Review.

3. EVALUATION CRITERIA

Criteria for evaluation of Performance Capability are listed in Section 00800.

4. AWARD OF CONTRACT

A. Award will be made to that Offeror whose offer, conforming to the Solicitation, will be the most advantageous to the Government, price and performance factors considered, as listed and weighted above. The Government may choose to award to an Offeror whose price is not the lowest, since price is only one factor and weighted as shown above.

B. The right is reserved to accept other than the lowest offer. The right is also reserved to reject any and all offers. The basis of award will be an acceptable offer, the price or cost of which may or may not be the lowest. If other than the lowest offer, it must be sufficiently more advantageous than the lowest offer to justify the payment of additional amounts.

SECTION 00810

SPECIAL CONTRACT REQUIREMENTS

SCR-1 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

The Contractor shall be required to (1) commence work under this contract within 5 calendar days after the Contractor receives the notice to proceed, (2) prosecute the work diligently,and (3) complete the entire work ready for use not later than 600 calendar days after the date the Contractor receives the notice to proceed. The time stated for completion shall include final cleanup of the premises.

(FAR 52.211-10)

SCR-2 KEY PERSONNEL, SUBCONTRACTORS AND OUTSIDE ASSOCIATES OR CONSULTANTS - AUG 1997

In connection with the services covered by this contract, any in-house personnel, subcontractors, and outside associates or consultants will be limited to the individuals or firms that were specifically identified and agreed to during negotiations. The contractor shall obtain the Contracting Officer’s written consent before making any substitution for these designated in-house personnel, subcontractors, associates, or consultants.

(End of Clause)

SCR-3 SUPPLEMENTAL WARRANTY OF CONSTRUCTION WORK (AUG 1997)

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (1) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession. At any time subsequent to the acceptance by the Government of a completed installation under this contract, which installation is required to be covered by a specified warrant under the terms of the various sections of the specifications, the United States Coast Guard will be the authorized party for the purpose of implementing the provisions of such warranties on behalf of the Government.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, or workmanship.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense. See paragraph (l), Warranty Payment, below.

(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice:

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(k) The Contractor shall furnish the following items to the Contracting Officer upon completion of installation of equipment but prior to the Joint or Final Inspection:

(1) A real property list for all installed mechanical, plumbing, and electrical equipment.

(2) A list of equipment covered by a warranty under the terms and conditions of the contract, including, but not limited to:

(a) The specific contact point at the prime Contractor with complete address and telephone number. If contact for warranty action is other than the prime Contractor, furnish specific procedure for contact.

(b) The period during which each warranty is in effect assuring that each subcontractor or supplier warranty that extends beyond the normal one year period is listed.

(3) Copy of all warranty documents.

(4) Warranty Payment: Warranty work is a subsidiary portion of the contract work, and has a value to the Government approximating 1.0% of the contract amount. The contractor shall assign a value of that amount in the breakdown for progress payments in the Contract Clause: Payments Under Fixed-Price Construction Contracts. If the contractor fails to respond to warranty items as provided, the Government may elect to acquire warranty repairs through other sources and, if so, will back charge the contractor for the cost of such repairs. Such back charges will be accomplished under the Changes Clause of the contract through a credit modification. Such modifications will include a Government administration fee per occurrence.

(End of Clause)

SCR-4 RECOMMENDED INSURANCE COVERAGE AND INSURANCE REQUIREMENTS

The Contractor's attention is invited to the contract requirements WARRANTY OF CONSTRUCTION WORK. These requirements vest in the Contractor complete responsibility for the professional quality, technical accuracy, and coordination of work or materials furnished by his in-house or sub contractor forces. The Contractor must correct and revise any errors or deficiencies in his work, notwithstanding any review, approval, acceptance or payment by the Government. The requirements further stipulate that the Contractor shall be liable to the Government for the damages to the Government caused by negligent performance. Though not a mandatory requirement, this is to recommend that the Contractor investigate and obtain appropriate insurance coverage for such liability protection.

The following insurance requirements shall be provided in conjunction with the requirements of Contract Clause: Insurance - Work on a Government Installation.

a. General Liability Insurance (Comprehensive form of policy): Bodily Injury Liability - $500,000 per occurrence.

b. Automobile Liability Insurance (Comprehensive form of policy): Bodily Injury Liability - $200,000 per person and $500,000 per accident. Property Damage Liability - $20,000 per accident.

c. Workmen's Compensation and Employer's Liability Insurance: Compliance with applicable workmen's compensation and occupational disease statutes is required. Employer's liability coverage in the minimum amount of $100,000 is also required.

d. Asbestos Abatement Contractor Liability Insurance: $500,000 per occurrence minimum.

(End of Clause)

SCR-5 TRAINING – FEB 2000

The Contractor shall provide operational and maintenance training for all systems furnished under this contract for the operating and maintenance personnel. The system manufacturer shall conduct the training, where feasible. All operation and maintenance manuals shall be submitted and approved prior to conducting the training and shall be used during training.

(End of Clause)

SCR-6 VALUE ENGINEERING AFTER AWARD - JUNE 1999

(a) In reference to Contract Clause 52.248-3, Value Engineering Construction, the Government may refuse to entertain a Value Engineering Change Proposal (VECP) for those performance oriented aspects of the Solicitation documents which were addressed in the Contractor's accepted contract proposal and which were evaluated in competition with other offerors for award of this contract.

(b) The Government may consider a VECP for those prescriptive aspects of the Solicitation documents, not addressed in the Contractor's accepted contract proposal or addressed but evaluated only for minimum conformance with the Solicitation requirements.

(c) For purposes of this clause, the term performance oriented refers to contract requirements which allow the Offeror or Contractor certain latitude, choice of and flexibility to propose in its accepted contract offer a choice

of construction approach or other approach to fulfill the contract requirements. Such requirements generally tend to be expressed in terms of functions to be performed, performance required or essential physical characteristics, without dictating a specific process for achieving the desired result.

(d) In contrast, for purposes of this clause, the term prescriptive refers to those aspects of the Solicitation requirements wherein the Government expressed the design solution or other requirements in terms of specific materials, approaches, systems and/or processes to be used. Prescriptive aspects typically allow the Offerors little or no freedom in the choice of design approach, materials, fabrication techniques, methods of installation or other approach to fulfill the contract requirements.

(End of Clause)

SCR-7. PARTNERING – FEB 2000

In order to most effectively accomplish this contract, the Government proposes to form a partnership with the Contractor to develop a cohesive building team. It is anticipated that this partnership would involve the Users, operators, and other parties deemed appropriate by the Government, the Contractor, primary subcontractors and designers and the Corps of Engineers. This partnership would strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership would be bilateral in membership and participation will be totally voluntary. Any cost associated with effectuating this partnership, excluding travel and lodging cost of Government personnel, will be borne by **each party**. Activities are expected to include one or more brainstorming sessions among potential partners pursuant to a Memorandum-of-Understanding that will detail the bylaws of partnering. Bylaws will establish, for example, an effective means of addressing clarifications or issues that may develop during the design-build process, to include real time Alternate Dispute Resolution procedures to effectively address those issues that are not more readily resolved. Effective partnering is expected to be beneficial to all parties.

(End of Clause)

SCR-8 PERFORMANCE EVALUATION OF CONTRACTOR

a. As a minimum, the Contractor’s performance will be evaluated upon final acceptance of the work. However, interim evaluations may be prepared at any time during contract performance when determined to be in the best interest of the Government.

b. The format for the evaluation will be DD Form 2626, and the Contractor will be rated either outstanding, satisfactory, or unsatisfactory in the areas of Contractor Quality Control, Timely Performance, Effectiveness of Management, Compliance with Safety Standards. The Contractor will be advised of any unsatisfactory rating, either in an individual element or in the overall rating, prior to completing completion of the evaluation, and all Contractor comments will be made part of the official record. Performance Evaluation Reports will be available to all DOD Contracting offices for their future use in determining Contractor responsibility, in compliance with DFARS 236.201 (c) (1). (CENAP)

(End of Clause)

SCR-9 LIQUIDATED DAMAGES - CONSTRUCTION (APR 1984)

a. If the Contractor fails to complete the work within the time specified in the contract, or any extensions thereof, the Contractor shall pay to the Government as liquidated damages $1830 for each calendar day of delay.

b. If the Contractor fails to complete the removal and/or installation phase so as to allow the resumption of navigation in and through the navigational channel as specified, the Contractor shall pay to the Government as liquidated damages $10,000 for each calendar day of the delay.

c. If the Government terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increase costs occasioned the Government in completing the work.

d. If the Government does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted. (FAR 52.211-12)

(End of Clause)

SCR-10 CONTRACT DRAWINGS, MAPS AND SPECIFICATIONS (DEC 1991)

a. The Government will provide the Contractor, without charge, a CD (read only format) containing all contract drawings (existing site plan and existing building plans) and specifications except for publications incorporated into the technical provisions by reference;

b. The Contractor shall

(1) Check all drawings furnished immediately upon receipt;

(2) Be responsible for verifying existing conditions shown on the drawings.

c. Large scale drawings shall, in general, govern small scale drawings. Figures marked on drawings shall, in general, be followed by reference to scale measurements.

d. Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications,or which are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work, but shall be performed as if fully and correctly set forth and described in the drawings and specifications. (DFARS 252.236-7001)

(End of Clause)

SCR-11 PHYSICAL CONDTIONS (Apr 1984)

Data and information furnished of referred to below is for the Contractor's information. The Government will not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor. (FAR 52.236-4)

a. Weather Conditions. The climate of the area is referred to as continental by climatologists, characterized by cold winters and moderately hot summers. Complete weather records and reports may be obtained from the local U.S. Weather Bureau Office nearest to the work site. The Contractor shall satisfy himself as to the hazards likely to arise from weather conditions during the construction period.

b. Transportation Facilities: U.S. Interstates 76 and 95 and State Route 611 serve the locality of the proposed work. The Contractor shall make his own investigation of available routes and load limits of bridges. Roads within the Naval Business Center may be used by the Contractor subject to the approval of the Philadelphia Industrial Development Corporation. Such roads, when used by the Contractor, shall be maintained throughout the contract period and shall be restored to at least the condition which existed prior to

the start of the work. The Contractor shall also be responsible for the construction of any temporary haul roads and bridges required for execution of the contract work. All temporary construction shall be removed by the Contractor and the area restored to the condition which existed prior to the start of work.

c. Location. The site of the work is located on the Philadelphia Naval Business Center. The site of the work is over a navigable waterway and all rules and regulations issued by the United States Coast Guard covering navigation shall be observed by the Contractor.

d. Magnitude of the Contract Work. The estimated value of the contract work is over $25,000,000.

e. Inspection of the Site. Prospective bidders are invited to visit the site of work to acquaint themselves with the site conditions and any problems incidental to the prosecution of the work. A site inspection will be held on January 16, 2002 starting at 1000 hrs. Arrangements for inspection of the site shall be made through Mr. Mike Borovicka of the Philadelphia District Fort Dix Resident Office, telephone 609 562 2853.

f. Hours of Work. The Contractor shall provide at least 24 hours advanced notification to establish when on-site work will commence and prior to restarting on-site work following any discontinuances lasting longer than five normal workdays. Notification shall be provided by phone, in person, or in writing, and shall be given directly to the ACO. Work shall only be performed between 0600 hrs and 1800 hrs daily, Monday through Friday, excluding Federal legal holidays as outlined by Public Law Number 98-144. Unless otherwise specifically authorized herein or in writing by the Contracting Officer, the scheduling of work for times other than as set forth above, will not be permitted.

g. Interruption of Utilities.

(1) No utility services shall be interrupted by the Contractor to make connections, to relocate, or for any purpose without approval of the Contracting Officer. Power outages and limited utility interruptions for hookups will be permitted in accordance with a schedule arranged in advance of the interruption. The Contractor shall be responsible for notifying and coordinating all temporary outages with the Contracting Officer at least five working days in advance of the intended outage.

(2) Power outages and limited utility interruptions for hookups will be permitted in accordance with a schedule arranged in advance with the Contracting Officer. The Contractor shall be responsible for notifying and coordinating all outages with the Administrative Contract Officer (ACO) at least 17 working days in advance of the intended outage. The request shall be include the following information:

(a) Nature of Utility (Gas, Water, Electric, etc.)

(b) Size of line and location of shutoff

(c) Buildings and services affected.

(d) Hours and date of shutoff.

(e) Estimated length of time service will be interrupted.

(3) Services shall not be shut off until receipt of approval of the proposed hours and date from the Contracting Officer.

(4) Shutoffs which will cause interruption of Government work operations as determined by the Contracting Officer shall be accomplished during regular non-work hours or on non-work days of the Using Agency without any additional cost to the Government.

(5) Operation of valves on water mains will be by Government personnel. Where shutoff of water lines interrupts service to fire hydrants of fire sprinkler systems, the Contractor shall arrange his operations and have sufficient material and personnel available to complete the work without undue delay or to restore service without delay in the event of an emergency.

(6) Flow in gas mains which have been shut off shall not be restored until a Utility Company inspector has determined that all items serviced by the gas line have been shut off.

h. Alterations to Utilities. Where changes and relocations of utility lines are noted to be performed by others, the Contractor shall give the Contracting Officer at least thirty days' written notice in advance of the time that the change or relocation is required. In the event that, after the expiration of thirty days after the receipt of such notice by the Contracting Officer, such utility lines have not been changed or relocated and delay is occasioned to the completion of the work under this contract, the Contractor will be entitled to a time extension equal to the period of time lost by the Contractor after the expiration of said thirty day period. Any modification to existing or relocated lines required as a result of the Contractor's method of operation shall be made wholly at the Contractor's expense and no additional time will be allowed for delays incurred by such modifications.

i. Street Closing. When operations in connection with contract work necessitate the closing of streets, it shall be the Contractor's responsibility to arrange at least 28 working days in advance with the Contracting Officer for such street closings and to provide appropriate barricades, signs, markers, flares, and other devices as may be required by the ACO for traffic guides and public safety.

(End of Clause)

SCR-12 AVAILABILITY AND USE OF UTILITY SERVICES (APR 1984)

a. The Government will not make any required utilities available to the Contractor from existing outlets and supplies. The Contractor will make all inquiries for utility service from the utilities. The amount of each utility service consumed shall be paid for by the Contractor at prevailing rates charged by the utilities.

b. The Contractor, at its expense and in workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary connections and distribution lines except that only PECO personnel may make connections to the city electrical distribution system, connections to gas lines shall be coordinated with the gas company, and only the local telephone company may make connections to their distribution lines. Before final acceptance of the completed project by the Government, the Contractor shall remove or arrange to have removed by the appropriate agency, all temporary connections, distribution lines, meters, and associated paraphernalia. (FAR 52.236-14)

a. Electric service to Contractor-furnished office or storage facilities will be charged at the current rate prescribed by PIDC. The service connection shall be made through a Contractor furnished kilowatt hour meter appropriate for the circumstances. Contractor is also responsible for all costs associated with telephone services; telephone service will not be Government furnished.

SCR-13 IDENTIFICATION OF EMPLOYEES

The Contractor shall be responsible for furnishing an identification badge/card to each employee prior to the employees work on-site, and for requiring each employee engaged on the work to display such identification as may be approved and directed by the Contracting Officer. All prescribe identification shall immediately be delivered to the Contracting Officer for cancellation upon the release of any employee. When required by the Contracting Officer, the Contractor shall obtain and submit fingerprints of all persons employed or to be employed on the project (CENAP)

(End of Clause)

SCR-14 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)

a. This statement shall become operative only for negotiated contracts where cost or pricing data is requested, and for modifications to sealed bid or negotiated contracts where cost or pricing data is requested. This clause does not apply to terminations. See FAR 52-231-5001, Basis for Settlement of Proposal and FAR Part 49.

b. Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by the Contractor or sub-contractors at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial or series for which the Government can determine both ownership and operating costs from the Contractor’s accounting records. When both ownership and operating costs cannot be determined for any piece of equipment from the Contractor’s accounting records, cost for the equipment shall be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region II. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the Contracting Officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retrospective pricing, the schedule in effect as of the time work was performed shall apply.

c. Equipment rental costs are allowable, subject to the provisions of FAR 31.205 (d) (ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control,lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated leasees.

d. When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the Contracting Officer will request that the Contractor submit either certified cost or pricing data, or partial/limited data, as appropriate. This data shall be submitted on Standard Form 1411, Contractor Pricing Proposal Cover Sheet.

(End of Clause)

SCR-15 CERTIFICATE OF COMPLIANCE

Any certificate required for demonstrating proof of compliance of materials with specifications requirements shall be executed in triplicate. Each certification shall be signed by an official authorized to certify on behalf of the manufacturing company and shall contain the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material, if, after test are performed on

selected samples, the material is found not to meet the specific requirements. (CENAP)

(End of Clause)

SCR-16 TIME EXTENSIONS FOR UNUSALLY SEVERE WEATHER (OCT 1989)

a. This clause specifies the procedure for determining the time extensions for unusually severe weather in accordance with the Contract Clause entitled Default (Fixed-Price Construction). In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month based on historic data.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

b. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor’s progress schedule must reflect thee anticipated adverse weather delays in all weather dependent activities. For the purpose of this contract, unusually severe weather is defined as daily precipitation equal to or exceeding 0.5 inches and/or maximum daily temperature not exceeding 32 degrees F.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON A 5 DAY WORK WEEK AT THE NAVAL BUSINESS CENTER

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4	2	2	2	2	2	2	2	2	2	1	2

c. Upon acknowledgement of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor shall record on the daily CQC report, the occurrence of adverse weather and resultant impact to normal scheduled work. Actual adverse weather days must prevent work on critical activities for 50 percent or more of the Contractor’s scheduled work day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph b. above,the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled: Default (Fixed Price Consturction). (ER 415-1-15)

SCR-17 PAYMENT FOR MATERIALS DELIVERED OFF-SITE

Pursuant to Contract Clause entitled: Payments Under Fixed-Price Construction Contracts, materials delivered to the Contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all conditions of the Contract Clauses are fulfilled. Payment for items delivered to locations other than the work site will be limited to those materials which have been approved, if required by the specifications; those materials which have been fabricated to the point where they are identifiable to an item of work required under this contract. Such payment will be made only after receipt of paid or receipted invoices with cancelled check showing title to the items in the prime Contractor’s name

and including the value of materials and labor incorporated into the item. (CENAP)

SCR-18 U.S. ARMY CORPS OF ENGINEERS SAFETY AND HEALTH REQUIREMENTS

U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1 and its changes are available at http://www.hq.usace.army.mil/soh/hqusace_soh.htm. The Contractor shall be responsible for complying with the current edition and all changes posted on the web as of the effective date of the solicitation. (USACE)
(End of Clause)

SCR-19 PAYMENT FOR MOBILIZATION AND DEMOBILIZATION (DEC 1991)

(a) The Government will pay all costs for the mobilization and demobilization of all the Contractor's plant and equipment at the contract lump sum price for this item.

(1) 75 percent of the lump sun price upon completion of the contractor's mobilization at the work site.

(2) The remaining 25 percent upon completion of demobilization.

(b) The Contracting Officer may require the Contractor to furnish cost data to justify this portion of the bid if the Contracting Officer believes that the percentages in paragraphs (a)(1) and (2) of this clause do not bear a reasonable relation to the cost work in this contract.

(1) Failure to justify such price to the satisfaction of the Contracting Officer will result in payment, as determined by the Contracting Officer, of –

(i) Actual mobilization costs at completion of mobilization;

(ii) Actual demobilization costs at completion of demobilization; and

(iii) The remainder of this item in the final payment under this contract.

(2) The Contracting Officer's determination of the actual costs in paragraph (b)(1) of this clause is not subject to appeal.

(DFARS 252.236-7004)

WAGE RATES

General Decision Number PA010006

General Decision Number PA010006 Superseded General Decision No. PA000006
State: Pennsylvania Construction Type:
HEAVY
HIGHWAY
County(ies):
BUCKS DELAWARE PHILADELPHIA
CHESTER MONTGOMERY
HEAVY AND HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	03/02/2001
1	07/06/2001
2	09/07/2001
3	10/05/2001
4	10/12/2001
5	10/19/2001

COUNTY(ies):
BUCKS DELAWARE PHILADELPHIA
CHESTER MONTGOMERY

* BOIL0013C 08/30/2001

	Rates	Fringes
BOILERMAKERS	30.85	13.68

CARP0454D 07/01/2001

	Rates	Fringes
PILEDRIVERMEN	27.45	16.79+A

FOOTNOTE:
A. PAID HOLIDAYS: Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (provided the employee works the day before the holiday and the day after the holiday)

CARP0612A 05/01/2001

	Rates	Fringes
CARPENTERS	27.20	13.16+A

FOOTNOTE:
A. PAID HOLDIDAY: Labor Day

CARP1906A 07/01/2000

	Rates	Fringes
MILLWRIGHTS	25.42	13.66

ELEC0098A 04/30/2001

Rates Fringes

BUCKS COUNTY: Starting at the Delaware River and following the west limits of the Borough of Bristol, along the continuation of U.S. Highway 13 and under the Pennsylvania Railroad Bridge to Route 09113, north 09113 to Route 152, north along Route 152 to the Humeville Road, east on Humeville Road to Route 333, north on Route 344 to the junction of Spurs 281 and 252, continue north on Spur 252 to Route 09028, west on 09028 to Route 152, north on 152 to TR 232, north on TR 532 to Tr 113, north on TR 113 to TR 232 at Anchor Inn, northeast on TR 232 and continue northeast along Rounte 659 to Route 09060, west on 09060 to Route 402, north on 402 to the Borough line at the southwest corner of the Borough of New Hope. The Bouough of New Hpoe is excluded.Starting at the Delaware at the Delaware River and proceeding southwest along the Plumstead-Solebury and the Plumstead-Buckingham Township lines to Route 09064, northwest on 09064 to U.S. Highway 611 south on 611 to the spur of Route 270, northwest along the spur to Route 397, Southwest on 397 to Route 350, southeast on 350 to Route 395, southwest on 395 to Route 09060, southeast on 09069 to Route 09041 southwest on 09041 to the Montgomery County line.

DELAWARE COUNTY: That portion east of a line following State Highway 320 from Montgomery County to Maple, then along the Springfield Road to Saxer Ave, along Saxer Avenue to Powell Road, along Powell Road to State Highway 420 and continuing in a straight line to the Delaware River.

MONTGOMERY COUNTY: That portion southeast of a line following Lower State Road from Bucks County southwest to the Bethlehem Pike (U.S Highway 309), south on the Bethlehem Pike to the Penllyn Pike, southwest on the Penllyn and Blue Bell Pikes to the Wissahickon Creek, southeast on the Wissahickon Creek to the Butler Pike to North Lane near Conshohocken Borough, southwest on North Lane to Schuylkill River and continuing southeast in a line to the Spring Mill Road and southwest on the Spring Mill Road to Delaware County.

PHILADELPHIA COUNTY

ELECTRICIANS 32.95 42.12%

ELEC0102D 05/01/2000

Rates Fringes

BUCKS COUNTY (Plumstead, Bedminister, Tinicum, Nockomixon, Bridgeton and Durham Townships in their entireties, and that portion of Haycock and Springfield Townships east of a line following State Highway 412, from Northampton County south to Route 09071 to State Highway 212, along Highway 212 to Route 09068, and along 09068 to State Highway 313. Also included is

that portion of Bublin Borough east of State Highway 313
ELECTRICIANS 31.31 37.75%

ELEC0126D 12/03/2000
Rates Fringes
CHESTER, DELAWARE, MONTGOMERY, PHILADELPHIA, AND REMAINDER OF
BUCKS COUNTY
LINE CONSTRUCTION:
Lineman 32.23 18%+3.30
Winch Truck Operator 22.56 18%+3.30
Truck Driver 20.95 18%+3.30
Groundman 19.34 18%+3.30

ELEC0269A 10/01/2000
Rates Fringes
BUCKS COUNTY (Area East of a line starting at the Delaware River
and following the west limits of the Borough of Bristol, along
the continuation of U.S. Highway 13 and under the Pennsylvania Railroad Bridge to Route 09113, north along 09113 to route 152,
north along route 152 to the Hulmeville Rd., east on the
Hulmeville to Route 344, north on route 344 to the junction of
Spurs 281 and 252 continue north on spur 252 and route 09028,
west on 09028 to Route 152, north on 152 to TR 532, north on TR
532 to TR 113, north on TR 113 to TR 232 as Anchor Inn, northeast
on TR 232 and continue northeast along 659 to Route 09060, West
on 09060 to Route 402, north on 402 to the Borough Line at the
southwest corner of the Borough of New Hope; including the
Boroughs of New Hope and Bristol)
ELECTRICIANS 33.08 29%+5.00

ELEC0269C 10/01/2000
Rates Fringes
BUCKS COUNTY - That portion east of a line starting at the
Delaware River and following the west limits of the Borough of
Bristol, along the continuation of U.S. Highway 13 and under the
Pennsylvania Railroad Bridge to Route 09113, north along 09113 to
route 152, north along route 152 to the Hulmeville Rd., east on
the Hulmeville to Route 344, north on route 344 to the junction
of Spurs 281 and 252 continue north on spur 252 and route 09028,
west on 09028 to Route 152, north on 152 to TR 532, north on TR
532 to TR 113, north on TR 113 to TR 232 as Anchor Inn, northeast
on TR 232 and continue northeast along 659 to Route 09060, West
on 09060 to Route 402, north on 402 to the Borough Line at the
southwest corner of the Borough of New Hope. The Boroughs of New
Hope and Bristol are included.

LINE CONSTRUCTION:
Lineman, Cable Splicer,
Heavy Equipment Operator,
and Truck Drivers 33.08 5.00+29%
Groundman, Winch Operator 26.46 5.00+29%

ELEC0313G 12/01/2000

	Rates	Fringes
DELAWARE COUNTY :(That portion south of U.S. Highway No. 1 and west of U.S. Highway No. 202) Chester County (That portion South and east of U. S. Highway 1)		
ELECTRICIANS	26.82	47.62%

ELEC0375A 06/01/2000

	Rates	Fringes
BUCKS COUNTY (East Rock Hill, West Rock Hill, Milford and Richland Towships in their entirety and that portion of Haycock and Springfield Townships west of a line following State Highway 212 from Northampton County South to Route 09071 along 09071 to state Highway 212, along Highway 212 to Route 09068 and along 09068 to State Highway 313) MONTGOMERY COUNTY(Upper Hanover Twp.in its entirety)		
ELECTRICIANS	25.23	3%+5.40

ELEC0380A 09/04/2000

	Rates	Fringes
BUCKS COUNTY (Hilltown and New Britain Townships in their entirety; that portion of Telford Borough Northeast of County Line Road (Main Street) and bounded by West Rock Hill and Hilltown Township that portion of Dublin Borough West of State Highway 313, and that portion of Doylestown and Warrington Townships and Doylestown Borough Northwest of a line following U.S. Highway 611 South from Route 09064 to the spur of Route 270, and proceeding Northwest along the spur to Route 397, Southwest on 397 to Route 350, Southeast on 350 to Route 395, Southwest on 395 to Route 09069, Southeast on 09069 to Route 09041, Southwest on 09041 to the Montgomery County Line)		
DELAWARE COUNTY (The portion of Radnor Township North of U.S Highway 30 and West of State Highway 320)		
MONTGOMERY COUNTY (The portion Northwest of a line following Lower State Road from Bucks County Southwest to Bethlehem Pike (U.S. Highway 309), South on Bethlehem Pike to Penllyn Pike, Southwest on the Penllyn and Blue Bell Pikes to Wissahickon Creek to the Butler Pike, Southwest Wissahickon Creek to Butler Pike, Southwest on Butler Pike, to North Lane near Conshohocken Borough, Southeast on North Lane to the Schuylkill River and		

continuing Southeast in a line to Spring Mill Road, Southwest on Spring Mill Road to Delaware County; but excluding Upper Hanover, Douglas, Upper Pottsgrove, West Pottsgrove Townships and also excluding that portion of the Borough of Pottstown North and West of a line drawn Northeast on Kein Street from the Schuylkill River to Reading Railroad Northwest on the railroad to Madison Street, to High Street, East on High Street to Green Street, North on Green Street and Northeast on Mintzer Street to Lower Pottsgrove Township Line, along this township line and the borough line Northwest to Adams Street and Beehive Road, Northeast on Beehive Road to the Township Line at Mervine Street)

CHESTER COUNTY (East Coventry. East Vincent, West Vincent, East Pikeland, West Pikeland, Uwchlan, Upper Uwchlan, East Brandywine, Schuylkill and Charleston Townships in their entirety, and that portion of Clan, East Clan, East Whiteland & West Whiteland, Tredyffrin, Willistown, Easttown Townships and Borough of Downingtown north of U. S.Highway 30)

ELECTRICIANS	30.13	35%

ELEC0654A 06/04/2001

	Rates	Fringes
DELAWARE COUNTY (The portion south of U.S. Highway 30 and north of that part U.S. Highway 1 between U.S. Highway 202 and the Chester County Line, and east of that part of U.S. Highway 202 between U.S. Highway 1 and the Delaware Line, and west of a line extending from Montgomery County along State Route 320 to Maple, then along the Springfield Road to Saxer Avenue, along Saxer Avenue to Powell Road; along Powell Road to State Highway 420; along 420 and continuing in a straight line to the Delaware River in the State of Pennsylvania) CHESTER COUNTY (That portion south of U. S. Highway 30 and north of that part of U.S. Highway 1)		
ELECTRICIANS	30.44	4.87+8.74%

ELEC0743A 09/01/2001

	Rates	Fringes
CHESTER (Coatesville, Honey Brook, South Coventy, Valley, Wallace, Warwich, West Brandywine, West Clan, and West Nantmeal Twps); AND MONTGOMERY (Douglas, Pottstown, Upper Pottsgrove, and West Pottsgrove, Twps) COUNTIES		
ELECTRICIANS	24.55	3%+7.37

ELEC0743G 09/01/2001

	Rates	Fringes
CHESTER COUNTY (The portion of Sadsbury and West Sadsbury Township north of U.S. Highway 30)		

ELECTRICIANS	23.44	3%+7.37

ENGI0542D 05/01/2001

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
HEAVY, HIGHWAY, AND WATER LINE CONSTRUCTION (Off Plant Site)		
GROUP 1	26.99	29.5%+5.76+A
GROUP 2	26.74	29.5%+5.76+A
GROUP 3	23.27	29.5%+4.96+A
GROUP 4	22.96	29.5%+4.96+A
GROUP 5	21.24	29.5%+4.97+A
GROUP 6	20.25	29.5%+4.97+A

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Handling steel and stone in connection with erection, cranes doing hook work, any machine handling machinery, helicopters, concrete pumps building machines similar to the above, including remote control equipment.

GROUP 2: All types of cranes, All types of backhoes, Cableways, Draglines, Keystones, all types of shovels, Derricks, Pavers 21E and over, Trenching machines, Trench shovel, Graddalls, Front-End loaders, Boat Captain, Pippin type backhoes, Tandems scrapers, Towers type crane operation erecting, Dismantling, Jumping or Jacking, Drills (self-containes), (drillmaster type) forklift (20 ft. and over), Moter patrols (fine grade), Batch plant with mixer, Carryalls, Scraper, Trounapulls, Roller (Hith Grade Finishing), Spreaders (asphalt), Bulldozers and Tractors, Mechanic welder, Conveyor loaders (euclid-type wheel), Concrete pump, Milling Machines, Hoist with two towers, Building hoist double drum (unless used as a single drum), Mucking machines in tunnel, All auto grade and concrete finishing machines, Bundle pullers/extractors (tublar), toxic/hazardous waste removal rate 20 per cent added to all classificiation, bobcat, side broom, directional boring machines, vermeet saw type machines (other than hand held) tractor mounted hydro axe, chipper with boom, all machine similar to the above includidng remote control equipment.

GROUP 3: Asphalt plant engineers, Well drillers, Ditch witch (small trencher), Motor patrols, Fine grade machines, Ten-ton roller (grade fill stone base), Concrete breaking machines, Guilloline only, Stump grinder, Conveyors (except building conveyors), Fork lift trucks of all types, High pressure boliers, Machine similar to the above, including remote control equipment.

GROUP 4: Seaman, Pulverzer form line grader, Farm tractors, road finishing, Concrete spreader, Power broom (self-contained), Seed spreader, Grease truck.

GROUP 5: Compressors pumps, Well point pumps, Welding machines Tireman, Power equipment, Maintenance engineer (power boats), and macnines similar to the above.
GROUP 6: Fireman, Oilers and deck hands (personnel Boats), grease truck.
FOOTNOTE:
A. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day and Christmas Day
TOXIC/HAZARDOUS WASTE REMOVAL* Add 20 per cent to basic hourly rate for all classifications

---

IRON0068D 07/01/2001

	Rates	Fringes
BUCKS COUNTY (Remainder)		
IRONWORKERS, Structural, Ornamental, and Reinforcing	27.56	21.10

IRON0161A 07/01/2001

	Rates	Fringes
BUCKS COUNTY (Includes the towns of Bensalem, Breadysville, Bristol, Churchville, Cornwells Heights, Davisville, Eddington, Feasterville, Hartsville, Johnsville, Line Lexington, Neshaminy, Southhampton, Tradesville, Trevose, Unionville, Warminster, and Warrington), DELAWARE (North of a line running along State Route 352 to right on Stae Route 291 to State Line); CHESTER (Includes the towns of Alsham, Anselma, Bacton, Berwyn, Cedar Hollow, Charlestown, Chester Springs, Cromby, Devon, Devault, Daylesford, Diamond Rock, Dutton Mill, Frazer, Goshenville, Howellville, Kimberton, Ludwig Corner, Paoli, Mattews, Perkiomen Junction, Phoenixville, Rapps Corner, Rocky Hill, Strafford, Sugartown, Tanguy, Valley Forge, Valley Store, White Horse, Williams Corner); MONTGOMERY (Remainder); and PHILADELPHIA COUNTIES		
IRONWORKERS:		
Rigger and Machinery Mover	27.95	13.45

IRON0401A 07/01/2001

	Rates	Fringes
BUCKS (Includes the towns of BEnsalem, Breadysville, Bristol Churchville, Cornwells Heights, Davisville, Eddington, Feasterville, Hartsville, Johnsville, Line Lexington, Neshaminy, Southampton, Tradesville, Trevose, Unionville, Warminster, and Warrington): DELAWARE (North of a line running along State Rt 352 to right on State Rt 291 to State Line); CHESTER (Includes the towns of Aldham, Anselma, Bacton, Berwyn, Cedar Hollow, Charlestown, Chester Springs, Cromby, Devon, Devault, Daylesford, Diamond Rock, Dutton Mill, Frazer, Goshenville, Howellville,		

Kimberton, Ludwigs Corner, Paoli, Matthews, Perkiomen Junction, Phoenixville, Rapps Corner, Rocky Hill, Strattford, Sugartown, Tanguy, Valley Forge, Valley Store, White Horse, Williams Corner, and Wilsons Corner); MONTGOMERY (Remainder); and PHILADELPHIA COUNTIES

IRONWORKERS:

Structural and Ornamental	32.45	14.80

IRON0405A 07/02/2001

	Rates	Fringes

BUCKS (Includes the towns of Bensalem, Breadysville, Bristol, Churchville, Cornwell Heights, Davisville, Eddington, Festerville, Hartsville, Johnsville, Line Lexington, Neshaminy, Southhampton, Transville, Trevose, Unionville, Warminister, and Warrington), DELAWARE (North of a line running along State Route 352 to right on State Route 291 to State Line); CHESTER (Includes the towns of Aldham, Anselma, Bacton, Berwyn, Cedar Hollow, Charlestown Chester Springs, Cromby, Devon, Devault, Daylesford, Diamaond Rock, Dutton Mill, Frazer, Goshenville, Howellville, Kimberton, Ludwigs Corner, Paoli, Mathews, Perkiomen Junction, Phoenixville, Rapps Corner, Rocky Hill, Strafford, Sugartown, Tanguy, Valley Forge, Valley Store, White Horse, Williams Corner, and Wilsons Corner); MONTGOMERY (Remainder); AND PHILDELPHIA COUNTIES

IRONWORKERS:

Reinforcing Steel Mesh, Rebar Work	27.89	13.95

IRON0420G 07/01/2001

	Rates	Fringes

MONTGOMERY COUNTY (Anise, Berguy, Congo, Douglas, East Greenfield, East Limerick, East Slaford, East Zieglerville, Engleville, Fagleysville, Ford, Gilbertsville, Green Lane, Hanover, New Perksionenville, Niato, Palm, Obelish, Pennsburg, Perkiomen, Pottstown, Royerfored, Roytown, Sammamansville, Tylerport, Upper Hanover, Upper Pottsgrove, Upper Wodall, West Limerick, West Salford, and West Zieglerville Townships)

IRONWORKERS:

Projects $100,000,000 and greater, all work	22.75	12.70
Projects less than $100,000,000	22.25	12.70

IRON0451D 07/01/2001

	Rates	Fringes

CHESTER (Remainder of County), AND DELAWARE (Remainder of County) COUNTIES

IRONWORKERS:
Structural, Ornamental, and
Reinforcing 24.60 14.80

LABO0401A 05/01/2001

	Rates	Fringes
LABORERS:		
GROUP 1	20.45	12.45
GROUP 2	20.25	12.45
GROUP 3	20.15	12.45
GROUP 4	20.30	12.45
GROUP 5	20.05	12.45
GROUP 6	20.70	12.45
GROUP 7	20.55	12.45
GROUP 8	20.40	12.45
GROUP 9	20.95	12.45
GROUP 10	14.85	12.45
GROUP 11	20.45	12.45
GROUP 12	24.14	12.45

LABORERS CLASSIFICATIONS

GROUP 1: Multiple wagon drill operator

GROUP 2: Finished surface asphalt raker; pipelayers; conduit and duct layer; jackhammer operator; paving breaker; experienced pipelayer or caulker (all joints up to within 5 ft of builing foundation line)

GROUP 3: Other pneumatic tool operators; laborers stripping concrete forms, carrying or handling lumber, steel, steel mesh, and other concrete materials; form pinners; tool room men; mortar mixers; concrete pitman & spaders; grademen; asphalt shovelers; setting cut stone, granite or artificial stone; hod carriers; scaffold builders; all other laborers with the exception of workers in compressed air, relief joints and approach slab; men working in sheeting, pouring concrete, assembling and placing gabians

GROUP 4: Wagon drill operators

GROUP 5: Yard workers: Laborers, sscale mixmen, burnermen, dustmen, feeder

GROUP 6: Free air tunnel: Miner bore driver, blaster, drillers pneumatic shield operator; miners

GROUP 7:Form setters; circular caisson excavation bottom men underpinning excavation bottom men, welders, burner and air tugger

GROUP 8: Trackmen; brakemen; groutmen; bottom shaft men; all others in free air tunnels

GROUP 9: Welders and burners

GROUP 10: Flaggers

GROUP 11: Powderman
GROUP 12: Toxic/hazardous waste handler

LABO0402A 05/01/2001

	Rates	Fringes
LANDSCAPING:		
Landscape Laborers	15.69	10.09+A
Farm Tractor Driver, Hydroseeder Nozzleman, Mulcher Nozzleman	16.19	10.09+A

FOOTNOTE:
A. PAID HOLIDAYS: Independence Day, Labor Day, and Thanksgiving Day

---

PAIN0021D 05/01/2000

	Rates	Fringes
PAINTERS:		
Brush	23.55	10.45
Spray, Steel, Swing	24.80	10.45
Roller	23.55	10.45

PLAS0592A 05/01/2001

	Rates	Fringes
CEMENT MASONS	23.45	14.24

PLUM0420A 05/01/2001

	Rates	Fringes
STEAMFITTERS	30.77	13.74

PLUM0690H 05/01/2001

	Rates	Fringes
PLUMBERS	31.29	13.20

TEAM0470B 05/01/2001

	Rates	Fringes
TRUCK DRIVERS:		
GROUP 1	19.60	8.0725+A+B
GROUP 2	19.70	8.0725+A+B
GROUP 3	19.95	8.0725+A+B

FOOTNOTES FOR TRUCK DRIVERS:
A. PAID VACATION: Employee will earn one vacation day for every two months up to a maximum of five vacation days per calendar year. During each two consecutive months period, employee must have worked twenty-six days in that two month period. After 130 workdays the employee will be entitled to all days of vacation.
B. PAID HOLIDAYS: Memorial Day, Independence Day, Labor Day

and Veterans Day and five personal holidays provided such employee works the scheduled work day before and after said holiday; and employee gives employer one week's notice requesting a personal holiday. The eligibility for personal holiday every two months up to a maximum of five consecutive month period, employee must have worked 26 days in that two month period. After 130 work days the employee will be entitled to all personal holidays.

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1 - Stake body truck (single axle, dumpster)
GROUP 2 - Dump trucks, tandem and batch trucks, semi-trailers, agitator mixer trucks, and dumpcrete type vehicles, asphalt distributors, farm tractor when used for transportation, stake body truck (tandem)
GROUP 3 - Euclid type, off-highway equipment or belly dump trucks and double hitched equipment, staddle (ross) carrier, low-bed trailers

---

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.)

and 3.) should be followed.
With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.
3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

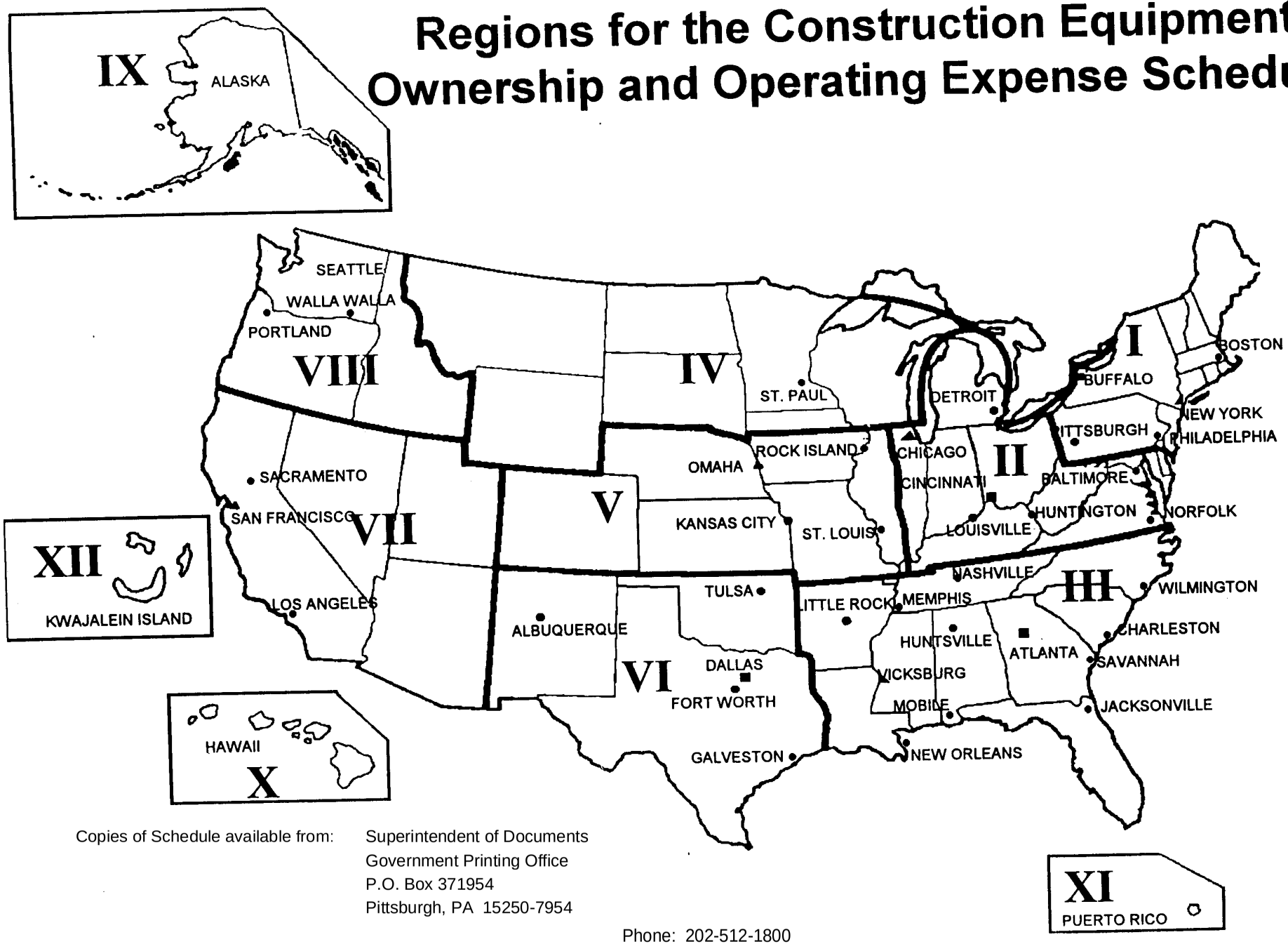
Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

Regions for the Construction Equipment Ownership and Operating Expense Schedule



Copies of Schedule available from: Superintendent of Documents
Government Printing Office
P.O. Box 371954
Pittsburgh, PA 15250-7954

Phone: 202-512-1800

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01010 SUMMARY OF WORK
01270 MEASUREMENT AND PAYMENT
01312 GOVERNMENT RESIDENT MANAGEMENT SYSTEM
01320 PROJECT SCHEDULE
01330 SUBMITTAL PROCEDURES
01350 DIVING SERVICES
01351 SAFETY, HEALTH, AND EMERGENCY RESPONSE
01354 ENVIRONMENTAL PROTECTION FOR CIVIL WORKS
01356 STORM WATER POLLUTION PREVENTION MEASURES
01380 CONSTRUCTION PHOTOGRAPHS
01451 CONTRACTOR QUALITY CONTROL
01500 TEMPORARY CONSTRUCTION FACILITIES
01570 TRAFFIC CONTROL
01576 PROTECTION OF MARINE AND AERIAL NAVIGATION
01580 PROJECT AND SAFETY SIGNS
01780 CLOSEOUT SUBMITTALS

DIVISION 02 - SITE WORK

02111 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL
02120 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
02220 DEMOLITION
02300 EARTHWORK
02451 CONCRETE FILLED STEEL PIPE PILES
02457 ROUND TIMBER PILES
02466 DRILLED FOUNDATION CAISSONS (PIERS AND ABUTMENTS)
02740 BITUMINOUS ROAD PATCHING
02770 CONCRETE SIDEWALKS AND CURBS AND GUTTERS

DIVISION 03 - CONCRETE

03100 STRUCTURAL CONCRETE FORMWORK
03200 CONCRETE REINFORCEMENT
03300 CAST-IN-PLACE STRUCTURAL CONCRETE
03415 PRECAST-PRESTRESSED CONCRETE

DIVISION 05 - METALS

05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS
05120 STRUCTURAL STEEL
05500 MISCELLANEOUS METAL
05650 RAILROADS

DIVISION 06 - WOODS & PLASTICS

06100 ROUGH CARPENTRY

DIVISION 07 - THERMAL & MOISTURE PROTECTION

07413 METAL SIDING
07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
07900 JOINT SEALING

DIVISION 08 - DOORS & WINDOWS

08110 STEEL DOORS AND FRAMES
08510 STEEL WINDOWS
08550 WOOD WINDOWS
08700 BUILDERS' HARDWARE
08810 GLASS AND GLAZING

DIVISION 09 - FINISHES

09250 GYPSUM WALLBOARD
09510 ACOUSTICAL CEILINGS
09650 RESILIENT FLOORING
09900 PAINTING, GENERAL

DIVISION 13 - SPECIAL CONSTRUCTION

13120 STANDARD METAL BUILDING SYSTEMS
13280 ASBESTOS ABATEMENT
13281 LEAD HAZARD CONTROL ACTIVITIES

DIVISION 15 - MECHANICAL

15014 OPERATING MACHINERY
15015 WIRE ROPES AND SPAN BALANCING
15016 OPERATING AND MAINTENANCE MANUALS
15017 MAINTENANCE LIFTS

DIVISION 16 - ELECTRICAL

16100 BRIDGE CONTROL SYSTEM
16110 BRIDGE ELECTRIC SERVICE
16120 BRIDGE STANDBY ENGINE GENERATOR SYSTEM
16200 TRAFFIC SIGNALS AND BARRIER GATES
16910 SIGNALING FOR RAILROAD LIFT BRIDGE

-- End of Project Table of Contents --

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

The general description below is given to indicate the approximate scope of this project only. It does not limit the work required under the contract drawings and specifications.

The work of this project consists of the rehabilitation of the lift span, including strengthening and deck system replacement and cleaning and painting of the structural steel; the removal and disposal of both existing towers and the tower spans, except for certain structural and machinery items that will be salvaged for reuse; the construction of two new taller towers with new counterweights and rope systems; two new tower spans; the reconstruction of the four substructure elements; replacement of the fender system; new electrical control system and operator's house; new railroad track and signal system; new approach roadways within the limits of the project, as shown or specified.

The rehabilitation of the lift span cannot be accomplished with the span in place. The lift span shall be removed to an offsite location so that the navigation channel will remain open during the major portion of the project construction. After the lift span has been rehabilitated, the towers have been reconstructed, the machinery and counterweight ropes have been installed, the electrical control system has been installed, and the lift span is ready to be be made operational, then the lift span shall be moved back into position on the towers.

1.1.1 Additional Work

It is anticipated that during the performance of the repair and painting work specified, the Contractor may uncover or otherwise discover additional areas that need to be repaired When such areas are discovered they shall be inspected concurrently by the Contractor and the Contracting Officer. The Contracting Officer will promptly make a determination of the action to be taken. Equitable adjustments to the contract will be made for additional work directed by the Contracting Officer.

1.2 WORK SEQUENCE AND SCHEDULING

1.2.1 Hours of Operations

Except as otherwise authorized in writing by the Contracting Officer, construction activities on the railroad bridge will be permitted only between the hours of 6:00 a.m. to 6:00 p.m. on Monday through Friday. Reference SECTION 00810 SPECIAL CONTRACT REQUIREMENTS, SCR-11 f. Hours of Work.

The exclusion of work on weekends and the specified legal holidays has been considered in computing the performance time of this contract. Refer to other sections of these specifications for requirements and restrictions for allowed time periods for performance of particular items of work and

for temporary suspension of the work, if required.

The following legal holidays are observed:

January 1st
Third Monday in January
Third Monday in February
Last Monday of May
July 4th
1st Monday of September
2nd Monday of October
11th of November
Fourth Thursday of November
25th of December

When one of the above designated legal holidays falls on a Sunday, the following Monday will be observed as a legal holiday. When a legal holiday falls on a Saturday, the preceding Friday is observed as a holiday. Requests to perform work at other times shall be made in writing to the Contracting Officer. Every effort will be made to accommodate such requests.

1.2.2 Work Sequence

1.2.2.1 General

There are certain essential criteria relative to the preparation of a work sequence and time schedule which the Contractor will be required to implement and follow during the prosecution of the work. Minor variations in the sequence of the items of work as specified may be made by the Contractor, provided such variations do not conflict with critical elements of the schedule. Proposed minor variations shall be noted on the progress charts submittal required by CONTRACT CLAUSE, entitled "SCHEDULES FOR CONSTRUCTION CONTRACTS." Variations shall be approved by the Contracting Officer prior to implementation.

1.2.3 Organization at the Site

1.2.3.1 General

The Contractor shall employ ample personnel and sufficient equipment to accomplish the work of this contract in the least amount of time, within the prosecution period specified in the SPECIAL CONTRACT REQUIREMENTS.

1.2.3.2 Rate of Progress

Should the Contractor fail to maintain a satisfactory rate of progress, the Contracting Officer may require that additional personnel and equipment be placed on the work and weekend and overtime work be performed, in order that the work be brought up to schedule and maintained. This additional work shall be performed at no additional cost to the Government.

1.3 CONTRACTOR WORK LIMITS

Work shall be restricted to the areas shown on the contract drawings in addition to storage areas assigned to this Contractor.

1.4 CONTRACTOR RECEIPT OF SUPPLIES

The Contractor shall be responsible for all arrangements for the receipt of materials and supplies at the job site. Government personnel are not permitted to receive or sign for items delivered to the site.

1.5 PRE-CONSTRUCTION CONFERENCE

The Contracting Officer will conduct a pre-construction conference with key Contractor personnel. The purpose of the conference is to review contract requirements and to establish a working relationship between the Contractor's Staff and the Corps Of Engineers personnel who will be closely associated with the project. During the conference, the Contracting Officer will inform the Contractor concerning Job Safety, Quality Control, Labor Relations, and Environmental Protection. The Contractor's Superintendent and Quality Control Representative shall attend this conference. All submittals which are ready for submission prior to start of work may be brought to the conference for distribution to the participating reviewers.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SUMMARY

The following is a list of the various payment items that will be used by the bidders to present the total amount bid for the construction of the project. The same payment items will be used by the Contracting Officer to make payment for the contract to the Contractor.

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Certificates; FIO

Submit certified certificates for pre-assembled item,\s, such as machinery and electrical items, etc.

1.3 LUMP SUM PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.4 UNIT PRICE PAYMENT ITEMS

Payment items for the work of this contract on which the contract unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

1.5 ITEM LIST

1.5.1 Item 1 Mobilization/Demobilization

1.5.1.1 Payment

Payment will be made for costs associated with mobilization and demobilization, as defined in Special Clause PAYMENT FOR MOBILIZATION AND DEMOBILIZATION. Other work included in this item are the use of barges for crane placement and access during construction, preparation and revision of progress schedules, all work necessary to obtain, prepare, maintain, and restore a remote site for all the rehabilitation work to be performed on the Lift Span after the "float-out" and prior to the "float-in". Other work included in this item are preparation of the work site and administrative site and restoration of the areas that were used during the construction. Prior to the start of field operations and after the completion of field work, the work of taking soundings across the channel and reports shall be included. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.1.2 Unit of Measure

Unit of measure: lump sum.

1.5.2 Item 2 Maintenance and Protection of Traffic

1.5.2.1 Payment

Payment will be made for costs associated with operations necessary for maintaining traffic around the bridge construction and providing for final traffic pattern after the alteration to the bridge. Temporary concrete barriers, signs, flashers, barricades floodlights, and temporary roadway striping shall be placed, maintained and removed during the construction. The final roadway lane striping shall be placed on both approaches to the bridge. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

The work of this payment item will not include the work of the Railroad Signalization payment item or the Traffic Gates and Signals payment item.

1.5.2.2 Unit of Measure

Unit of measure: lump sum.

1.5.2.3 Partial Payments

a. Whenever the initial traffic protection has been installed, 30% of the amount bid for this item will be paid.

b. Whenever work is performed equal to 50% of the total contract price, 30% of the amount bid for this item will be paid.

c. Whenever the final traffic protection has been finalized, the remaining portion of the amount bid for this item will be paid.

1.5.3 Item 3 Approach Excavation

Payment will be made for the removal of all non-structural excavation of the pavement, curb, sidewalk, subbase and subgrade that is necessary to install additions and modifications to the landward side of the abutments. The measurement will be made based on in place quantities prior to excavation. The cost of all labor, material, and equipment necessary to

perform the work is included in the unit price bid for this item.

1.5.3.1 Unit of Measure

Unit of Measure: cubic yard.

1.5.4 Item 4 Pile Load Test

1.5.4.1 Payment

Adjustments in the contract price will be made for such increases or decreases by the amounts bid for "Pile Load Test". The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.4.2 Unit of Measure

Unit of measure: lump sum.

1.5.4.3 Partial Payments

There will be no partial payments for this item. Payment will be made when the pile load tests are completed.

1.5.5 Item 5 Pipe Piles

1.5.5.1 Payment

Payment in accordance with the following paragraph, "Measurement," shall constitute full compensation for furnishing, delivering, handling, and/or installing (as applicable) pipe piles, reinforcement, concrete necessary to meet contract requirements applicable to the foundation piles. The Contractor will not be allowed payment for withdrawn or rejected piles, or for a portion of any pile remaining above the cut-off point. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.5.2 Measurement

The Contracting Officer reserves the right to increase or decrease the total length of piles to be furnished and installed, by changing the foundation pile locations or elevations, requiring the installation of additional piles, or requiring omission of piles from the requirements shown and specified. Whether or not such changes are made, the Contractor will be paid at the contract unit price per linear foot (including control test piles), multiplied by the total linear feet of acceptable piles actually installed.

1.5.5.3 Unit of Measure

Unit of measure: linear foot.

1.5.6 Item 6 Concrete Pile Cap

1.5.6.1 Payment

Payment will be made for costs associated with the construction of concrete pile caps at the top of the pipe piles. The costs will include forming, furnishing and placing reinforcement steel bars, placing and curing

concrete, and removing forms. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.6.2 Unit of Measure

Unit of measure: lump sum.

1.5.6.3 Partial Payments

There will be no partial payments for this item. Payment will be made when concrete pile cap is completed.

1.5.7 Item 7 Prestressed Box Beams

1.5.7.1 Payment

Payment will be made for costs associated with the construction of prestressed, reinforced concrete box beams at the top of the pipe pile caps. The costs will include forming, furnishing and placing reinforcement steel bars, furnishing and placing prestressing tendons, placing and curing concrete in two pours, placing lightweight voids, transverse ducts, and removing forms. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.7.2 Unit of Measure

Unit of measure: lump sum.

1.5.7.3 Partial Payments

There will be no partial payments for this item. Payment will be made when prestressed box beams are completed.

1.5.8 Item 8 Backfill

1.5.8.1 Payment

Payment will be made for costs associated with placement and compaction of backfill on the bridge approaches, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.8.2 Measurement

The total compacted in place volume of backfill within the limits of excavation

1.5.8.3 Unit of Measure

Unit of measure: cubic yard.

1.5.9 Item 9 Approach Slab

1.5.9.1 Payment

Payment will be made for costs associated with placement of concrete approach slab on the bridge approaches, furnishing and placing reinforcement steel bars, and other operations incidental thereto. The

cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.9.2 Unit of Measure

Unit of measure: lump sum.

1.5.9.3 Partial Payments

There will be no partial payments for this item. Payment will be made when approach slab is completed.

1.5.10 Item 10 Concrete Curb and Sidewalk

1.5.10.1 Payment

Payment will be made for costs associated with construction of concrete curbs and adjacent concrete sidewalks on prepared subbases on the bridge approaches, furnishing and placing reinforcment steel bars in the sidewalks, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.10.2 Measurement

The total quantity of concrete curb and sidewalk volume for which payment will be made will be the actual quantity of concrete placed on the approaches for the curb and sidewalk.

1.5.10.3 Unit of Measure

Unit of measure: cubic yard.

1.5.11 Item 11 Roadway Repairs

1.5.11.1 Payment

Payment will be made for costs associated with furnishing and placement of full depth bituminous wearing course, consisting of granular subbase, bituminous base course, tack coat bituminous binder course and bituminous wearing course, on the bridge approaches, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.11.2 Measurement

Unit of measure: lump sum

1.5.11.3 Partial Payments

There will be no partial payments made for this item. Payment will be made when the roadway is finished and is ready for traffic.

1.5.12 Item 12 Fender System Removal

1.5.12.1 Payment

Payment will be made for costs associated with operations necessary for removing the existing fenders. The timber sheeting, piles, walers, and

dolphins shall be removed in several stages in conjunction with the installation of the new fender system immediately behind the removal item. The existing timber is coated with a preservative and shall be appropriately disposed of at site that will accept this type of material. This work also include the removal from the existing fender, storage and re-installation of a portion of the debris barrier on the new fender. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.12.2 Unit of Measure

Unit of measure: lump sum.

1.5.12.3 Partial Payments

a. Whenever one fender on one side of the channel is completely removed, 50% of the amount bid for this item will be paid.

b. Whenever the entire existing fender on both sides of the channel is completely removed, the remaining portion of the amount bid for this item will be paid.

1.5.13 Item 13 New Fender System

1.5.13.1 Payment

Payment will be made for costs associated with operations necessary for constructing a new fender system. The new fender system shall be constructed in portions immediately after the removal of portions of the existing fender. This is for protection of marine navigation. The cost shall include timber piles, timber pile clusters, horizontal timber walers, vertical sheeting, and the necessary hardware and appurtenances. Also included in the fender system is the cost for clearance gauges, including timber piles, timber bracing, structural steel plate and lettered gauge markers. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.13.2 Unit of Measure

Unit of measure: lump sum.

1.5.13.3 Partial Payments

a. The new fender system will be divided into six sections. There will be four curved sections that run from pile cluster to pile cluster at each end of each fender. The remaining two sections consist of each straight section in front of each main pier.

b. Whenever one of the above sections is completed, 17% of the amount bid for the item will be paid. This payment will be made for the first five sections that are completed.

c. When the entire fender is completed, the remaining portion of amount bid for this item will be paid.

1.5.14 Item 14 Substructure Concrete Removal

1.5.14.1 Payment

Payment will be made for costs associated with operations necessary for removing and disposing of the portion of the top of each pier and abutment that will be reconstructed. The existing reinforcing bars that project upward into the removal location shall be cleaned for future use. The horizontal reinforcement bars shall be disposed of with the excavated concrete. A waterproof trough may be required to keep the excavated area dry for anchor bolt placement and reconstruction under another payment item. Existing anchor bolts shall also be removed. Portions of the abandoned submarine cable shall be removed with substructure concrete removal. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.14.2 Unit of Measure

Unit of measure: lump sum.

1.5.14.3 Partial Payments

a. The existing substructure consists of four elements.

b. Whenever one substructure element has had all of the existing concrete removed, 25% of the amount bid for this item will be paid.

1.5.15 Item 15 New 6-Foot Caissons

1.5.15.1 Payment

Payment will be made for costs associated with soil borings at each caisson location, drilling, excavation, temporary casing pipe, furnishing and placing reinforcement steel bar cage, placing concrete in caissons for the substructure, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.15.2 Measurement

The total quantity of drilled length for which payment will be made will be the actual quantity between the bottom of caisson ground surface as determined by a survey and the top grade of the excavated substructure unit indicated. No allowance will be made for overdepth excavation or for the removal of any material below the indicated depth, unless authorized by the Contracting Officer.

1.5.15.3 Unit of Measure

Unit of measure: linear foot.

1.5.16 Item 16 3-Foot Caissons

1.5.16.1 Payment

Payment will be made for costs associated with soil borings at each caisson location, drilling, excavation, temporary casing pipe, furnishing and placing reinforcement steel bar cage, placing concrete in caissons for the substructure, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.16.2 Measurement

The total quantity of drilled length for which payment will be made will be the actual quantity between the bottom of caisson ground surface as determined by a survey and the top grade of the excavated substructure unit indicated. No allowance will be made for overdepth excavation or for the removal of any material below the indicated depth, unless authorized.

1.5.16.3 Unit of Measure

Unit of measure: linear foot.

1.5.17 Item 17 New Substructure Concrete

1.5.17.1 Payment

Payment will be made for costs associated with furnishing and placing concrete and reinforcing bars for the substructure locations, as indicated. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.17.2 Unit of Measure

Unit of measure: lump sum.

1.5.17.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new substructure concrete is completed.

1.5.18 Item 18 Float-Out/Float-In

1.5.18.1 Payment

Payment will be made for costs associated with operations necessary for removing the lift span to a remote work site. The mobilization of a minimum of two barges and supporting dunnage, the rental cost for the barges for the duration of the storage at a remote rehabilitation site, and the cost of a tug boat to maneuver the barges for the "float-out" and "float-in" shall be included in the cost of this item. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.18.2 Unit of Measure

Unit of measure: lump sum.

1.5.18.3 Partial Payments

a. Whenever the "float-out" is completed, as determined by the Contracting Officer, 60% of the amount bid for this item will be paid.

b. Whenever the "float-in" is completed, as determined by the Contracting Officer, the remaining amount bid for this item will be paid.

1.5.19 Item 19 Lift Span Deck Removal

1.5.19.1 Payment

Payment will be made for costs associated with operations necessary for the removal of the existing grid deck, concrete sidewalk and railroad supports stringers and roadway support stringers. Existing rivets shall be removed under this item as the structural steel component is being removed. Any damage to material to remain shall be repaired by the Contractor at no additional cost to the Government. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.19.2 Unit of Measure

Unit of measure: lump sum.

1.5.19.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the entire lift span deck that has been removed.

1.5.20 Item 20 Lift Span Paint Removal with Containment

1.5.20.1 Payment

Payment will be made for costs associated with operations necessary for cleaning the existing paint from the portions of the lift span to remain. After the "Float-Out" and the removal of the deck system, the Contractor shall enclose a portion or the entire lift span, to prepare to remove the existing lead-based paint. All blasting waste shall be collected for eventual disposal. During the preparation for the demolition of the counterweights, towers and tower spans, localized cleaning of lead paint so that the structural steel can be cut and existing rivets removed. The waste from the localized cleaning shall be collected and added to the other paint removal waste. The containment system, monitoring, and worker health requirements are also included in this item. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.20.2 Unit of Measure

Unit of measure: lump sum.

1.5.20.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the entire lift span structure that has been cleaned with all the paint removed.

1.5.21 Item 21 Paint Waste Disposal

1.5.21.1 Payment

Payment will be made for costs associated with the disposal of waste from the removal of existing paint from various payment items that require the removal of existing paint. Contractor-furnished disposal area(s) and the transportation to the disposal site is included. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.21.2 Measurement

The total quantity of paint waste material for which payment will be made will be the actual quantity contained in special containers.

1.5.21.3 Unit of Measure

Unit of measure: tons.

1.5.22 Item 22 Lift Span Painting

1.5.22.1 Payment

Payment will be made for costs associated with operations necessary for applying a three coat paint system to the lift span existing steel to remain. This painting shall be performed at the remote location prior to the addition of new lift span structural steel. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.22.2 Unit of Measure

Unit of measure: lump sum.

1.5.22.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the entire lift span structure that has been painted with the three coat paint system.

1.5.23 Item 23 New Lift Span Structural Steel

1.5.23.1 Payment

Payment will be made for costs associated with erection of new structural steel for the lift span structure for rehabilitation purposes, which includes other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.23.2 Unit of Measure

Unit of measure: lump sum.

1.5.23.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new lift span structural steel is completed.

1.5.24 Item 24 New Lift Span Rehabilitation Steel

1.5.24.1 Payment

Payment will be made for costs associated with erection of new structural steel for the lift span structure for rehabilitation purposes, which includes other operations incidental thereto. Also included is painting in the shop and touch-up painting in the field after erection. The removal, modification and reinstallation of the finger joint at each end of the lift span and adjacent tower spans are also included. The cost of all labor, material, and equipment necessary to perform the work is included in the

unit price bid for this item.

1.5.24.2 Measurement

The total quantity of new structural steel erected for rehabilitation purposes for which payment will be made will be the theoretical quantity based on the shop drawing weights. At locations where open holes will be present after rehabilitation steel has been added to the lift span, new high-strength bolts will be installed as part of this item. The weight of these extra fasteners will be measured at the weight of 0.8 pounds per 7/8-inch diameter fastener. This same weight will be used for other new 7/8-inch diameter fasteners that will connect rehabilitation steel to existing structural steel. No allowance will be made for structural steel added to the lift span for temporary reasons.

1.5.24.3 Unit of Measure

Unit of measure: pound.

1.5.25 Item 25 Rivet Replacement

1.5.25.1 Payment

Payment will be made for costs associated with the removal of indicated rivets and their replacement with new high strength structural bolts for the lift span structure for rehabilitation purposes, which includes other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.25.2 Unit of Measure

Unit of measure: lump sum.

1.5.25.3 Partial Payments

There will be no partial payments for this item. Payment will be made when rivet replacement is completed.

1.5.26 Item 26 New Lift Span Steel Grid Deck

1.5.26.1 Payment

Payment will be made for costs associated with erection of bridge steel grid deck flooring, including the area of the railroad portion of the deck, of the lift span, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.26.2 Unit of Measure

Unit of measure: lump sum.

1.5.26.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new lift span steel grid deck is completed.

1.5.27 Item 27 New Lift Span Steel Parapet

1.5.27.1 Payment

Payment will be made for costs associated with erection of the steel parapet on the lift span, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.27.2 Unit of Measure

Unit of measure: lump sum.

1.5.27.3 Sub Title

There will be no partial payments for this item. Payment will be made when new lift span steel parapet is completed.

1.5.28 Item 28 New Lift Span Concrete Sidewalk

1.5.28.1 Payment

Payment will be made for costs associated with placing concrete sidewalk deck flooring on the lift span including furnishing and placing of reinforcement steel bars, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.28.2 Unit of Measure

Unit of measure: lump sum.

1.5.28.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new lift span concrete sidewalk is completed.

1.5.29 Item 29 Tower Removal

1.5.29.1 Payment

Payment will be made for costs associated with operations necessary for removing the structural steel from each tower and tower span. This work cannot be performed until all other removal work that is on these two structures is completed. Also isolated removal of existing lead paint on these two structures is necessary before the structural steel can be cut by torch or saw or other means. The structural steel may be further cut into more manageable pieces on the ground before being hauled away to a disposal site that will accept lead painted steel for scrap. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.29.2 Unit of Measure

Unit of measure: lump sum.

1.5.29.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the both towers that have been

removed.

1.5.30 Item 30 New Tower Structural Steel

1.5.30.1 Payment

Payment will be made for costs associated with erection for new structural steel for the tower and tower span span structure including painting in the shop and touch-up painting in the field after erection, and other operations incidental thereto. The drilling, placing and grouting of anchor bolts is included in this payment item. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.30.2 Unit of Measure

Unit of measure: lump sum.

1.5.30.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new tower structural steel is completed.

1.5.31 Item 31 New Machinery Room Architectural

1.5.31.1 Payment

Payment will be made for costs associated with operations necessary for construction of two Machinery Rooms at the top of each tower. This work includes many components, such as: reinforced concrete floors, roof insulation, wood interior framing, wall insulation, drywall interiors, steel casement windows, steel doors, furnishings, and miscellaneous items. The structural steel framework and steel exterior walls and curved roof are not part of this item. Electrical furnishings are not part of the item. The steel stairways and grating platforms are not part of this item. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.31.2 Unit of Measure

Unit of measure: lump sum.

1.5.31.3 Partial Payments

a. The new machinery rooms consist of two separate elements.

b. Whenever one machinery room has had all of the architectural work completed, 50% of the amount bid for this item will be paid.

c. The remainder of the payment for this item will be paid when both machinery rooms have been completed.

1.5.32 Item 32 Operator and Electrical Building

1.5.32.1 Payment

Payment will be made for costs associated with operations necessary for construction of the Operator Room and the Electrical Room. This work includes many components, such as: reinforced concrete floors, metal

roofing, roof insulation, wood interior framing, metal siding, wall insulation, suspended ceiling, resilient flooring with cove, drywall interiors, wood double hung windows, steel doors, furnishings, and miscellaneous items. The structural steel framework is not part of this item. Electrical furnishings are not part of the item. The interior stairway up from the Operator Room to the Electrical Room is included in this item. The exterior steel stairways and grating platforms leading to and adjacent to this building are not part of this item. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.32.2 Unit of Measure

Unit of measure: lump sum.

1.5.32.3 Partial Payments

a. The new Operator Room and Electrical Room consist of two separate elements.

b. Whenever the Operator Room has had all of the architectural work completed, 40% of the amount bid for this item will be paid.

c. Whenever the Electrical Room has had all of the architectural work completed, 60% of the amount bid for this item will be paid.

1.5.33 Item 33 New Tower Concrete Deck

1.5.33.1 Payment

Payment will be made for costs associated with placing concrete deck flooring on the tower spans including furnishing and placing of reinforcement steel bars, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.33.2 Unit of Measure

Unit of measure: lump sum.

1.5.33.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new tower concrete deck is completed.

1.5.34 Item 34 New Tower Concrete Parapet

1.5.34.1 Payment

Payment will be made for costs associated with placing concrete parapet on the tower spans including furnishing and placing reinforcement steel bars, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.34.2 Unit of Measure

Unit of measure: lump sum.

1.5.34.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new tower concrete parapet is completed.

1.5.35 Item 35 New Tower Concrete Sidewalk

1.5.35.1 Payment

Payment will be made for costs associated with placing concrete sidewalk deck flooring on the tower spans including furnishing and placing of reinforcement steel bars, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.35.2 Unit of Measure

Unit of measure: lump sum.

1.5.35.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new tower concrete sidewalk is completed.

1.5.36 Item 36 New Tower Filled-Grid Deck

1.5.36.1 Payment

Payment will be made for costs associated with erection of bridge steel grid deck flooring with concrete filling, in the area of the railroad portion of the deck, of the tower span, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.36.2 Unit of Measure

Unit of measure: lump sum.

1.5.36.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new tower filled-grid deck is completed.

1.5.37 Item 37 Counterweight Removal

1.5.37.1 Payment

Payment will be made for the operations necessary for lowering and removal of the counterweights. The cost shall include the design of a system that can be used to lower the main counterweight for each tower. The falsework that is necessary to lower the existing counterweights and the auxiliary counterweights in each tower shall be provided and be installed. After each counterweight is lowered to the bridge deck level, the balance blocks, support system and other components to be reused shall be removed, cleaned and stored for reuse. The concrete and the structural steel shall be removed and disposed of off of Government property. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.37.2 Unit of Measure

Unit of measure: lump sum.

1.5.37.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the both tower counterweights that have been removed.

1.5.38 Item 38 New Maintenance Lifts

1.5.38.1 Payment

Payment will be made for costs associated with installation of proprietary personnel maintenance lift with all controls in each tower. The structural steel framework necessary to support the maintenance lifts are not part of this item. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.38.2 Unit of Measure

Unit of measure: lump sum.

1.5.38.3 Partial Payments

a. The new Maintenance Lifts consist of two separate elements.

b. Whenever one Maintenance Lift has been completed, 50% of the amount bid for this item will be paid.

c. The remainder of the payment for this item will be paid when both maintenance lifts have been completed.

1.5.39 Item 39 New Counterweight Steel

1.5.39.1 Payment

Payment will be made for costs associated with erection for new structural steel for the tower counterweight structures, which includes other operations incidental thereto. The painting of the removed, cleaned and stored pin connection plates and rope castings from the existing counterweights is included in this payment item. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.39.2 Unit of Measure

Unit of measure: lump sum.

1.5.39.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new counterweight steel is completed.

1.5.40 Item 40 New Counterweight Concrete

1.5.40.1 Payment

Payment will be made for costs associated with placing concrete filling in the tower counterweights including furnishing and placing reinforcement steel bars, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.40.2 Unit of Measure

Unit of measure: lump sum.

1.5.40.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new counterweight concrete is completed.

1.5.41 Item 41 Operating Machinery

1.5.41.1 Payment

Payment will be made for costs associated with operations necessary for installing new and refurbished machinery items in conjunction with the re-installation of the salvaged machinery items from the existing bridge. The list of all machinery that is included in this item is indicated on the plans. The removal of all existing machinery components, and the cleaning, storing and refurbishing of the indicated portion of the existing machinery components, and the disposal of the remaining machinery components are included in the work. Also included in this item is contractor supervised lift span operation and training. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.41.2 Unit of Measure

Unit of measure: lump sum.

1.5.41.3 Partial Payment

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Operating Machinery that has been completely installed in both towers.

1.5.42 Item 42 Counterweight Ropes

1.5.42.1 Payment

Payment will be made for costs associated with erection of new main counterweight ropes and new auxiliary counterweight ropes for the lift span structure, which includes attachment structural steel that is either new or re-installed and new fasteners. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.42.2 Measurement

Unit of measure: lump sum.

1.5.42.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Counterweight Ropes that have been completely installed in both towers.

1.5.43 Item 43 New Balance Blocks

1.5.43.1 Payment

Payment will be made for costs associated with manufacturing of new concrete balance blocks for the lift span counterweight structure, which includes placement in the counterweight pocket or storage at the top of the tower. Also included in this item is furnishing and placing of reinforcement steel bars. Balance blocks that are reused from the existing counterweight will not be measured but any cost with their use will be incidental to the item for Lift Span Balancing. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.43.2 Measurement

The total quantity of new balance blocks will be the actual number of each new balance block brought to the bridge tower top. Minimum number of balance blocks to be provided is indicated on the drawings and bid schedule. The quantity of new balance blocks may be increased to allow for the actual lift span weight requirements. The same unit price will be used for the additional balance blocks.

1.5.43.3 Unit of Measure

Unit of measure: each.

1.5.44 Item 44 Lift Span Balancing

1.5.44.1 Payment

Payment will be made for costs associated with operations necessary for the task of getting the lift span to a balanced condition with the counterweights, as indicated. The installation of the stored existing balance blocks in the new counterweight pockets is included in this payment item. The stored existing balance blocks that are not used in the new counterweight pockets and new balance blocks that are provided in another payment item shall be stored equally in the Machinery Houses at the top of each tower at a location that is approved by the Contracting Officer. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.44.2 Unit of Measure

Unit of measure: lump sum.

1.5.44.3 Partial Payments

There will be no partial payments.

1.5.45 Item 45 Operating and Maintenance Manual

1.5.45.1 Payment

Payment will be made for costs associated with operations necessary for

compiling and publishing of a complete electrical system manual with instructions on how to operate the bridge in a controlled manner and maintain the electrical system. Also included are the compiling and publishing of a complete mechanical operation and maintenance manual. In addition a similar manual shall be compiled and published for the various components of the Operator and Electrical Building and the two Machinery Houses. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.45.2 Unit of Measure

Unit of measure: lump sum.

1.5.45.3 Partial Payments

There will be no partial payments.

1.5.46 Item 46 Bridge Electrical and Control System

1.5.46.1 Payment

Payment will be made for costs associated with operations necessary for installing a complete electrical system to operate the bridge in a controlled manner. The list of all the electrical control system components is shown on the plans. The removal and disposal of the existing electrical components is also included. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.46.2 Unit of Measure

Unit of measure: lump sum.

1.5.46.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Electrical Control System that has been completely installed on the bridge.

1.5.47 Item 47 Bridge Electrical Service

1.5.47.1 Payment

Payment will be made for costs associated with operations necessary for connecting the bridge control system to an external electric power source. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.47.2 Unit of Measure

Unit of measure: lump sum.

1.5.47.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Bridge Electrical Service that has been completely installed on the bridge.

1.5.48 Item 48 Electrical Generator System

1.5.48.1 Payment

Payment will be made for costs associated with operations necessary for installing and connecting a backup generator and fuel supply to operate the lift span in the event of a external electric power failure. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.48.2 Unit of Measure

Unit of measure: lump sum.

1.5.48.3 Partial Payment

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Electrical Generator System that has been completely installed on the bridge.

1.5.49 Item 49 Railroad Signalization - Optional

1.5.49.1 Payment

Payment will be made for costs associated with operations necessary for installing a signalization system for the railroad over the bridge. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.49.2 Unit of Measure

Unit of measure: lump sum.

1.5.49.3 Partial Payment

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Railroad Signalization that has been completely installed on the bridge.

1.5.50 Item 50 Traffic Gates and Signals

1.5.50.1 Payment

Payment will be made for costs associated with operations necessary for the installation of a barrier gate system at each end of the bridge and traffic signals. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.50.2 Unit of Measure

Unit of measure: lump sum.

1.5.50.3 Partial Payment

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Traffic Gates and Signals that has been completely installed on the bridge and approaches.

1.5.51 Item 51 Track Removal

1.5.51.1 Payment

Payment will be made for costs associated with operations necessary for the removal of the railroad track and components between the limits indicated, All components of the railroad track shall be disposed of off of Government property. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.51.2 Unit of Measure

Unit of measure: lump sum.

1.5.51.3 Partial Payments

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Track that has been completely removed on the bridge and approaches, as indicated.

1.5.52 Item 52 New Lift Span Track

1.5.52.1 Payment

Payment will be made for costs associated with erection of bridge ties and rail to the lift span, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.52.2 Unit of Measure

Unit of measure: lump sum.

1.5.52.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new lift span track is completed.

1.5.53 Item 53 New Miter Rail Joints

1.5.53.1 Payment

Payment will be made for costs associated with operations necessary for constructing a miter rail at each end of the Lift Span and on each tower span. The miter rail shall include the length of rail indicated on the plans and as proposed by the miter rail manufacturer. The ties, rail connection hardware, and tie attachment hardware are included with this item. The steel grid on each side of the rail is not included in this item. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.53.2 Unit of Measure

Unit of measure: lump sum.

1.5.53.3 Partial Payment

The partial payments will be based on the approximate percentage, as determined by the Contracting Officer, of the Miter Rail Joints that have been completely installed on the bridge.

1.5.54 Item 54 New Tower Track

1.5.54.1 Payment

Payment will be made for costs associated with erection of bridge ties and rail to the tower spans, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.54.2 Unit of Measure

Unit of measure: lump sum.

1.5.54.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new tower track is completed.

1.5.55 Item 55 New Approach Track

1.5.55.1 Payment

Payment will be made for costs associated with construction of direct fixation on the bridge approaches, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.55.2 Measurement

The total quantity of railroad track length for which payment will be made will be the actual quantity between the end of the tower span. to the existing track to remain. No allowance will be made for concrete flooring between the railroad track. portion .

1.5.55.3 Unit of Measure

Unit of measure: linear foot.

1.5.56 Item 56 New Bridge Access Metalwork

1.5.56.1 Payment

Payment will be made for costs associated with operations necessary for constructing galvanized stairways, walkways, and ladders. The access system is constructed in numerous locations: the full length of each fender, from the piers to the fenders, from the piers to the sidewalk, from the abutment tops to abutment walkways, from the sidewalk to the Operator House, from the Operator House to the Electrical Room, ladders in each tower, and stairways at the top of each tower. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.56.2 Unit of Measure

Unit of measure: lump sum.

1.5.56.3 Partial Payments

The partial payments will be based on the approximate percentage, as

determined by the Contracting Officer, of the entire complex of Access Metalwork that has been completely installed on the bridge.

1.5.57 Item 57 New Sidewalk Pipe Railing

1.5.57.1 Payment

Payment will be made for costs associated with placement of bridge railing on the inboard side of the sidewalks of the lift span and the tower spans, and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.57.2 Unit of Measure

Unit of measure: lump sum.

1.5.57.3 Partial Payments

There will be no partial payments for this item. Payment will be made when new sidewalk pipe railing is completed.

1.5.58 Item 58 Soil Analysis

1.5.58.1 Payment

Payment will be made for costs associated with the testing samples of excavated soil above the relieving platform and in each caisson to determine the nature of the soil, for establishing the required disposal method and other operations incidental thereto. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.58.2 Measurement

The total quantity of soil sampling for which payment will be made will be the actual unit of samples taken.

1.5.58.3 Unit of Measure

Unit of measure: each.

1.5.59 Item 59 Regulated Construction/Demolition Waste Disposal

1.5.59.1 Payment

Payment will be made for costs associated with the disposal of general removal materials from approach excavation and caisson installation that is not suitable for use as backfill for this project. Contractor-furnished disposal area(s) away from Government Property at a regulated disposal site. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.59.2 Measurement

The total quantity of excavated material for which payment will be made will be the theoretical quantity between the ground surface as determined by a survey and the grade and slope of the theoretical cross sections indicated dependent upon the results of the soil analysis. No allowance

will be made for overdepth excavation or for the removal of any material outside the required slope lines unless authorized.

1.5.59.3 Unit of Measure

Unit of measure: cubic yard.

1.5.60 Item 60 Regulated Dredge Spoil Disposal

1.5.60.1 Payment

Payment will be made for costs associated with the disposal of material removal during the drilling of the caissons that is not suitable for use as backfill for this project. Contractor-furnished disposal area(s) away from Government Property at a regulated disposal site. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.60.2 Measurement

The total quantity of excavated material for which payment will be made will be the theoretical quantity between the bottom of existing pier surface and the ground surface at bottom of each caisson drilling dependent upon the results of the soil analysis.

1.5.60.3 Unit of Measure

Unit of measure: cubic yard.

1.5.61 Item 61 Hazardous Soil Disposal

1.5.61.1 Payment

Payment will be made for costs associated with the disposal of general removal materials from approach excavation and caisson installation that is not suitable for use as backfill for this project. Contractor-furnished disposal area(s) away from Government Property at a regulated hazardous disposal site. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.61.2 Measurement

The total quantity of excavated material for which payment will be made will be the actual quantity, determined by soil analysis as hazardous, that is loaded on vehicles that are equipped and licensed to transport hazardous between the generated site and the licensed disposal site.

1.5.61.3 Unit of Measure

Unit of measure: cubic yard.

1.5.62 Item 62 Clean Soil Disposal On-Site

1.5.62.1 Payment

Payment will be made for costs associated with the disposal of soil from approach excavation that is not suitable for use as backfill for this project. A disposal area(s) is available on-site this excavated material. The cost of all labor, material, and equipment necessary to perform the

work is included in the unit price bid for this item.

1.5.62.2 Measurement

The total quantity of excavated material for which payment will be made will be the theoretical quantity between the ground surface as determined by a survey and the grade and slope of the theoretical cross sections indicated dependent upon soil analysis. No allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines unless authorized.

1.5.62.3 Unit of Measure

Unit of measure: cubic yard.

1.5.63 Item 63 Clean Soil Disposal Off-Site

1.5.63.1 Payment

Payment will be made for costs associated with the disposal of soil from approach excavation that is not suitable for use as backfill for this project. Contractor-furnished disposal area(s) away from Government Property at a regulated disposal site. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.63.2 Measurement

The total quantity of excavated material for which payment will be made will be the theoretical quantity between the ground surface as determined by a survey and the grade and slope of the theoretical cross sections indicated dependent upon soil analysis. No allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines unless authorized.

1.5.63.3 Unit of Measure

Unit of measure: cubic yard.

1.5.64 Item 64 Asbestos Removal

1.5.64.1 Payment

Payment will be made for costs associated with operations necessary for collecting the asbestos material from the machinery rooms at the top of each tower, from the Operator House and the Electrical Room, from the abandoned steam line on the South Approach, and from the small existing building on the North Approach. The asbestos areas shall be separately contained and sealed to the outside except for an entrance/exit. The removed asbestos shall be collected and sealed for disposal. The cost of all labor, material, and equipment necessary to perform the work is included in the lump sum price bid for this item.

1.5.64.2 Unit of Measure

Unit of measure: lump sum.

1.5.64.3 Partial Payment

a. Whenever the asbestos is completely removed from either Machinery House, 25% of the amount bid for this item will be paid.

b. Whenever the asbestos is completely removed from the Operator House and Electrical Room, 35% of the amount bid for this item will be paid.

c. Whenever the asbestos is completely removed from the abandoned steam line, 5% of the amount bid for this item will be paid.

d. Whenever the asbestos is completely removed from the abandoned building, 10% of the amount bid for this item will be paid.

1.5.65 Item 65 Asbestos Waste Disposal

1.5.65.1 Payment

Payment will be made for costs associated with the disposal of the asbestos waste collected under other payment items. The cost of all labor, material, and equipment necessary to perform the work is included in the unit price bid for this item.

1.5.65.2 Measurement

The total quantity of excavated material for which payment will be made will be the actual weight of asbestos waste collected for removal.

1.5.65.3 Unit of Measure

Unit of measure: tons.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01312

GOVERNMENT RESIDENT MANAGEMENT SYSTEM

PART 1 GENERAL

1.1 SUMMARY

The Government will be implementing a Resident Management System to assist in the execution of the Government's Quality Assurance program. The Contractor shall provide information to this system on computer disks using the Government-furnished Resident Management System Quality Control (RMS QC) computer program. The Contractor shall enter the information into the RMS QC program and submit it with the final approved Schedule. No contract payment will be made until the entered information is approved by the COR. Throughout this project, the Contractor shall keep this information current and at a minimum furnish the Government an updated disk with each Pay Request. Throughout this project, the Contractor shall provide, at the Contracting Officer's request, any additional information that may be required to implement this system.

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

RMS QC Information; GA

Submit information, as described herein, on computer disks, with final approved Schedule. Provide updates, also as described herein.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 INSTRUCTIONS FOR COMPLETING CONTRACTING PLANNING INFORMATION FORMS

The following detailed information is required to be entered into the Government-furnished RMS QC computer program:

3.1.1 Prime Contractor

a. Abbreviated name.

b. Full name and address.

c. County.

d. Phone and fax numbers.

3.1.2 Prime Contractor Staffing

a. Project Manager and phone number.

b. Superintendent and job phone number.

c. Assistant Superintendent (if any) and job phone number.

d. Contractor Quality Control staff and category assignments.

e. Contractor-scheduled work days.

3.1.3 Contractor Letter Schedule

All correspondence will be serialized using a letter code designation. Recommended format is as follows:

a. Letter from Site Office: XXX-S-

b. Letter from Home Office: XXX-H-

3.1.4 Contract Schedule

The Contractor shall import, either manually or using Standard Data Exchange Format, their approved Schedule into the Contract Schedule Module of the RMS QC computer program.

3.1.5 Subcontractor Information

a. An abbreviated name of the subcontractor.

b. The trade the subcontractor will be working on.

c. The full name of the subcontractor.

d. The street address of the subcontractor.

e. The city, state, and nine digit zip code of the subcontractor.

3.1.6 Planning Features of Work

Section 01451 CONTRACTOR QUALITY CONTROL requires that three phase inspections be performed on all features of work. Included in the RMS QC computer program is a listing of CSI Subdivisions which is suggested for use in determining various definable features of work. The Contractor is requested to select from this listing those features which the Contractor thinks are applicable to this project and annotate how many days prior to start of work the Contractor will hold a Preparatory Inspection for the feature.

Determining which features the Contractor is going to use will be given a great deal of latitude. Subcontractors, for example, may hold a Preparatory Inspection for all their concrete work into various sub-features, like bridge concrete, precast concrete, etc. How many features the Contractor desires to break your job into is up to the Contractor. The key is to recognize the level of control required on any one feature. If the level of control is different, a separate feature of work should be defined. Naturally the more features, the less extensive each Preparatory Inspection will be.

In addition, if there is a feature of work that is not described by one of

the selections in the RMS QC computer program, the Contractor may add it to the list.

3.1.7 Planning Pay Activities

Reference is made to the following contract clauses:

a. FAR 52.232-5 titled, "Payments Under Fixed Price Construction Contracts".

b. FAR 52.236-15 titled, "Schedule for Construction Contracts".

The payments clause provides, in part: "The Contractor shall furnish a breakdown of the total construction price, showing the amount included therein for each principal category of the work, which shall substantiate the payment amount requested in order to provide a basis for determining progress payments, in such detail as requested by the Contracting Officer."

The schedule clause provides, in part: "The Contractor shall prepare a practical schedule showing the order in which the Contractor proposes to perform the work and the dates for starting and completing salient features of the work (including acquiring materials, plant, and equipment)."

On this contract, payment will be based upon approved construction schedule, and pay activities for the purpose of breakdown of the pay request shall be identical to the activities on the progress schedule. The following information must be provided:

a. Activity Number: Numerical identification number assigned to each Pay Activity in the approved schedule.

b. Activity description.

c. Bid Item Number: Each one of the activities in the approved schedule must be tied into a Bid Item in the Bid Schedule. Activities cannot under any circumstances be so general as to require payment under more than one Bid Item.

d. Amount or Quantity: In this field, provide either the dollar amount if the activity is a lump sum activity, or the estimated quantity in CY, LF, etc. if it is a unit price item.

e. Duration Working Days: In this field, provide the number of scheduled working days for this activity based on the activity duration from the Schedule.

f. Feature of Work: Each activity should be grouped under one of the various features of work already selected from the dictionary list.

g. Work Category: Select the work category which best describes the type of work this activity falls into. Allowable work categories include the following:

(1) A - Architectural

(2) E - Electrical

(3) P - Plumbing

(4) M - Mechanical

(5) F - Fire Sprinkler

(6) S - Structural

(7) R - Roofing

(8) C - Civil

(9) T - Safety

h. Subcontractor: For each activity in the approved schedule, the Contractor must indicate by name whether the work is performed by the prime or one of the subcontractors.

i. Project Area: If this contract has specific areas of work, each activity in the approved schedule shall identify what particular area of the contract this activity pertains to.

j. Contract Phase: If this is a phased construction contract, each activity in the construction schedule shall be identified with the particular phase of the contract.

Contract clause "Schedule for Contracts", specifies the required date of submission of the schedule. Under no circumstances will any progress payments be made until the Contractor has submitted the above information on disk and it has been approved by the Contracting Officer. The Contractor shall submit an updated RMS QC disk with the Progress Payment Module completed for each Pay Request submitted.

3.1.8 Planning Required Submittals

A partial submittal register for this contract has been prepared on ENG Form 4288 and on the Government-furnished RMS QC disk. This register can be found in Section 01330 SUBMITTAL PROCEDURES.

Items to be submitted must be grouped by specification section. It is not allowable to submit any two or more items from different specification sections.

All items known to require submission should be numbered in the register under their individual CSI Section Number. Items are to be identified numerically commencing with one and increasing as necessary. Once an item has been assigned a number, it will remain with that item for the duration of the contract.

Once an item has been numbered and all backup information has been compiled, the Contractor shall assign the item to a pay activity and a quality control requirement and indicate this activity on the register in the RMS QC computer program. The Contractor shall indicate the procurement period for the material or equipment covered by the item.

Following receipt of the submittal register, the Government will annotate each item into one of two categories:

a. Submit for Approval.

b. For Information Only.

In both cases, the Contractor quality control staff is required to conduct a thorough review of all information submitted and certify contract compliance.

In the case of submittals annotated For Information Only, the Contractor quality control staff is required to conduct a thorough review and to also assign an action code each item submitted. The quality control representative must also certify contract compliance. The Government will conduct spot reviews of action codes assigned by our quality control representative.

Each submittal will also be assigned a unique Submittal Identification Number using the CSI format number, from the section heading, followed by a numerical designator. Example, 03300-1 or 03300-2, etc. Again, each submittal may only include an item covered under its own specification (CSI) heading number.

In the event an item requires resubmission, usually a result of an "E" Action, requiring resubmission. The re-submittal Identification Number would be 03300-101 and would only include Item 1.

In summary, every submittal will be entered into the Transmittal Log in the Government Furnished RMS QC computer program and will include the following information:

a. Applicable Specification section.

b. Submittal Identification Number.

c. Item description.

d. Paragraph specifying technical requirements of item.

e. Pay Activity Number of each item.

f. CQC verification and certification.

g. Completed Action Code (Information Only Submittals).

3.1.9 Planning CQC Testing

The Contractor is required to review and plan all CQC testing required during the course of this contract. Examples of required tests include items such as hydrostatic pressure tests, performance testing of electrical systems, soil density test requirements, etc.

For each test anticipated, the Contractor shall provide the following:

a. Test description.

b. Specification section.

c. Specification paragraph.

d. Schedule Activity Number which requires test.

e. Identify who will perform the test.

3.1.10 Planning User Schooling

The contract requires instructional periods and user schooling sessions to be accomplished. For each of the required training sessions or instructional periods, the Contractor is to provide the following:

a. Description of the schooling session.

b. Specification section requiring this session.

c. Specification paragraph.

d. Pay Activity on the schedule for each schooling entry.

3.1.11 Planning CQC Report Content

Reference is made to the following:

a. FAR 52.246-12, Inspection of Construction.

b. Section 01451, CONTRACTOR QUALITY CONTROL.

The above referenced provisions require the Contractor to, in part, maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements, and maintain complete inspection records and make them available to the Government. The above provisions also require the Contractor to submit to the Government a daily Contractor Quality Control Report. Items required within this report include:

a. Weather conditions.

b. Job delays.

c. Verbal instructions given by the Government.

d. Notices of change orders or claims.

e. Inspections and meetings held.

f. Manpower staffing.

g. Lists of equipment in operations.

h. Notifications on three phase inspections.

i. Activities in progress.

j. Contractor quality control testing accomplished.

k. Schooling accomplished.

i. Installed property incorporated into the job.

m. Transfer property received or turned over.

n. Deficiencies corrected.

o. Safety inspections accomplished.

The Contractor may use the Daily Quality Control Report Module included in the Government-furnished RMS QC Program to enter and print out the above information. Any report format selected by the Contractor shall include the above information as a minimum and shall be submitted in paper form in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

3.1.12 Planning Installed Property

Installed property includes all major pieces of installed equipment such as air handling units, compressors, pumps, transformers, etc. These items and equipment and fixtures are generally contained in equipment schedules in the mechanical and electrical sections of the Contract Drawings.

Contract specification paragraph titled, Pricing of Contractor Furnished Property, requires the Contractor to furnish unit prices and descriptive data for property record purposes of fixtures and equipment furnished and installed under this contract. As a minimum, the Contractor shall provide the following for subject equipment:

a. Item description.

b. Pay Activity number.

c. Manufacturer, model, serial number.

d. Location.

e. Motor HP, volts, ph, amps, etc.

f. Quantity.

g. Unit cost.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01320

PROJECT SCHEDULE

PART 1 GENERAL

1.1 SCOPE

A schedule is required for the entire project that will depict the duration of the project from the Notice to Proceed to the final cleanup. Milestones shall be indicated for the significant portions of the work.

1.1.1 Channel Closure Duration

1.1.1.1 Float-Out Channel Closure

The time permitted for channel closure for the "float-out" is two weeks or 14 consecutive days. Only one "float-out" channel closure is permitted.

1.1.1.2 Float-In Channel Closure

The time permitted for channel closure for the "float-in" is one week or 7 consecutive days. Only one "float-in" channel closure is permitted.

1.2 REFERENCES

The publications listed below form a part of the specification to the extent referenced. The publications are referenced in the text by basic designation only.

ENGINEERING REGULATIONS (ER)

ER 1-1-11	(1995) Progress, Schedules, and Network Analysis Systems

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTALS:

SD-07 Schedules

Progress Schedule; GA

In accordance with the contract clauses, the Contractor shall, within five (5) days after receipt by him of notice to proceed or as otherwise determined by the Contracting Officer, submit for approval a practicable progress schedule. When changes are authorized that result in contract time extensions, Contractor shall submit a modified chart for approval by the Contracting Officer.

1.4 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS, a Project Schedule as described below shall be prepared. The scheduling of construction shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

3.2 PROJECT SCHEDULE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the Contracting Officer.

3.2.1 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in the Precedence Diagram Method (PDM).

3.2.2 Level of Detail Required

The Project Schedule shall include an appropriate level of detail. Failure to develop or update the Project Schedule or provide data to the Contracting Officer at the appropriate level of detail, as specified by the Contracting Officer, shall result in the disapproval of the schedule. The Contracting Officer will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule:

3.2.2.1 Activity Durations

Contractor submissions shall follow the direction of the Contracting Officer regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be accurately determined between payment periods (usually less than 2 percent of all non-procurement activities' Original Durations are greater than 20 days).

3.2.2.2 Procurement Activities

Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over 90 days. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, and

delivery.

3.2.2.3 Government Activities

Government and other agency activities that could impact progress shall be shown. These activities include, but are not limited to: approvals, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.2.2.4 Responsibility

All activities shall be identified in the project schedule by the party responsible to perform the work. Responsibility includes, but is not limited to, the subcontracting firm, contractor work force, or government agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

3.2.2.5 Work Areas

All activities shall be identified in the project schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

3.2.2.6 Modification or Claim Number

Any activity that is added or changed by contract modification or used to justify claimed time shall be identified by a mod or claim code that changed the activity. Activities shall not belong to more than one modification or claim item. The modification or claim number of each activity shall be identified by the Mod or Claim Number. Whenever possible, changes shall be added to the schedule by adding new activities. Existing activities shall not normally be changed to reflect modifications.

3.2.2.7 Bid Item

All activities shall be identified in the project schedule by the Bid Item to which the activity belongs. An activity shall not contain work in more than one bid item. The bid item for each appropriate activity shall be identified by the Bid Item Code.

3.2.2.8 Phase of Work

All activities shall be identified in the project schedule by the phases of work in which the activity occurs. Activities shall not contain work in more than one phase of work. The project phase of each activity shall be by the unique Phase of Work Code.

3.2.2.9 Category of Work

All Activities shall be identified in the project schedule according to the category of work which best describes the activity. Category of work refers, but is not limited, to the procurement chain of activities including such items as submittals, approvals, procurement, fabrication, delivery, installation, start-up, and testing. The category of work for each activity shall be identified by the Category of Work Code.

3.2.2.10 Feature of Work

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to, a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code.

3.2.3 Scheduled Project Completion

The schedule interval shall extend from NTP to the contract completion date.

3.2.3.1 Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.2.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the completion date for the project, and a zero day duration.

3.2.3.3 Early Project Completion

In the event the project schedule shows completion of the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Contractor shall specifically address each of the activities noted in the narrative report at every project schedule update period to assist the Contracting Officer in evaluating the Contractor's ability to actually complete prior to the contract period.

3.2.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date.

3.2.4.1 Start Phase

The Contractor shall include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.2.4.2 End Phase

The Contractor shall include as the last activity in a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the completion date for the project, and a zero day duration.

3.2.4.3 Phase X

The Contractor shall include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" activity shall be logically tied to the earliest and latest activities in the phase.

3.2.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the Actual Start and Finish dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Program features which calculate one of these parameters from the other shall be disabled.

3.2.6 Out-of-Sequence Progress

Activities that have posted progress without all preceding logic being satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case approval of the Contracting Officer. The Contractor shall propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule.

3.2.7 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

3.3 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.3.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned operations for the first 60 calendar days shall be submitted for approval within 20 calendar days after the NTP is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 60 calendar days after NTP.

3.3.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 40 calendar days after NTP. The schedule shall provide a reasonable sequence of activities which represent work through the entire project and shall be at a reasonable level of detail.

3.3.3 Periodic Schedule Updates

Based on the result of progress meetings, specified in "Periodic Progress Meetings," the Contractor shall submit periodic schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.3.4 Standard Activity Coding Dictionary

The Contractor shall use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used.

3.4 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the preliminary submission, initial submission, and every periodic project schedule update throughout the life of the project:

3.4.1 Data Disks

Two data disks containing the project schedule shall be provided. Data on the disks shall adhere to the SDEF format specified in ER 1-1-11, Appendix A.

3.4.1.1 File Medium

Required data shall be submitted on 3.5 disks, formatted to hold 1.44 MB of data, under the MS-Windows -98 or newer, unless otherwise approved by the Contracting Officer.

3.4.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Preliminary, Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the MS-DOS version used to format the disk.

3.4.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a naming convention that will ensure that the names of the files submitted are unique. The Contractor shall submit the file naming convention to the Contracting Officer for approval.

3.4.2 Narrative Report

A Narrative Report shall be provided with the preliminary, initial, and each update of the project schedule. This report shall be provided as the basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or

required to be taken. The narrative report is expected to relay to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis.

3.4.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the Contracting Officer shall be included in the schedule submission. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.4.4 Schedule Reports

The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in progress or completed.

3.4.4.1 Activity Report

A list of all activities sorted according to activity number.

3.4.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number. Preceeding and succeeding activities shall include all information listed above in paragraph Schedule Reports. A blank line shall be left between each activity grouping.

3.4.4.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates. Completed activities shall not be shown on this report.

3.4.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the NTP until the most recent Monthly Progress Meeting. This report shall reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and Contracting Officer at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining Contractor Payment. Activities shall be grouped by bid item and sorted by activity numbers. This report shall: sum all activities in a bid item and provide a bid item percent; and complete and sum all bid items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

3.4.5 Network Diagram

The network diagram shall be required on the initial schedule submission and on monthly schedule update submissions. The network diagram shall

depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.4.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity number, description, duration, and estimated earned value shall be shown on the diagram.

3.4.5.2 Project Milestone Dates

Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.4.5.3 Critical Path

The critical path shall be clearly shown.

3.4.5.4 Banding

Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.4.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.5 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment shall include a monthly onsite meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor shall describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. The Contracting Officer will approve activity progress, proposed revisions, and adjustments as appropriate.

3.5.1 Meeting Attendance

The Contractor's Project Manager and Scheduler shall attend the regular progress meeting.

3.5.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 4 working days after the monthly progress meeting.

3.5.3 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost-to-Date shall be subject to the approval of the Contracting Officer. As a minimum, the Contractor shall address the following items on an activity by activity basis during each progress meeting.

3.5.3.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in-progress or completed .

3.5.3.2 Time Completion

The estimated Remaining Duration for each activity in-progress. Time-based progress calculations shall be based on Remaining Duration for each activity.

3.5.3.3 Cost Completion

The earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

3.5.3.4 Logic Changes

All logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

3.5.3.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule which does not represent the actual or planned prosecution and progress of the work.

3.6 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, or any interim milestone date, the Contractor shall furnish the following for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals.

3.6.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, will not be a cause for a time extension to the contract completion date.

3.6.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

a. A list of affected activities, with their associated project schedule activity number.

b. A brief explanation of the causes of the change.

c. An analysis of the overall impact of the changes proposed.

d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

3.6.3 Additional Submission Requirements

For any requested time extension of over 2 weeks, the Contracting Officer may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the Contracting Officer's request.

3.7 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The proposed revisions to the schedule will be approved by the Contracting Officer prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, the Contractor shall advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.8 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

-- End of Section --

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUBMITTAL IDENTIFICATION

Submittals required are identified by SD numbers as follows:

SD-01 Data

SD-04 Drawings

SD-06 Instructions

SD-07 Schedules

SD-08 Statements

SD-09 Reports

SD-13 Certificates

SD-14 Samples

SD-18 Records

SD-19 Operation and Maintenance Manuals

1.2 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.2.1 Government Approved

Governmental approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.2.2 Information Only

All submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.3 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality

Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.5 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System Manager and each item shall be stamped, signed, and dated by the CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

3.2 SUBMITTAL REGISTER (ENG FORM 4288)

At the end of this section is one set of ENG Form 4288 listing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are

interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 20 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

3.4 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the RMS-QC software that the Contractor is required to use for this contract. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

3.5 SUBMITTAL PROCEDURE

Submittals shall be made as follows:

3.5.1 Procedures

One copy of each submittal shall be sent to the Resident Engineer. Six copies shall be sent to the Architect-Engineer. Six copies shall be sent to the Construction Branch of the Corps of Engineers:

US Army Corps of Engineers
Philadelphia District
ATTN: CENAP EC-CQ(Lucas)
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

3.5.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

3.6 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

3.7 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. 6 copies of the submittal will be retained by the Contracting Officer and 6 copies of the submittal will be returned to the Contractor.

3.8 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

3.9 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved

_____ Approved with corrections as noted on submittal data and/or attached sheets(s).

SIGNATURE: _____

TITLE: _____

DATE: _____

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* *b.*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 6)* *h.*	FOR CE USE CODE *i.*
				SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*			

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288 for each entry on this form.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".

7. Form is self-transmittal, letter of transmittal is not required.

8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A -- Approved as submitted.

B -- Approved, except as noted on drawings.

C -- Approved, except as noted on drawings. Refer to attached sheet resubmission required.

D -- Will be returned by separate correspondence.

E -- Disapproved (See attached).

F -- Receipt acknowledged.

FX -- Receipt acknowledged, does not comply as noted with contract requirements.

G -- Other *(Specify)*

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
01270

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Certificates	X										X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **01312**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	RMS QC Information	X											X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
01320

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Progress Schedule				X								X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **01350**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.4	Diving Plan							X					X										
			1.4	Diving Operations Manual							X					X										
			1.4	Daily Logs							X					X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **01351**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.18.1	Work Zones		X										X										
			1.19.1	Decontamination Facilities		X										X										
			1.20.1	Decontamination Facilities		X										X										
			1.6.1	Debris Containment and Fall					X							X										
				Protection Plan																						
			1.6.1	Debris Containment and Fall					X							X										
				Protection Plan																						
			1.3	Monitoring/Sampling Results						X						X										
			1.18.2	Site Control Log						X						X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
01354

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			3.6	Retention Pond Removal Plan					X							X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **01356**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.1.3	Mill Certificate or Affidavit							X				X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
01380

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Photography Plan					X							X										
			1.3	Photographs									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
01451

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			3.2	Quality Control Plan						X						X										
			1.3	Daily CQC Reports						X						X										
			1.3	Preparatory, Initial, and Final Phase Meeting Minutes						X						X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
01500

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Temporary Facilities Layout and Work Plan						X						X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
01570

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Traffic Control Devices Plan		X										X										
			1.3	Concrete Barriers		X										X										
			1.3	Traffic Control Plan					X						X											
			1.3	Daily Condition Log						X						X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **01576**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Equipment List	X											X										
			1.3	Sweeping Procedure					X							X										
			1.3	Notification of Work Schedule						X					X											
			1.3	Sweepings and Soundings Report						X						X										
			1.3	Minutes of Coordination Meetings						X					X											
			1.3	Notification Letters						X					X											
			1.3	Requests for Channel Closure						X					X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **01780**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.1	As-Built Drawings									X			X										
			1.1	As-Built Record of Equipment and Materials									X			X										
			1.1	Warranty Management Plan									X			X										
			1.1	Final Clean-Up									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **02111**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Excavation and Handling Work Plan	X											X										
			1.2	Surveys						X						X										
			1.3	Sample Testing						X						X										
			2.1	Backfill Material						X						X										
			1.3	Confirmation Sampling and Analysis						X						X										
			3.5.1	Sampling of Stored Material						X						X										
			3.7.1	Compaction						X						X										
			1.6	Chemical Testing						X						X										
			3.9	Closure Report						X						X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **02120**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			3.1	On-site Hazardous Waste	X											X										
				Management																						
			3.2	Off-site Hazardous Waste	X											X										
				Management																						
			3.7	Recordkeeping						X						X										
			3.8	Spill Response						X					X											
			1.2	Exception Reports						X						X										
			1.3	Qualifications							X				X											
			1.2	Off-Site Policy Compliance							X					X										
				Certification																						
			1.2	Certificates of Disposal							X				X											
			1.2	Shipping Documents and Packagings							X					X										
				Certification																						
			1.2	Notices of Non-Compliance and									X		X											
				Notices of Violation																						

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
02220

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.4	Work Plan					X							X										
			1.4	Counterweight Removal Plan					X							X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
02300

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Earthwork					X							X										
			3.10	Testing						X					X											
			3.10	Testing							X				X											
			1.3	Earthwork									X		X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
02451

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.5	Equipment	X											X										
			1.3	Concrete Filled Steel Pipe Piling		X										X										
			3.2.1	Test Piles						X						X										
			3.1.1	Steel Pipe Piles									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **02457**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			3.2	Pile Driving Equipment	X											X										
			1.3	Timber Piles		X										X										
			3.1.2	Pile Driving									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **02466**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Drilled Foundation Caissons	X											X										
			1.4	Qualifications					X							X										
			3.4	Penetration Tests						X						X										
			1.3	Drilled Foundation Caissons									X			X										
			1.3	Drilled Shaft Installation Plan									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **02740**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Equipment	X										X											
			1.3	Job-Mix Formula (JMF)	X											X										
			1.4	Sampling and Testing						X						X										
			2.1	Aggregates						X						X										
			1.3	QC Monitoring						X						X										
			1.3	Sources of Aggregates						X						X										
			1.3	Bituminous Materials						X						X										
			1.3	Tests						X						X										
			2.2	Asphalt Cement Binder							X					X										
			1.3	Testing Laboratory							X				X											
			1.3	Sources of Aggregates								X			X											
			1.3	Job Mix Gradation of Aggregates									X			X										
			1.3	Waybills and Delivery Tickets									X		X											
			2.3	Mix Design									X			X										
			1.3	Material Acceptance									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
02770

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			3.8	Field Quality Control						X						X										
			2.1	Concrete									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
03100

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Design	X											X										
			2.1	Form Materials	X											X										
			1.2	Concrete Formwork		X										X										
			2.1.5	Form Releasing Agents			X									X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
03200

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Concrete Reinforcement System		X										X										
			1.3	Welding					X							X										
			2.3	Reinforcing Steel							X					X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
03300

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.6	Mixture Proportions					X							X										
			3.14	Testing and Inspection for Contractor						X						X										
				Quality Control																						
			1.5.2.2	Concrete						X					X											
			1.4	Qualifications							X					X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **03415**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3.1.3	Design Calculations	X										X											
			2.2.2	Concrete Mixture Proportions	X											X										
			1.4	Prestressing Method and Equipment	X											X										
			3.9	Erection		X										X										
			3.3.2	Installation Drawings for Stressing		X										X										
				Tendons and Accessories																						
			3.9.3	Erection Plan					X							X										
			1.6	Certification for Prestressing					X						X											
				Technicians																						
			2.1	Materials						X					X											
			1.3.2.2	Concrete						X					X											
			1.4	Stressing Tendons and Accessories						X					X											
			2.1.1	Cement							X				X											
			2.1.3	Air-Entraining Admixture							X				X											
			2.1.3	Water- Reducing Admixture							X				X											
			2.1.3	Accelerating Admixture							X				X											
			2.1.2	Aggregates							X				X											
			1.3.2.3	Air Content							X				X											
			1.4	Precast Concrete Panel								X			X											
			3.10	Construction Records									X		X											
			1.4	Materials Disposition Records									X		X											
			3.3.9	Prestressing Operations Records									X		X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **05055**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Detail Drawings		X										X										
			2.1.1	Materials Orders				X							X											
			2.1.2	Materials List				X							X											
			2.1.3	Shipping Bill				X							X											
			2.2.3.1	Welding Procedures for Structural					X							X										
				Steel																						
			1.2	Welding Procedures for Fracture					X							X										
				Control Plan																						
			2.3.4	Structural Steel Welding Repairs					X							X										
			2.3	Tests, Inspections, and Verifications						X					X											
			1.4	Qualification of Welders and Welding							X				X											
				Operators																						
			2.2.3.2	Application Qualification for Steel							X					X										
				Studs																						
			1.2	Materials Disposition Records									X		X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **05120**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.4	Anchor Bolts		X										X										
			1.3	Structural Steel Fabrication		X										X										
			3.2.4	Structural Connections		X										X										
			1.3	Lift Span Temporary System		X										X										
			3.2	Erection Procedure					X							X										
			3.4.1	Lift Span Float-out and Float-in					X							X										
			3.3	Welding					X							X										
			3.3	Prequalified Welding					X						X											
			1.3	Mill Test Reports							X					X										
			1.3	Welder Qualifications							X					X										
			1.5	Welding Inspector							X					X										
			3.1	Fabrication							X					X										
			2.2	High Strength Bolts and Nuts								X				X										
			2.3	Carbon Steel Bolts and Nuts								X				X										
			2.5	Nuts Dimensional Style								X				X										
			2.6	Washers								X				X										
			2.4	Anchor Bolts								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **05500**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Miscellaneous Metal Items		X										X										
			1.3	Miscellaneous Metal Items								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **05650**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.5	Wood Ties	X											X										
			2.3.1	New Jointed Rail	X											X										
			2.1	Joint Bars	X										X											
			2.1.3	Compromise Joint Bars	X										X											
			1.2	Miscellaneous Track Materials	X										X											
			2.7.1	Crossing Material or Surface	X											X										
			1.2	Components or Products	X											X										
			1.2	Bridge Repair		X										X										
			1.2	As-Built		X										X										
			1.2	Materials and Equipment				X								X										
			2.7.1	Crossing Material or Surface					X						X											
			3.17	Thermite Welding Procedures					X							X										
			3.18	Sampling and Testing						X						X										
			2.5	Wood Ties						X					X											
			2.8	Direct Fixation Rail Attachments						X						X										
			1.2	Ultrasonic Test						X					X											
			2.5	Wood Ties							X				X											
			1.2	Materials and Equipment							X				X											
			1.2	Record of Field Weld									X		X											
			1.2	Table VII									X		X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
06100

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSI-FICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.1.5	Structural Wood Members	X										X											
			2.1.5	Structural Wood Members		X										X										
			3.1	Installation of Framing		X										X										
			3.2.4	Nailers and Nailing Strips		X										X										
			2.1.1	Grading and Marking							X					X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **07413**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.1	Siding		X										X										
			2.1	Siding							X					X										
			3.1	Installation							X					X										
			2.3	Accessories							X					X										
			2.5	Insulation							X					X										
			2.3	Accessories								X				X										
			2.1	Siding								X				X										
			2.4	Fasteners								X				X										
			2.5	Insulation								X				X										
			2.8	Gaskets and Insulating Compounds								X				X										
			2.7	Sealant								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **07416**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.5	Design Analysis	X											X										
			1.5	Structural Standing Seam Metal Roof		X										X										
				System																						
			1.5	Qualifications					X							X										
			1.5	Test Report for Uplift Resistance of						X						X										
				the SSSMR																						
			1.5	Structural Standing Seam Metal Roof							X					X										
				System																						
			2.7	Insulation							X					X										
			2.3	Accessories								X				X										
			2.1	Roof Panels								X				X										
			2.6	Factory Color Finish								X				X										
			2.4	Fasteners								X				X										
			2.7	Insulation								X				X										
			2.10	Gaskets and Insulating Compounds								X				X										
			2.9	Sealant								X				X										
			2.2	Concealed Anchor Clips								X				X										
			2.5	Subpurlins								X				X										
			2.12	EPDM Rubber Boots								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **07900**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.1	Backing	X											X										
			2.2	Bond-Breaker	X											X										
			2.4	Sealant	X											X										
			2.4	Sealant							X					X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **08110**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Steel Doors and Frames		X										X										
			2.2	Fire Rated Doors						X						X										
			2.2	Fire Rated Doors							X					X										
			2.3	Thermal Insulated Doors							X					X										
			2.4	Security Doors							X					X										
			1.2	Steel Doors and Frames								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **08510**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Steel Windows	X											X										
			1.3	Steel Windows		X										X										
			2.4	Insect Screens		X										X										
			1.3	Steel Windows			X									X										
			1.3	Steel Windows							X					X										
			1.3	Steel Windows								X				X										
			1.3	Steel Windows										X		X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **08550**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.1	Wood Windows	X											X										
			2.6	Insect Screens	X											X										
			2.1	Wood Windows		X										X										
			2.6	Insect Screens		X										X										
			3.1	Installation			X									X										
			3.3	Cleaning			X								X											
			2.1	Wood Windows							X					X										
			2.5	Finish								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **08700**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Hardware and Accessories	X											X										
			1.2	Hardware Devices		X										X										
			1.2	Hardware Schedule				X								X										
			1.2	Keying Schedule				X								X										
			1.2	Hardware and Accessories							X					X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **08810**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Glass	X											X										
			1.2	Glazing Accessories	X											X										
			1.2	Glazing Materials and Accessories		X										X										
			1.2	Glass							X					X										
			1.2	Glass								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **09250**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Steel Framing		X										X										
			1.3	Control Joints		X										X										
			3.5	Fire-Resistant Assemblies		X										X										
			1.3	Gypsum Wallboard							X					X										
			2.2.3	Water-Resistant Gypsum Board							X					X										
			1.3	Steel Framing							X					X										
			2.2.2	Fire-Rated Gypsum Board							X					X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **09510**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Acoustical Ceiling System	X											X										
			1.3	Acoustical Ceiling System		X										X										
			2.5	Fire Resistive Ceilings						X						X										
			2.7	Ceiling Attenuation Class and Test						X						X										
			2.1	Acoustical Units							X					X										
			2.1	Acoustical Units								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION
Alter Lift Bridge at P Naval Business Cntr

CONTRACTOR

SPECIFICATION SECTION
09650

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Resilient Flooring and Accessories	X											X										
			1.2	Resilient Flooring and Accessories						X						X										
			1.2	Resilient Flooring and Accessories								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **09900**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			2.1	Paint	X											X										
			3.3	Mixing and Thinning			X									X										
			3.4	Application			X									X										
			2.1	Paint						X						X										
			2.1.2	Lead							X					X										
			2.1.4	Volatile Organic Compound (VOC)							X					X										
				Content																						
			2.1	Paint								X			X											
			2.5	Concrete Sealer								X			X											
			1.2	Specification and Proprietary Paints								X				X										
			1.2	Thinners								X				X										
			1.2	Colors								X				X										
			1.2	Inspections and Operations									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **13120**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.4	Design Analysis	X											X										
			1.5	Instruction Manuals	X											X										
			1.5	Erection Procedures	X											X										
			1.5	Metal Building Systems		X										X										
			1.2.2	Qualifications					X							X										
			1.5	Metal Building Systems							X					X										
			2.9	Insulation							X					X										
			2.3.5	Accessories								X				X										
			2.3	Roofing and Siding								X				X										
			2.4	Fasteners								X				X										
			2.9	Insulation								X				X										
			2.11	Gaskets and Insulating Compounds								X				X										
			2.10	Sealant								X				X										
			1.5	Wall Liners								X				X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **13280**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.4	Materials and Equipment	X										X											
			1.4	Site Layout		X										X										
			1.5	Qualifications					X							X										
			1.11	Training Program					X						X											
			1.10	Medical Requirements					X						X											
			1.4	Encapsulants					X							X										
			3.8	Exposure Assessment and Air						X						X										
				Monitoring																						
			1.20	Local Exhaust Ventilation						X					X											
			1.14	Licenses, Permits and Notifications						X						X										
			1.3.1	Response Action Detail Sheet						X						X										
			1.3.1	Response Action Detail Sheet						X						X										
			1.3.1	Set-Up Detail Sheets						X						X										
			1.3.1	Set-Up Detail Sheets						X						X										
			1.4	Vacuum, Filtration and Ventilation							X				X											
				Equipment																						
			1.12	Respiratory Protection Program									X			X										
			3.10	Cleanup and Disposal									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **13281**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.6	Materials and Equipment	X											X										
			1.7	Qualifications					X							X										
			1.6	Pressure Differential Recordings						X					X											
			1.6	Licenses, Permits, and Reports						X						X										
			1.9	Accident Prevention Plan (APP)						X						X										
			1.6	Analytical Results						X						X										
			1.6	Clearance Report						X						X										
			1.6	Confined Space Procedures						X						X										
			1.6	Respiratory Protection Program						X						X										
			1.6	Airborne Sampling Plan						X						X										
			1.6	Medical Surveillance Plan						X						X										
			1.6	Waste Classification, Handling, and						X						X										
				Disposal Plan																						
			1.6	Containment Plan						X						X										
			1.6	Visible Emissions Monitoring Plan						X						X										
			1.6	Ambient Air Monitoring Plan						X						X										
			1.6	Water Quality Plan						X						X										
			1.6	Soil Quality Plan						X						X										
			1.6	Inspections and Operations									X			X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **15014**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Standard Items							X					X										
			1.3	Installation, Operation, Maintenance and Lubrication Manuals							X					X										
			1.3	Fabricated Items		X										X										
			1.3	Shop Drawings		X										X										
			1.3	Assembly and Erection Drawings		X										X										
			1.3	Approval Process		X										X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **15015**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Standard Items							X					X										
			1.3	Installation, Operation, Maintenance and Lubrication Manuals							X					X										
			1.3	Fabricated Items		X										X										
			1.3	Shop Drawings		X										X										
			1.3	Assembly and Erection Drawings		X										X										
			1.3	Approval Process		X										X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **15017**

ACTIVITY NO. a.	TRANS-MITTAL NO. b.	ITEM NO. c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Licenses and Permits					X							X										
			1.2	Shop Drawings		X										X										
			1.2	Calculations						X						X										

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **16100**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Shop Drawing and Manufacturer's	X											X										
				Catalog																						
			1.3	Detailed Layout Drawings		X										X										
			1.3	Shop Drawings		X										X										
			1.3	Working Drawings		X										X										
			1.3	As-Built Drawings		X									X											
			1.3	Contractor Experience					X							X										
			1.3	Samples								X				X										
			1.3	Operation and maintenance manual										X	X											
			1.3	Posted operating instructions										X	X											
			1.3	Instructions and training to personnel										X	X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **16110**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Shop Drawing and Manufacturer's	X											X										
				Catalog																						
			1.2	Detailed Layout Drawings		X										X										
			1.2	Shop Drawings		X										X										
			1.2	Working Drawings		X										X										
			1.2	As-Built Drawings		X									X											
			1.2	Contractor Experience					X							X										
			1.2	Samples								X				X										
			1.2	Operation and maintenance manual										X	X											
			1.2	Posted operating instructions										X	X											
			1.2	Instructions to personnel										X	X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **16120**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Shop Drawing and Manufacturer's	X											X										
				Catalog																						
			1.2	Shop Drawings		X										X										
			1.2	Working Drawings		X										X										
			1.2	As-Built Drawings		X									X											
			1.2	Contractor Experience					X							X										
			1.2	Operation and maintenance manual										X	X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **16200**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.2	Shop Drawing and Manufacturer's	X											X										
				Catalog																						
			1.2	Shop Drawings		X										X										
			1.2	Working Drawings		X										X										
			1.2	As-Built Drawings		X									X											
			1.2	Contractor Experience					X							X										
			1.2	Operation and maintenance manual										X	X											

SUBMITTAL REGISTER
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION: **Alter Lift Bridge at P Naval Business Cntr**

CONTRACTOR

SPECIFICATION SECTION: **16910**

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	O&M MANUALS o.	CLASSIFICATION: INFORMATION ONLY p.	GOVERNMENT APPROVED q.	REVIEWER r.	CONTRACTOR SCHEDULE DATES: SUBMIT s.	APPROVAL NEEDED BY t.	MATERIAL NEEDED BY u.	CONTRACTOR ACTION: CODE v.	DATE w.	SUBMIT TO GOVERN-MENT x.	GOVERNMENT ACTION: CODE y.	DATE z.	REMARKS aa.
			1.3	Test Procedure	X											X										
			1.3	Procedures	X											X										
			1.3	Factory Test Program	X											X										
			1.3	Installation Drawings		X										X										
			1.3	Foundation Drawings		X										X										
			1.3	Circuit Drawings		X										X										
			1.3	Instructions		X										X										
			1.3	Shop Plans		X										X										
			1.3	Cables		X										X										
			1.3	Submission Schedule				X								X										
			1.3	50% Submission				X								X										
			1.3	90% Submission				X								X										
			1.3	100% Submission				X								X										
			1.3	Product Approval							X					X										
			1.3	Training								X				X										
			1.3	Detailed List								X				X										
			1.3	Test Reports									X			X										
			1.3	Test Verification									X			X										
			1.3	Test Instruments									X			X										

SECTION 01350

DIVING SERVICES

PART 1 GENERAL

1.1 SCOPE OF SECTION

The work specified in this section includes the development and enforcement of a diving services plan.

1.2 GENERAL REQUIREMENTS

All diving performed under this contract shall be in strict accordance with the rules and regulations prescribed by the U.S. Navy Diving Manual: 0910-LP-708-8000; 29 CFR Part 1910, Subpart T; 29 CFR Part 1915; the EM 385-1-1, Section 30; and ER 385-1-86, except as modified below. A Contracting Officer's Representative, will be designated by the Contracting Officer at the Post Award Conference, to act for the Contracting Officer for all submissions, directions and/or acceptance(s) required under the specifications. There will also be an individual designated as the District Dive Coordinator.

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ENGINEERING MANUALS (EM)

EM 385-1-1	(Latest Rev.) Safety and Health Requirements Manual
ER 385-1-86	(July 1994) Engineer Regulation, Government Personnel Diving Operations

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1910	(1999) Occupational Safety and Health Standards
29 CFR Part 1915	(1999) Safety and Health Standards Applicable to Shipyard Employment

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

0910-LP-708-8000	(Jan 1999) U.S. Navy Diving Manual, Revision 4

1.4 SUBMITTALS

NOTE: The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES. These submittals are for Government acceptance. The COR may require resubmittal of these submittals if deemed necessary.

SD-13 Certificates

Diving Plan; GA

Submit, for review, at least 10 days prior to any diving operations, a Project/Task Specific Dive Plan prior to performing any actual dive task or assignment. Each separate Dive Plan will require review and acceptance by the Contracting Officer's Representative prior to commencing any diving required under this contract. A typical Dive Plan (the Contractor may prepare a form with the appropriate subject/item already listed with blank spaces to be filled in as required for each Dive Plan submitted) shall include the following information as a minimum:

a. Dive Plan for: (project and specific tasks).

b. Name of Contractor (and diving subcontractor if required).

c. Contract Number.

d. Date of Dive Plan submission.

e. Name of diving supervisor preparing the Dive Plan.

f. Description of proposed work and diving mission.

g. Approximate time and date dive mission will start.

h. Listing of diving equipment to be used.

i. Name or type of diving platform to be used.

j. Planned depth of dive and maximum depth to bottom.

k. Maximum single dive bottom time for the planned depth of dive for each diver.

l. Surface and underwater conditions , to include visibility, temperature, thermal protection, and currents.

m. Lockout/Tagout procedures, including procedures for dealing with differential pressures.

n. Listing of special tools or equipment to be used.

o. Materials to be handled or installed.

p. Listing by name each member of the diving team. The first time each diver is employed on the job, the Contractor shall attach to the dive plan a qualification statement and copy of the diver's current medical record, giving the physician's written report and opinion of the diver's fitness for exposure to hyperbaric conditions, including any limitations to such exposure. The required qualifications statement and current medical report shall be in accordance with EM 385-1-1. Diver's qualification statement and medical record need not be attached to subsequent Dive Plans unless a diver's medical report has expired and a new medical report has been submitted.

q. Listing by name each person directly involved in topside

assistance/support to the dive team.

r. Listing of information and equipment required at the dive site. The following information and work materials shall be available at the dive site, either referenced in the Diving Operations Manual or work materials furnished by the Contractor: U. S. Navy Standard Air Decompression Table; Diving Log Sheets; Repetitive Dive Worksheets; Table of No-Decompression Air Dives; means of direct emergency communications between the dive site and the Contractor's project office, the Dive Coordinator/Dive Inspector; stop watch or equivalent, as required to monitor times for each diver; standard first aid supplies; litter or tilt board and a manual resuscitator capable of administering oxygen; portable VHF marine band radio as required to communicate with vessel traffic.

s. Listing of information required at the dive site and the project office; local emergency medical assistance names, locations, and telephone numbers for ambulance service, hospital, and doctor, emergency medical evacuation assistance for ground and/or air transportation facilities with point of contact names, locations and telephone numbers; nearest emergency medical facility with hyperbaric chamber capable of recompression equivalent to 165 feet of water, with point of contact names, location and telephone numbers.

t. The Dive Plan shall contain the following statement: "If for any reason the diving plan, as accepted, is altered in scope of mission, depth, personnel, or equipment, the Philadelphia District Diving Coordinator shall be contacted in order to review the proposed diving plan revision prior to the actual diving operation." (24 Hrs).

Diving Operations Manual; GA

Submit, for review, at least 15 days prior to any diving operations, a Diving Operations Manual, which shall depict the Contractor's general plan for accomplishing the diving operations required under this contract. The Diving Operations Manual shall be reviewed by the Contracting Officer's Representative prior to commencing of any diving operations under this contract. The Diving Operations Manual shall include the following information as a minimum:

a. A complete copy of 29 CFR Part 1910, Subpart T, and the Contractor's proposed method of complying with each of its pertinent parts.

b. U. S. Navy Standard Air Decompression Table.

c. A sample of the Diving Log sheets to be used under this contract.

d. A sample of the Repetitive Dive Worksheets or equivalent (dive profile method) to be used under this contract.

e. U. S. Navy Table of No-Decompression Limits and Repetitive Group Designation for No-Decompression Air Dives.

f. U. S. Navy Residual Nitrogen Timetable for Repetitive Air Dives.

g. An outline of emergency communications between the dive site and the Contractor's project office (located at the job site); Contractor-furnished portable radios, hardware, telephone hookup, etc.

h. An outline of proposed treatment and emergency evacuation for drowning, gas embolism, decompression sickness, or traumatic injury.

i. Emergency assistance information, including location, telephone numbers, and names of nearest doctor, hospital, emergency ground and air transportation, recompression facilities, and other appropriate medical assistance.

j. An Activity Hazard Analysis Plan, setting forth potential hazards, means of prevention, and actions to be taken should an accident involving the potential hazard occur. Minimum coverage in the Activity Hazard Analysis Plan shall include; means of prevention and procedures for dealing with fire, equipment failure, and adverse environmental conditions, drowning, air embolism, decompression sickness, hypoxia, carbon dioxide excess, carbon monoxide excess, strangulation, various type of squeezing, fouling or entanglement, mechanical injury, overexertion/exhaustion, hypothermia, hyperthermia, currents caused by hydraulic differential through the structure, and electrocution and blowup if dry suits are used.

k. An outline of pre-dive briefings and equipment checkout procedures for daily diving activities under this contract.

l. An outline of qualifications and experience requirements for the dive team members, required under this contract. As a minimum, each team member shall have at least one (1) year of commercial experience in the applicable position; divers shall have completed at least four (4) working dives to the depths required by this contract, using the particular diving techniques and equipment to be used under this contract. Divers shall demonstrate that at least one (1) of the four (4) qualification dives was performed in the last six (6) months prior to the contract award date.

m. An outline of the medical qualifications required for divers to be employed under this contract. As a minimum, each diver shall meet the certification requirements specified in 29 CFR Part 1910, Subpart T, and EM 385-1-1, Section 30.

n. An outline of diving equipment, maintenance procedures and certification of analysis of air output for diving air supply compressors to be used under this contract. As a minimum, the equipment maintenance procedures shall indicate method of testing, frequency, and repair methods used. Diving air supply compressors' output air shall be in conformance with the following limits: oxygen - 20 to 22 percent by volume, carbon dioxide - 1,000 ppm maximum, carbon monoxide - 20 ppm maximum, total hydrocarbons - 25 ppm maximum, particulates - 5 mg/cubic meter maximum, and have no objectionable odor.

o. An outline of administrative and record-keeping procedures. As a minimum, the outline shall contain (by title of position) job responsibilities, the chain of command, daily briefing and diving safety orientation procedures, log and diving-related record-keeping responsibilities, equipment maintenance and pre-dive equipment checklist, etc.

Daily Logs; GA

Submit each day, to the Contracting Officer/District Dive Coordinator fully completed copies of the previous day's Diving Log Sheets and any other work

sheets prepared in conjunction with the Diving Log Sheets.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 RESTRICTIONS

Only surface air-supplied diving within the No-Decompression Limits, using the previously cited U. S. Navy Diving Tables, will be permitted under this contract, unless otherwise accepted by the Contracting Officer. Any deviation from or modification to the U. S. Navy Diving Tables, proposed by the Contractor, shall be submitted at the time the Diving Operations Manual is submitted, with any such deviation or modification clearly identified for review purposes.

3.2 DOCUMENTS AVAILABILITY

One (1) copy of the accepted Diving Operations Manual (to be kept in D.O.) and one (1) copy of the appropriate accepted Diving Plan shall be available at the dive site while diving operations are underway.

3.3 COORDINATION

All Diving activities shall be conducted with full knowledge and close coordination with the Contracting Officer and Dive Coordinator. Divers shall not enter the water or move from prescribed location without the acceptance of the Dive Inspector or Dive Coordinator.

3.4 PRE-DIVE CHECK

Prior to the dive and at the scene of the dive, the Contractor will meet with the USACE diving inspector and shall insure, as a minimum, the following pre-dive checks are performed:

a. Breathing air tanks contain sufficient air supply to perform the required work, i.e., standby air tanks are on site and full to the capacity (3,000 psi). A pressure reading shall be taken to insure that approximately 3,000 psi of breathing air is contained.

b. All diving equipment shall be checked for proper function prior to diver entry.

c. All necessary safety equipment specified hereinbefore are on site and functioning properly.

d. Lockout/tagout procedures are followed and the diving supervisor is in possession of the key or keys.

e. Crane signals are reviewed and radio communications with the crane operator is functioning properly, when applicable.

f. Welding or cutting procedures are clearly reviewed, the proper welder polarity is set and precautions have been taken to insure that electrocution will not occur.

g. A pre-dive briefing shall be given which includes but is not limited to, the accident management plan, activity hazards analysis, equipment check list, diving logs, diving conditions, and diving procedures.

3.5 DIVE TEAM CREW REQUIREMENTS

The following dive team members are required as the minimum crew manning levels:

Comply with EM 385-1-1, Appendix N, Table III.

3.5.1 Surface-Supplied Air Mode

All working dives requiring communications between the Divers and topside to direct crane load movements, etc., shall be performed in surface-supplied air mode. The minimum crew manning level consists of the In-water Diver, Stand-by Diver, Diver Tender, and Dive Supervisor. A member of the crew shall be responsible for radio communications and timekeeping. Surface-supplied air gear shall include hardwire communications and a diver carried air reserve.

3.6 MEASUREMENT AND PAYMENT

The work specified in this section will not be measured for payment and all costs in connection therewith shall be included in the costs of all the bid items.

-- End of Section --

SECTION 01351

SAFETY, HEALTH, AND EMERGENCY RESPONSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Threshold Limits	(1998) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z358.1	(1990) Emergency Eyewash and Shower Equipment

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual (http://www.hq.usace.army.mil/soh/hqusace_soh.htm)

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 85-115	(1985) Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

1.2 DESCRIPTION OF WORK

This section provides additional requirements for implementing the accident prevention provisions of EM 385-1-1, and specifies a Site Safety and Health Plan (SSHP) which shall satisfy the requirements for submission of a separate Accident Prevention Plan (APP) as required by EM 385-1-1. The requirements shall apply to work performed in both "contaminated" and "clean" areas.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Work Zones; GA.

Drawings shall include initial work zone boundaries: Exclusion Zone (EZ), including restricted and regulated areas; Contamination Reduction Zone (CRZ); and Support Zone (SZ).

Decontamination Facilities; GA.

Drawings shall show the layout of the personnel and equipment decontamination facilities.

SD-08 Statements

Debris Containment and Fall Protection Plan; GA.

A debris containment and fall protection plan shall be submitted and approved by the Contracting Officer prior to the commencement of rehabilitation work.

SD-09 Reports

Monitoring/Sampling Results; GA.

Personnel exposure monitoring/sampling results.

Site Control Log; GA.

Record of each entry and exit into the site, as specified.

1.4 REGULATORY REQUIREMENTS

Work performed under this contract shall comply with EM 385-1-1, applicable Federal, state, and local safety and occupational health laws and regulations. This includes, but is not limited to, Occupational Safety and Health Administration (OSHA) standards, 29 CFR 1910, especially Section .120, "Hazardous Waste Site Operations and Emergency Response" and 29 CFR 1926, especially Section .65, "Hazardous Waste Site Operations and Emergency Response". Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.5 PRECONSTRUCTION SAFETY CONFERENCE

A minimum of ten working days prior to the start of field work the Contractor shall convene a meeting a location near the project site for the purpose of discussing the work zone safety. A representative of each sub-contractor that will be performing work in the field shall be present. The Contracting Officer shall invite representatives from the field

inspectors to be present.

1.6 SAFETY AND HEALTH PROGRAM

OSHA Standards 29 CFR 1910, Section .120 (b) and 29 CFR 1926, Section .65 (b) require employers to develop and implement a written Safety and Health Program for employees involved in hazardous waste operations. The site-specific program requirements of the OSHA Standards shall be integrated into one site-specific document, the Site Safety and Health Plan (SSHP). The SSHP shall interface with the employer's overall Safety and Health Program. Any portions of the overall Safety and Health Program that are referenced in the SSHP shall be included as appendices to the SSHP.

1.6.1 Debris Containment and Fall Protection Plan

A debris containment and fall protection plan shall be submitted and approved by the Contracting Officer prior to the commencement of rehabilitation work.

1.7 SITE SAFETY AND HEALTH PLAN

1.7.1 Preparation and Implementation

A Site Safety and Health Plan (SSHP) shall be prepared covering onsite work to be performed by the Contractor and all subcontractors. The Safety and Health Manager shall be responsible for the development, implementation and oversight of the SSHP. The SSHP shall establish, in detail, the protocols necessary for the anticipation, recognition, evaluation, and control of hazards associated with each task performed. The SSHP shall address site-specific safety and health requirements and procedures based upon site-specific conditions. The level of detail provided in the SSHP shall be tailored to the type of work, complexity of operations to be performed, and hazards anticipated. Details about some activities may not be available when the initial SSHP is prepared and submitted. Therefore, the SSHP shall address, in as much detail as possible, anticipated tasks, their related hazards and anticipated control measures. Additional details shall be included in the activity hazard analyses as described in paragraph ACTIVITY HAZARD ANALYSES.

1.7.2 Acceptance and Modifications

Prior to submittal, the SSHP shall be signed and dated by the Safety and Health Manager and the Site Superintendent. The SSHP shall be submitted for review 5 days prior to the Preconstruction Safety Conference. Deficiencies in the SSHP will be discussed at the preconstruction safety conference, and the SSHP shall be revised to correct the deficiencies and resubmitted for acceptance. Onsite work shall not begin until the plan has been accepted. A copy of the written SSHP shall be maintained onsite. As work proceeds, the SSHP shall be adapted to new situations and new conditions. Changes and modifications to the accepted SSHP shall be made with the knowledge and concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Site Safety and Health Officer (SSHO) shall bring such hazard to the attention of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, necessary action shall be taken to re-establish and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Disregard for the provisions of

this specification or the accepted SSHP shall be cause for stopping of work until the matter has been rectified.

1.7.3 Availability

The SSHP shall be made available in accordance with 29 CFR 1910, Section .120 (b)(1)(v) and 29 CFR 1926, Section .65 (b)(1)(v).

1.7.4 Elements

Topics required by 29 CFR 1910, Section .120 (b)(4) 29 CFR 1926, Section .65 (b)(4) and the Accident Prevention Plan as described in Appendix A of EM 385-1-1 and those described in this section shall be addressed in the SSHP. Where the use of a specific topic is not applicable to the project, the SSHP shall include a statement to justify its omission or reduced level of detail and establish that adequate consideration was given the topic.

1.8 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.8.1 Project/Site Conditions

The locations of possible site contaminants are shown on the drawings. This information is provided to assist in preparing the SSHP.

1.8.2 Plan Requirements

The SSHP shall include a site description and contamination characterization section that addresses the following elements:

a. Description of site location, topography, size and past uses of the site.

b. A list of contaminants which may present occupational health and safety hazards. This list shall be created by evaluating the analytical results in this section and by researching sources of information from past site investigation activities. Chemical names, concentration ranges, media in which found, locations onsite, and estimated quantities/volumes to be impacted by site work shall be included if known. The contamination characterization shall be reviewed and revised if new chemicals are identified as work progresses.

1.9 HAZARD/RISK ANALYSIS

The SSHP shall include a safety and health hazard/risk analysis for each site task and operation to be performed. The hazard/risk analysis shall provide information necessary for determining safety and health procedures, equipment, and training to protect onsite personnel, the environment, and the public. Available site information shall be reviewed when preparing the "Hazard/Risk Analysis" section of the SSHP. The following elements, at a minimum, shall be addressed.

1.9.1 Site Tasks and Operations (Workplan)

The SSHP shall include a comprehensive section that addresses the tasks and objectives of the site operations and the logistics and resources required to reach those tasks and objectives. Based on the type of remediation required, the following is a list of anticipated major site tasks and operations to be performed: Lead paint is present on the structural lift span that will be cleaned and repainted. Lead paint is also present on the

two towers that will be removed for disposal. There is also asbestos present in the machinery rooms at the top of each tower. There is contaminated soil above the relieving platform on each approach to the bridge, This is not a complete list of site tasks and operations; therefore, it shall be expanded and/or revised, during preparation of the SSHP as necessary.

1.9.2 Hazards

The following potential hazards may be encountered during site work. These are not complete lists; therefore, they shall be expanded and/or revised as necessary during preparation of the SSHP.

1.9.2.1 Safety Hazards

Asbestos is present in the machinery rooms and operator's house.

1.9.2.2 Chemical Hazards

Lead paint is present on the painted structural steel. .

Potential chemical hazards that may be encountered during site work are discussed in paragraph SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION. The Hazard/Risk Analysis section of the SSHP shall describe the chemical, physical, and toxicological properties of contaminants, sources and pathways of employee exposures, anticipated onsite and offsite exposure level potentials, and regulatory (including Federal, state, and local) or recommended protective exposure standards. The SSHP shall also address employee exposure to hazardous substances brought onsite, and shall comply with the requirements of 29 CFR 1910, Section .1200 and 29 CFR 1926, Section .59, Hazard Communication.

1.9.3 Action Levels

1.9.3.1 General Requirements

Action levels shall be established for the situations listed below, at a minimum. The action levels and required actions (engineering controls, changes in PPE, etc.) shall be presented in the SSHP in both text and tabular form.

a. Implementation of engineering controls and work practices.

b. Upgrade or downgrade in level of personal protective equipment.

c. Work stoppage and/or emergency evacuation of onsite personnel.

d. Prevention and/or minimization of public exposures to hazards created by site activities.

1.9.3.2 Confined Space Entry

Entry into and work in a confined space will not be allowed when oxygen readings are less than 19.5% or greater than 23.5% or if the Lower Flammable Limit (LFL) reading is greater than 10%, unless these conditions are adequately addressed in the confined space entry program. In addition, action levels for toxic atmospheres shall be determined.

1.10 ACTIVITY HAZARD ANALYSES

Prior to beginning each major phase of work, an Activity Hazard Analysis shall be prepared by the Contractor performing that work and submitted for review and acceptance. The format shall be in accordance with EM 385-1-1, figure 1-1. A major phase of work is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform. The analysis shall define the activities to be performed and identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the activity hazard analysis has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the government onsite representatives. The activity hazard analyses shall be continuously reviewed and when appropriate modified to address changing site conditions or operations, with the concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Activity hazard analyses shall be attached to and become a part of the SSHP.

1.11 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

An organizational structure shall be developed that sets forth lines of authority (chain of command), responsibilities, and communication procedures concerning site safety, health, and emergency response. This organizational structure shall cover management, supervisors and employees of the Contractor and subcontractors. The structure shall include the means for coordinating and controlling work activities of subcontractors and suppliers. The SSHP shall include a description of this organizational structure as well as qualifications and responsibilities of each of the following individuals. The Contractor shall obtain Contracting Officer's acceptance before replacing any member of the Safety and Health Staff. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement.

1.11.1 Site Superintendent

A Site Superintendent, who has responsibility to implement the SSHP, the authority to direct work performed under this contract and verify compliance, shall be designated.

1.11.2 Safety and Health Manager

1.11.2.1 Qualifications

The services of an Industrial Hygienist certified by the American Board of Industrial Hygiene shall be utilized. The name, qualifications education summary and documentation, ABIH certificate, and work experience summary shall be included in the SSHP. The Safety and Health Manager shall have the following additional qualifications:

a. A minimum of 3 years experience in developing and implementing safety and health programs at hazardous waste sites.

b. Documented experience in supervising professional and technician level personnel.

c. Documented experience in developing worker exposure assessment programs and air monitoring programs and techniques.

d. Documented experience in the development of personal protective equipment programs, including programs for working in and around potentially toxic, flammable and combustible atmospheres and confined spaces.

e. Working knowledge of state and Federal occupational safety and health regulations.

1.11.2.2 Responsibilities

The Safety and Health Manager shall:

a. Be responsible for the development, implementation, oversight, and enforcement of the SSHP.

b. Sign and date the SSHP prior to submittal.

c. Conduct initial site-specific training.

d. Be present onsite during the first 3 days of remedial activities and at the startup of each new major phase.

e. Visit the site as needed and at least once per month for the duration of activities, to audit the effectiveness of the SSHP.

f. Be available for emergencies.

g. Provide onsite consultation as needed to ensure the SSHP is fully implemented.

h. Coordinate any modifications to the SSHP with the Site Superintendent, the SSHO, and the Contracting Officer.

i. Provide continued support for upgrading/downgrading of the level of personal protection.

j. Be responsible for evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE.

k. Review accident reports and results of daily inspections.

l. Serve as a member of the Contractor's quality control staff.

1.11.3 Site Safety and Health Officer (SSHO)

1.11.3.1 Qualifications of SSHO

An individual and one alternate shall be designated the Site Safety and Health Officer (SSHO). The name, qualifications education and training summary and documentation, and work experience of the Site Safety and Health Officer and alternate shall be included in the SSHP. The SSHO shall have the following qualifications:

a. A minimum of 2 years experience in implementing safety and health programs in the hazardous waste disposal industry where Level B personal protective equipment was required.

b. Documented experience in construction techniques and construction safety procedures.

c. Working knowledge of Federal and state occupational safety and health regulations.

d. Specific training in personal and respiratory protective equipment program implementation, confined space program oversight, and in the proper use of air monitoring instruments, and air sampling methods including monitoring for ionizing radiation.

1.11.3.2 Responsibilities of SSHO

The Site Safety and Health Officer shall:

a. Assist and represent the Safety and Health Manager in onsite training and the day to day onsite implementation and enforcement of the accepted SSHP.

b. Be assigned to the site on a full time basis for the duration of field activities. The SSHO shall have no duties other than Safety and Health related duties. If operations are performed during more than 1 work shift per day, a site Safety and Health Officer shall be present for each shift and act as the radiation safety officer (RSO) as defined in paragraph 06.E.02 of EM 385-1-1 on radioactive waste cleanup projects.

c. Have authority to ensure site compliance with specified safety and health requirements, Federal, state and OSHA regulations and all aspects of the SSHP including, but not limited to, activity hazard analyses, air monitoring, monitoring for ionizing radiation, use of PPE, decontamination, site control, standard operating procedures used to minimize hazards, safe use of engineering controls, the emergency response plan, confined space entry procedures, spill containment program, and preparation of records by performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log.

d. Have authority to stop work if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.

e. Consult with and coordinate any modifications to the SSHP with the Safety and Health Manager, the Site Superintendent, and the Contracting Officer.

f. Serve as a member of the Contractor's quality control staff on matters relating to safety and health.

g. Conduct accident investigations and prepare accident reports.

h. Review results of daily quality control inspections and document safety and health findings into the Daily Safety Inspection Log.

i. In coordination with site management and the Safety and Health Manager, recommend corrective actions for identified deficiencies and oversee the corrective actions.

1.11.4 Occupational Physician (OP)

1.11.4.1 Qualifications of OP

The services of a licensed physician, who is certified in occupational medicine by the American Board of Preventative Medicine, or who, by necessary training and experience is Board eligible, shall be utilized. The physician shall be familiar with this site's hazards and the scope of this project. The medical consultant's name, qualifications, and knowledge of the site's conditions and proposed activities shall be included in the SSHP.

1.11.4.2 Responsibilities of OP

The physician shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910, Section .120 (f) and 29 CFR 1926, Section .65 (f) and paragraph MEDICAL SURVEILLANCE.

1.11.5 Persons Certified in First Aid and CPR

At least two persons who are currently certified in first aid and CPR by the American Red Cross or other approved agency shall be onsite at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030. These persons may perform other duties but shall be immediately available to render first aid when needed.

1.11.6 Safety and Health Technicians

For each work crew in the exclusion zone, one person, designated as a Safety and Health technician, shall perform activities such as air monitoring, decontamination, and safety oversight on behalf of the SSHO. They shall have appropriate training equivalent to the SSHO in each specific area for which they have responsibility and shall report to and be under the supervision of the SSHO.

1.12 TRAINING

Personnel shall receive training in accordance with the Contractor's written safety and health training program and 29 CFR 1910 Section .120, 29 CFR 1926 Section .65, and 29 CFR 1926 Section .21. The SSHP shall include a section describing training requirements.

1.12.1 General Hazardous Waste Operations Training

Personnel entering the exclusion or contamination reduction zones shall have successfully completed 40 hours of hazardous waste instruction off the site; 3 days actual field experience under the direct supervision of a trained, experienced supervisor; and 8 hours refresher training annually. Onsite supervisors shall have completed the above training and 8 hours of additional, specialized training covering at least the following topics: the employer's safety and health program, personal protective equipment program, spill containment program, and health hazard monitoring procedures and techniques. Copies of current training certification statements shall be submitted prior to initial entry onto the work site.

1.12.2 Site-specific Training

Site-specific training sessions shall be documented in accordance with Section 01.B.03.b of EM 385-1-1.

1.12.2.1 Initial Session (Pre-entry Briefing)

Prior to commencement of onsite field activities, all site employees, including those assigned only to the Support Zone, shall attend a site-specific safety and health training session of at least 4 hours duration. This session shall be conducted by the Safety and Health Manager and the Site Safety and Health Officer to ensure that all personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment. Procedures and contents of the accepted SSHP and Sections 01.B.02 and 28.D.03 of EM 385-1-1 shall be thoroughly discussed. The Contracting Officer shall be notified at least 5 days prior to the initial site-specific training session so government personnel involved in the project may attend.

1.12.2.2 Periodic Sessions

Periodic onsite training shall be conducted by the SSHO at least weekly for personnel assigned to work at the site during the following week. The training shall address safety and health procedures, work practices, any changes in the SSHP, activity hazard analyses, work tasks, or schedule; results of previous week's air monitoring, review of safety discrepancies and accidents. Should an operational change affecting onsite field work be made, a meeting prior to implementation of the change shall be convened to explain safety and health procedures. Site-specific training sessions for new personnel, visitors, and suppliers shall be conducted by the SSHO using the training curriculum outlines developed by the Safety and Health Manager.

1.13 PERSONAL PROTECTIVE EQUIPMENT

1.13.1 PPE Program

In accordance with 29 CFR 1910 Section .120 (g)(5) and 29 CFR 1926Section .65 (g)(5), a written Personal Protective Equipment (PPE) program which addresses the elements listed in that regulation, and which complies with respiratory protection program requirements of 29 CFR 1910 Section .134, is to be included in the employer's Safety and Health Program. The Site Safety and Health Plan shall detail the minimum PPE ensembles (including respirators) and specific materials from which the PPE components are constructed for each site-specific task and operation to be performed, based upon the hazard/risk analysis. Components of levels of protection (B, C, D and modifications) must be relevant to site-specific conditions, including heat and cold stress potential and safety hazards. Only respirators approved by NIOSH shall be used. Onsite personnel shall be provided with appropriate personal protective equipment. Protective equipment and clothing shall be kept clean and well maintained. The PPE section of the SSHP shall include site-specific procedures to determine PPE program effectiveness and for onsite fit-testing of respirators, cleaning, maintenance, inspection, and storage of PPE.

1.13.2 Levels of Protection

The Safety and Health Manager shall establish appropriate levels of protection for each work activity based on review of historical site information, existing data, an evaluation of the potential for exposure (inhalation, dermal, ingestion, and injection) during each task, past air monitoring results, and a continuing safety and health monitoring program.

The Safety and Health Manager shall also establish action levels for upgrade or downgrade in levels of PPE from initial minimum levels of protection. Protocols and the communication network for changing the level of protection shall be described in the SSHP. The PPE reassessment protocol shall address air monitoring results, potential for exposure, changes in site conditions, work phases, job tasks, weather, temperature extremes, individual medical considerations, etc.

1.13.3 PPE for Government Personnel

Three clean sets of personal protective equipment and clothing excluding air-purifying negative-pressure respirators and safety shoes, which will be provided by individual visitors, as required for entry into the Exclusion Zone and/or Contamination Reduction Zone, shall be available for use by the Contracting Officer or official visitors. The items shall be cleaned and maintained by the Contractor and stored in the clean room of the decontamination facility and clearly marked: "FOR USE BY GOVERNMENT ONLY." The Contractor shall provide basic training in the use and limitations of the PPE provided, and institute administrative controls to check prerequisites prior to issuance. Such prerequisites include meeting minimum training requirements for the work tasks to be performed and medical clearance for site hazards and respirator use.

1.14 MEDICAL SURVEILLANCE

The Safety and Health Manager, in conjunction with the Occupational Physician, shall detail, in the employer's Safety and Health Program and the SSHP, the medical surveillance program that includes scheduling of examinations, certification of fitness for duty, compliance with OSHA requirements, and information provided to the physician. Examinations shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place. Medical surveillance protocols and examination and test results shall be reviewed by the Occupational Physician. The medical surveillance program shall contain the requirements specified below. Personnel working in contaminated areas of the site shall have been examined as prescribed in 29 CFR 1910 Section .120, and 29 CFR 1926Section .65, and determined medically fit to perform their duties.

1.14.1 Frequency of Examinations

Employees shall have been provided with medical examinations as specified, within the past 12 months and shall receive exams annually thereafter (if contract duration exceeds 1 year); on termination of employment; reassignment in accordance with 29 CFR 1910 Section .120 (f)(3)(i), and 29 CFR 1926 Section .65 (f)(3)(i)(C); if the employee develops signs or symptoms of illness related to workplace exposures; if the physician determines examinations need to be conducted more often than once a year; and when an employee develops a lost time injury or illness during the period of this contract. The supervisor shall be provided with a written statement signed by the physician prior to allowing the employee to return to the work site after injury or illness resulting in a lost workday, as defined in 29 CFR 1904 Section .12 (f).

1.14.2 Content of Examinations

The following elements shall be included in the medical surveillance program. Additional elements may be included at the discretion of the

occupational physician responsible for reviewing the medical surveillance protocols.

a. Complete medical and occupational history (initial exam only).

b. General physical examination of major organ systems.

c. Pulmonary function testing including FVC and FEV1.0.

d. CBC with differential.

e. Blood chemistry screening profile (e.g. SMAC 20/25).

f. Urinalysis with microscopic examination.

g. Audiometric testing (as required by Hearing Conservation Program).

h. Visual acuity.

i. Chest x-ray. This test shall be performed no more frequently than every 4 years, unless directed by Occupational Physician.

j. Electrocardiogram as directed by Occupational Physician.

k. Urine heavy metals (arsenic, cadmium, chromium, and mercury).

l. serum lead.

m. zinc protoporphyrin.

1.14.3 Information Provided to the Occupational Physician

The physician shall be furnished with the following:

a. Site information from paragraph, SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION.

b. information on the employee's anticipated or measured exposure.

c. a description of any PPE used or to be used.

d. A description of the employee's duties as they relate to the employee's exposures including physical demands on the employee and heat/cold stress.

e. A copy of 29 CFR 1910 Section .120, or 29 CFR 1926 Section .65.

f. Information from previous examinations not readily available to the examining physician.

g. A copy of Section 5.0 of NIOSH Pub No. 85-115.

h. Information required by 29 CFR 1910 Section .134.

1.14.4 Physician's Written Opinion

Before work begins a copy of the physician's written opinion for each employee shall be obtained and furnished to the Safety and Health Manager; and the employee. The opinion shall address the employee's ability to

perform hazardous remediation work and shall contain the following:

a. The physician's recommended limitations upon the employee's assigned work and/or PPE usage.

b. The physician's opinion about increased risk to the employee's health resulting from work; and

c. A statement that the employee has been informed and advised about the results of the examination.

1.14.5 Medical Records

Documentation of medical exams shall be provided as part of the Certificate of Worker or Visitor Acknowledgment. Medical records shall be maintained in accordance with 29 CFR 1910 Section .120, and 29 CFR 1926Section .65.

1.15 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

The Safety and Health Manager shall prepare and implement an exposure monitoring/air sampling program to identify and quantify safety and health hazards and airborne levels of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment for affected site personnel. Available site information shall be reviewed and the exposure monitoring/air sampling program shall be expanded and/or revised for submittal as part of the SSHP. Minimum initial requirements for the program are delineated as follows:

a. Once a week blood sample for those workers that are involved with removing, containing, collecting, and disposal of paint removal waste.

b. Daily monitoring of air in the vicinity of the bridge and the remote lift span repair area.

1.16 HEAT AND COLD STRESS MONITORING

The Safety and Health Manager shall develop a heat stress and cold stress monitoring program for onsite activities. Details of the monitoring program, including schedules for work and rest, and physiological monitoring requirements, shall be described in the SSHP. Personnel shall be trained to recognize the symptoms of heat and cold stress. The SSHO and an alternate person shall be designated, in writing, to be responsible for the heat and cold stress monitoring program.

1.16.1 Heat Stress

Physiological monitoring shall commence when the ambient temperature is above 70 degrees F. Monitoring frequency shall increase as the ambient temperature increases or as slow recovery rates are observed. An adequate supply of cool drinking water shall be provided for the workers. NIOSH Pub No. 85-115 may be consulted for guidance in determining protocols for prevention of heat stress.

1.16.2 Cold Stress

To guard against cold injury, appropriate clothing and warm shelter for rest periods shall be provided. Procedures to monitor and avoid cold stress shall be followed in accordance with the current TLVs for Cold Stress as recommended in ACGIH Threshold Limits.

1.17 SAFETY PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

The SSHP shall describe the standard operating safety procedures, engineering controls and safe work practices to be implemented for the work covered. These shall include, but not be limited to, the following:

1.17.1 General Site Rules/Prohibitions

General site rules/prohibitions (buddy system, eating, drinking, and smoking restrictions, etc.):

a. No eating, drinking or smoking is permitted in any area where paint removal, asbestos removal or excavation is in progress.

b. No worker is permitted to be on the existing structure or the new structure above the roadway level unless accompanied by another worker.

c. No smoking is permitted at, along or above the waterway.

1.17.2 Material Handling Procedures

1.17.2.1 Spill and Discharge Control

Written spill and discharge containment/control procedures shall be developed and implemented. These procedures shall address radioactive wastes, shock sensitive wastes, laboratory waste packs, material handling equipment, and appropriate procedures for tank and vault entry as well as drum and container handling, opening, sampling, shipping and transport. These procedures shall describe prevention measures, such as building berms or dikes; spill control measures and material to be used (e.g. booms, vermiculite); location of the spill control material; personal protective equipment required to cleanup spills; disposal of contaminated material; and who is responsible to report the spill. Storage of contaminated material or hazardous materials shall be appropriately bermed, diked and/or contained to prevent any spillage of material on uncontaminated soil. If the spill or discharge is reportable, and/or human health or the environment are threatened, the National Response Center, the state, and the Contracting Officer shall be notified as soon as possible.

1.17.3 Excavation and Trench Safety

Personnel shall not enter into an area of excavation unless anchored sheeting is provided.

1.17.4 Fall Protection

Safety cables shall be attached to the existing towers, lift span, and new tower when workers are above the roadway deck. Safety lanyards shall be tied to these safety cables.

1.18 SITE CONTROL MEASURES

In order to prevent the spread of contamination and control the flow of personnel, vehicles, and materials into and out of work areas, site control measures shall be established and described in the SSHP. The SSHP shall describe the methodology to be used by the Safety and Health Manager and SSHO in determining work zone designations and their modifications, and procedures to limit the spread of contamination. The SSHP shall include

procedures for the implementation and enforcement of safety and health rules for all persons on the site, including employers, employees, outside Contractors, government representatives, and visitors.

1.18.1 Work Zones

Work zone boundaries and access points shall be established and the boundary delineations shall be included on the drawings and in the SSHP. Delineation of work zone boundaries shall be based on the contamination characterization data and the hazard/risk analysis to be performed as described in paragraph: HAZARD/RISK ANALYSIS. As work progresses and field conditions are monitored, work zone boundaries may be modified with approval of the Contracting Officer. Work zones shall be clearly identified and marked in the field using tape, signs, etc. A site map, showing work zone boundaries and locations of decontamination facilities, shall be posted in the onsite office. Work zones shall consist of the following:

a. Exclusion Zone (EZ): The exclusion zone is the area where hazardous contamination is either known or expected to occur and the greatest potential for exposure exists. Entry into this area shall be controlled and exit may only be made through the CRZ.

b. Contamination Reduction Zone (CRZ): The CRZ is the transition area between the Exclusion Zone and the Support Zone. The personnel and equipment decontamination areas shall be separate and unique areas located in the CRZ.

c. Support Zone (SZ): The Support Zone is defined as areas of the site, other than exclusion zones and contamination reduction zones, where workers do not have the potential to be exposed to hazardous substances or dangerous conditions resulting from hazardous waste operations. The Support Zone shall be secured against active or passive contamination. Site offices, parking areas, and other support facilities shall be located in the Support Zone.

1.18.2 Site Control Log

A log of personnel visiting, entering, or working on the site shall be maintained. The log shall include the following: date, name, agency or company, time entering and exiting site, time entering and exiting the exclusion zone (if applicable), and personal protective equipment utilized. Before visitors are allowed to enter the Contamination Reduction Zone or Exclusion Zone, they shall show proof of current training, medical surveillance and respirator fit testing (if respirators are required for the tasks to be performed) and shall fill out the Certificate of Worker or Visitor Acknowledgment. This visitor information, including date, shall be recorded in the log.

1.18.3 Communication

An employee alarm system that has adequate means of on and off site communication shall be provided and installed in accordance with 29 CFR 1910 Section .165. The means of communication shall be able to be perceived above ambient noise or light levels by employees in the affected portions of the workplace. The signals shall be distinctive and recognizable as messages to evacuate or to perform critical operations. This includes: lead and asbestos exposure.

1.18.4 Site Security

The following site security shall be provided: Signs shall be printed in bold large letters on contrasting backgrounds in English and/or where appropriate, in the predominant language of workers unable to read English. Signs shall be visible from all points where entry might occur and at such distances from the restricted area that employees may read the signs and take necessary protective steps before entering.

1.19 PERSONAL HYGIENE AND DECONTAMINATION

Personnel entering the Exclusion or Contamination Reduction Zones or otherwise exposed or subject to exposure to hazardous chemical vapors, liquids, or contaminated solids shall adhere to the following personal hygiene and decontamination provisions. Decontamination shall be performed in the CRZ prior to entering the Support Zone from the Exclusion Zone. Chapter 10.0 of NIOSH Pub No. 85-115 shall be consulted when preparing decontamination procedures. A detailed discussion of personal hygiene and decontamination facilities and procedures to be followed by site workers shall be submitted as part of the SSHP. Employees shall be trained in the procedures and the procedures shall be enforced throughout site operations. Persons disregarding these provisions of the SSHP shall be barred from the site.

1.19.1 Decontamination Facilities

The following facilities shall be provided: 1) A personnel decontamination facility in the CRZ. This facility shall be used by both Contractor personnel and government representatives. The decontamination facility shall provide for separation of street clothing and contaminated PPE and shall be equipped with heating, lighting, ventilation, a change room and lockers, hot and cold water, shower facilities with hot and cold water, towels, soap in sufficient quantities for all anticipated personnel, and waste water storage facilities for controlling the disposal of used water. 2) Laundry facilities or provisions of laundry service. If an offsite laundry service is used, they shall be notified, in writing, of the possibility and nature of contaminants expected on clothing.

1.19.2 Procedures

Available site information shall be reviewed and appropriate minimum decontamination procedures shall be expanded and/or revised for submittal as part of the SSHP.

1.20 EQUIPMENT DECONTAMINATION

Vehicles and equipment used in the EZ shall be decontaminated in the CRZ prior to leaving the site. The procedures for decontamination of vehicles and equipment shall be addressed in the SSHP.

1.20.1 Decontamination Facilities

A equipment decontamination station shall be provided within the CRZ for decontaminating vehicles and equipment leaving the EZ. The decontamination station shall include the following: A designated "clean area" in the CRZ for performing equipment maintenance. This area shall be used when personnel are required by normal practices to come in contact with the equipment.

1.20.2 Procedures

Procedures for equipment decontamination shall be developed and utilized to prevent the spread of contamination into the SZ and offsite areas. These procedures shall address disposal of contaminated products and spent materials used on the site, including containers, fluids, oils, etc. Any item taken into the EZ shall be assumed to be contaminated and shall be inspected and/or decontaminated before the item leaves the area. Equipment, and materials shall be cleaned and decontaminated prior to leaving the site. Construction material shall be handled in such a way as to minimize the potential for contaminants being spread and/or carried offsite. Prior to exiting the site, vehicles and equipment shall be monitored to ensure the adequacy of decontamination.

1.21 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

The SSHP shall describe the emergency and first aid equipment to be available onsite. The following items, as a minimum, shall be maintained onsite and available for immediate use:

a. First aid equipment and supplies approved by the consulting physician.

b. Emergency eyewashes and showers which comply with ANSI Z358.1.

c. Emergency-use respirators. For escape purposes, 15-minute emergency escape masks shall be supplied.

d. Fire extinguishers with a minimum rating of 20-A:120-B:C shall be provided at site facilities and in all vehicles and at any other site locations where flammable or combustible materials present a fire risk.

1.22 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

An Emergency Response Plan, that meets the requirements of 29 CFR 1910 Section .120 (l) and 29 CFR 1926 Section .65 (l), shall be developed and implemented as a section of the SSHP. In the event of any emergency associated with remedial action, the Contractor shall, without delay, alert all onsite employees that there is an emergency situation; take action to remove or otherwise minimize the cause of the emergency; alert the Contracting Officer; and institute measures necessary to prevent repetition of the conditions or actions leading to, or resulting in, the emergency. Employees that are required to respond to hazardous emergency situations shall be trained in how to respond to such expected emergencies. The plan shall be rehearsed regularly as part of the overall training program for site operations. The plan shall be reviewed periodically and revised as necessary to reflect new or changing site conditions or information. Copies of the accepted SSHP and revisions shall be provided to the affected local emergency response agencies. The following elements, as a minimum, shall be addressed in the plan:

a. Pre-emergency planning. The local emergency response agencies shall be contacted and met with during preparation of the Emergency Response Plan. Agencies to be contacted include local fire, police, and rescue authorities with jurisdiction and nearby medical facilities that may be utilized for emergency treatment of injured personnel. At these meetings, the agencies shall be notified of upcoming site activities and potential emergency situations. The response agencies' capabilities shall be ascertained and written response commitments

obtained. The Contractor shall ensure the Emergency Response Plan for the site is compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and Federal agencies.

b. Personnel roles, lines of authority, communications for emergencies.

c. Emergency recognition and prevention.

d. Site topography, layout, and prevailing weather conditions.

e. Criteria and procedures for site evacuation (emergency alerting procedures, employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control).

f. Specific procedures for decontamination and medical treatment of injured personnel.

g. Route maps to nearest prenotified medical facility. Site-support vehicles shall be equipped with maps. At the beginning of project operations, drivers of the support vehicles shall become familiar with the emergency route and the travel time required.

h. Emergency alerting and response procedures including posted instructions and a list of names and telephone numbers of emergency contacts (physician, nearby medical facility, fire and police departments, ambulance service, Federal, state, and local environmental agencies; as well as Safety and Health Manager, the Site Superintendent, the Contracting Officer and/or their alternates).

i. Criteria for initiating community alert program, contacts, and responsibilities.

j. Procedures for reporting incidents to appropriate government agencies. In the event that an incident such as an explosion or fire, or a spill or release of toxic materials occurs during the course of the project, the appropriate government agencies shall be immediately notified. In addition, the Contracting Officer shall be verbally notified immediately and receive a written notification within 24 hours. The report shall include the following items:

(1) Name, organization, telephone number, and location of the Contractor.

(2) Name and title of the person(s) reporting.

(3) Date and time of the incident.

(4) Location of the incident, i.e., site location, facility name.

(5) Brief summary of the incident giving pertinent details including type of operation ongoing at the time of the incident.

(6) Cause of the incident, if known.

(7) Casualties (fatalities, disabling injuries).

(8) Details of any existing chemical hazard or contamination.

(9) Estimated property damage, if applicable.

(10) Nature of damage, effect on contract schedule.

(11) Action taken to ensure safety and security.

(12) Other damage or injuries sustained, public or private.

k. Procedures for critique of emergency responses and follow-up.

1.23 CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGEMENT

A copy of a Contractor-generated certificate of worker/visitor acknowledgement shall be completed and submitted for each visitor allowed to enter contamination reduction or exclusion zones, and for each employee, following the example certificate at the end of this section.

1.24 INSPECTIONS

The SSHO shall perform daily inspections of the jobsite and the work in progress to ensure compliance with EM 385-1-1, the Safety and Health Program, the SSHP and other occupational health and safety requirements of the contract, and to determine the effectiveness of the SSHP. Procedures for correcting deficiencies (including actions, timetable and responsibilities) shall be described in the SSHP. Follow-up inspections to ensure correction of deficiencies shall be conducted and documented. Daily safety inspection logs shall be used to document the inspections, noting safety and health deficiencies, deficiencies in the effectiveness of the SSHP, and corrective actions taken. The SSHO's Daily Inspection Logs shall be attached to and submitted with the Daily Quality Control reports. Each entry shall include the following: date, work area checked, employees present in work area, PPE and work equipment being used in each area, special safety and health issues and notes, and signature of preparer. In the event of an accident, the Contracting Officer shall be notified according to EM 385-1-1. Within 2 working days of any reportable accident, an Accident Report shall be completed on ENG Form 3394 and submitted.

1.25 SAFETY AND HEALTH PHASE-OUT REPORT

A Safety and Health Phase-Out Report shall be submitted within 10 working days following completion of the work, prior to final acceptance of the work. The following minimum information shall be included:

a. Summary of the overall performance of safety and health accidents or incidents including near misses, unusual events, lessons learned, etc.

b. Final decontamination documentation including procedures and techniques used to decontaminate equipment, vehicles, and on site facilities.

c. Summary of exposure monitoring and air sampling accomplished during the project.

d. Signatures of Safety and Health Manager and SSHO.

EXAMPLE CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGMENT

PROJECT NAME CONTRACT NO.
PROJECT ADDRESS
CONTRACTOR'S NAME
[EMPLOYEE'S][VISITOR'S] NAME

The contract for the above project requires the following: that you be provided with and complete formal and site-specific training; that you be supplied with proper personal protective equipment including respirators; that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you.

I HAVE READ, UNDERSTAND AND AGREE TO FOLLOW THE SITE SAFETY AND HEALTH PLAN FOR THIS SITE.

Name Date

--- ---

FORMAL TRAINING: I have completed the following formal training courses that meet OSHA's requirements:

Date Completed

40 hour: ....._____
8 hour supervisory:....._____
8 hour refresher:....._____

SITE-SPECIFIC TRAINING: I have been provided and have completed the site-specific training required by this Contract. The Site Safety and Health Officer conducted the training. _____

RESPIRATORY PROTECTION: I have been trained in accordance with the criteria in [the Contractor's] [my Employer's] Respiratory Protection program. I have been trained in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair policy. _____

RESPIRATOR FIT-TEST TRAINING: I have been trained in the proper selection, fit, use, care, cleaning, and maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in [the Contractor's] [my employer's] Respiratory Program and have received a satisfactory fit. [I have been assigned my individual respirator.] I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time._____

MEDICAL EXAMINATION: I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests and may have included an evaluation of a chest ax-ray. A physician made determination regarding my physical capacity to perform work tasks on the project while wearing protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's industrial hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

were no limitations to performing the required work tasks;

were identified physical limitations to performing the required work tasks.

Date medical exam completed

[Employee's][Visitor's] Signature _____

Date _____

Contractor's Site Safety and Health Officer Signature _____

Date _____

Printed Name _____

Social Security Number _____

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01354

ENVIRONMENTAL PROTECTION FOR CIVIL WORKS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 261	Identification and Listing of Hazardous Waste

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual (http://www.hq.usace.army.mil/soh/hqusace_soh.htm)

1.2 DEFINITIONS

Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of plant or animal communities; or degrade the environment from an aesthetic, cultural or historic perspective. Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive materials; and other pollutants.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Retention Pond Removal Plan; GA

Submit plan detailing Contractor's procedures for testing and removal of retention pond sediment.

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

The Contractor shall comply with all applicable Federal, State, and local laws and regulations. The Contractor shall provide environmental

protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during construction. Safety and health documents and procedures for hazardous, toxic, and radioactive waste (HTRW) site activities are specified in Section 01351 SAFETY, HEALTH, AND EMERGENCY RESPONSE.

1.4.1 Permits

This section supplements the Contractor's responsibility under the contract clause PERMITS AND RESPONSIBILITIES to the extent that the Government has already obtained environmental permits. The contractor shall also comply with other environmental commitments made by the Government. The contractor is responsible for obtaining all other permits necessary to complete the project. Copies of permit terms and conditions as well as those other commitments made by the Government are included at the end of this section.

1.4.2 Special Environmental Requirements

The Contractor shall comply with the special environmental requirements included at the end of this section. These special environmental requirements are an outgrowth of environmental commitments made by the Government during the project development.

1.4.3 Environmental Assessment of Contract Deviations

The Contract specifications have been prepared to comply with the special conditions and mitigation measures of an environmental nature which were established during the planning and development of this project. The Contractor is advised that deviations from the drawings or specifications (e.g., proposed alternate borrow areas, disposal areas, staging areas, alternate access routes, etc.) could result in the requirement for the Government to reanalyze the project from an environmental standpoint. Deviations from the construction methods and procedures indicated by the plans and specifications which may have an environmental impact will require an extended review, processing, and approval time by the Government. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.5 ENVIRONMENTAL PROTECTION PLAN

Within 20 calendar days of Notice of Award, the Contractor shall submit an Environmental Protection Plan for review and acceptance by the Contracting Officer. The Government will consider an interim plan for the first 30 days of operations. However, the Contractor shall furnish an acceptable final plan not later than 30 calendar days after receipt of the Notice to Proceed. Acceptance is conditional and is predicated upon satisfactory performance during construction. The Government reserves the right to require the Contractor to make changes in the Environmental Protection Plan or operations if the Contracting Officer determines that environmental protection requirements are not being met. The plan shall detail the actions which the Contractor shall take to comply with all applicable Federal, State, and local laws and regulations concerning environmental protection and pollution control and abatement, as well as the additional specific requirements of this contract. No physical work at the site shall begin prior to acceptance of the Contractor s plan or an interim plan covering the work to be performed. The environmental protection plan shall

include, but not be limited to, the following:

1.5.1 List of State and Local Laws and Regulations

The Contractor shall provide as part of the Environmental Protection Plan a list of all State and local environmental laws and regulations which apply to the construction operations under the Contract.

1.5.2 Spill Control Plan

The Contractor shall include as part of the environmental protection plan, a Spill Control Plan. The plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by the Emergency Response and Community Right-to-Know Act or regulated under State or local laws or regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

a. The name of the individual who will be responsible for implementing and supervising the containment and cleanup.

b. Training requirements for Contractor's personnel and methods of accomplishing the training.

c. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

d. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

e. The methods and procedures to be used for expeditious contaminant cleanup.

f. The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Contracting Officer in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity spill occurs. The plan shall contain a list of the required reporting channels and telephone numbers.

1.5.3 Recycling and Waste Minimization Plan

The Contractor shall submit a Recycling and Waste Minimization Plan as a part of the Environmental Protection Plan. The plan shall detail the Contractor's actions to comply with the following recycling and waste minimization requirements:

a. The Contractor shall participate in State and local government sponsored recycling programs to reduce the volume of solid waste materials at the source.

b. The structural steel that is remove from the tower spans shall be recycled at a salvage location that is capable of recycling steel that is coated with lead paint.

1.5.4 Contaminant Prevention Plan

As a part of the Environmental Protection Plan, the Contractor shall prepare a contaminant prevention statement identifying potentially hazardous substances to be used on the job site and intended actions to prevent accidental or intentional introduction of such materials into the air, water, or ground. The Contractor shall detail provisions to be taken to meet Federal, State, and local laws and regulations regarding the storage and handling of these materials.

1.5.5 Environmental Monitoring

The Contractor shall include in the plan the details of environmental monitoring requirements under the laws and regulations and a description of how this monitoring will be accomplished.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 SPECIAL ENVIRONMENTAL PROTECTION REQUIREMENTS

3.1.1 Tree Protection

No ropes, cables, or guys shall be fastened to or attached to any tree(s) for anchorage unless specifically authorized by the Contracting Officer. Where such special use is permitted, the Contractor shall provide effective protection to prevent damage to the tree and other land and vegetative resources. Unless specifically authorized by the Contracting Officer, no construction equipment or materials shall be placed or used within the drip line of trees shown on the drawings to be saved. No excavation or fill shall be permitted within the drip line of trees to be saved except as shown on the drawings.

3.1.2 U.S. Department of Agriculture (USDA) Quarantined Considerations

The Contractor shall thoroughly clean all construction equipment at the prior job site in a manner that ensures all residual soil is removed and that egg deposits from plant pests are not present. The Contractor shall consult with the USDA Plant Protection and Quarantine (USDA - PPQ) jurisdictional office for additional cleaning requirements that may be necessary.

3.1.3 Commercial Borrow

Prior to bringing commercially obtained borrow material onsite, the Contractor shall provide the Contracting Officer with the location of the pit or pits, the names of the owners and operators, and the types and estimated quantities of materials to be obtained from each source.

3.1.4 Soil Disposal Areas on Government Property

Soil disposal on Government property shall be made only in those areas designated on the contract drawings. Excavated material classified as "Clean Fill" may be used on Government property for most purposes, including grating. The material shall not be used in surface waterbodies or groundwater or in excavations within 8 feet of average groundwater levels. Hazardous, toxic, and radiological wastes (HTRW) shall not be disposed of on Government property. Disposal operations shall be managed

and controlled to prevent erosion of soil or sediment from entering nearby waters or wetlands. Disposal operations shall be developed and managed in accordance with the grading plan shown on the drawings or as approved by the Contracting Officer.

3.1.5 Disposal of Solid Wastes

Solid waste is rubbish, debris, waste materials, garbage, and other discarded solid materials (excluding clearing debris and hazardous waste as defined in following paragraphs). Solid waste shall be placed in containers and disposed on a regular schedule. All handling and disposal shall be conducted in such a way as to prevent spillage and contamination. The Contractor shall transport all solid waste off Government property and dispose in compliance with Federal, State, and local requirements.

3.1.6 Clearing Debris

Clearing debris is trees, tree stumps, tree trimmings, and shrubs, and leaves, vegetative matter, excavated natural materials (e.g., dirt and sand, and demolition products (e.g., brick, concrete, glass, and metals).

a. The Contractor shall collect trees, tree stumps, tree trimmings, shrubs, leaves, and other vegetative matter; and shall transport from Government property for proper disposal in compliance with Federal, State, and local requirements. The Contractor shall segregate the matter where appropriate for proper disposal. Untreated and unpainted scrap lumber may be disposed of with this debris where appropriate.

b. Demolition products shall be transported from Government property for proper disposal in compliance with Federal, State, and local requirements.

3.1.7 Excavated Materials

Excavated materials include natural materials and historic fill removed during excavations. Historic fill includes unregulated or "Clean Fill", Construction/Demolition Waste and Dredge Spoils, and Hazardous Waste. The Contractor shall segregate these materials in accordance with applicable state solid waste regulations.

a. Natural or native materials generally include soil, sand, and rock. Natural materials not contaminated with any substance above applicable regulatory limits may be used for backfilling, grading, or nearly any other purpose generally without Federal, State, and local permits.

b. Unregulated or 'Clean Fill' includes uncoated soil, rock, brick, block, and concrete that does not exceed applicable regulatory contaminant levels or standards for hazardous waste characteristics. This waste may be reused as grading material onsite, but outside of surface waterbodies and groundwater in accordance with applicable state solid waste regulations. Unused material shall be transported offsite for disposal at an approved residual waste facility in compliance with Federal, State, and local requirements.

c. Construction/Demolition Waste includes, but is not limited to, wood, steel, re-bar, and any painted surface that does not exceed standards for hazardous waste characteristics. Dredge

Spoils are also classified as a regulated waste in accordance with applicable state solid waste regulations. These wastes shall be transported offsite for disposal at an approved residual waste facility or, in the case of dredge spoils, may be transported to a specific dredge disposal facility. Transportation and disposal of this waste shall be in compliance with Federal, State, and local requirements.

d. Hazardous Materials include any grossly or obviously contaminated materials along with any other materials that have been sampled, laboratory analyzed, and found to exceed regulatory standards for hazardous waste characteristics. These materials must be transported offsite for disposal at an approved hazardous waste facility in compliance with Federal, State, and local requirements.

3.1.8 Disposal of Contractor Generated Hazardous Wastes

Hazardous wastes are wastes as defined in 40 CFR 261, and as defined by applicable State and local regulations. Hazardous waste generated by construction activities shall be removed from the work area and be disposed in compliance with Federal, State, and local requirements. The Contractor shall segregate hazardous waste from other materials and wastes, and shall protect it from the weather by placing it in a safe covered location; precautionary measures against accidental spillage such as berming or other appropriate measures shall be taken. Hazardous waste shall be removed from Government property within 60 days. Hazardous waste shall not be dumped onto the ground, into storm sewers or open water courses, or into the sanitary sewer system.

3.1.9 Fuels and Lubricants

Fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spills and evaporation. Lubricants and waste oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with Federal, State, and local laws and regulations.

3.2 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

3.2.1 Known Historic, Archaeological, and Cultural Resources

Known historic, archaeological, and cultural resources within the Contractor's work area are marked on the contract drawings. The Contractor shall install protection for these resources as shown on the drawings and shall be responsible for their preservation during the contract.

3.2.2 Discovered Historic, Archaeological, and Cultural Resources

If during construction activities, items are observed that may have historic or archaeological value (e.g., Native American human remains or associated objects are discovered), such observations shall be reported immediately to the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall prevent his employees from trespassing on, removing, or otherwise disturbing such resources.

3.3 PROTECTION OF WATER RESOURCES

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters.

3.3.1 Wastewater

Water collected from natural dewatering of previously saturated soil and fill materials in stockpiles or roll-off units and groundwater pumped from excavations shall be pumped into the sanitary sewer system, if permitted by the local authority, or discharged into storm drains or directly into the adjacent waterway with prior written permission from the State regulatory agency and in compliance with Federal, State, and local requirements.

3.3.2 Monitoring of Water Areas Affected by Construction Activities

The Contractor shall perform discharge monitoring, inspections, stormwater sampling and testing, reporting, and record keeping as set forth in the permit conditions which are attached to this section.

3.4 PROTECTION OF AIR RESOURCES

Special management techniques as set out below shall be implemented to control air pollution by the construction activities. These techniques supplement the requirements of Federal, State, and local laws and regulations; and the safety requirements under this Contract. If any of the following techniques conflict with the requirements of Federal, State, or local laws or regulations, or safety requirements under this contract, then those requirements shall be followed in lieu of the following.

3.4.1 Particulates

Airborne particulates, including dust particles, from construction activities and processing and preparation of materials shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. The Contractor shall maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, disposal sites, borrow areas, and all other work areas free from airborne dust which would cause a hazard or nuisance.

3.4.2 Other Air Pollutants

Airborne debris from asbestos and lead paint removal operations shall not be permitted to enter the atmosphere adjacent to the bridge.

3.5 INSPECTION

If the Contracting Officer notifies the Contractor in writing of any observed noncompliance with contract requirements or Federal, State, or local laws, regulations, or permits, the Contractor shall inform the Contracting Officer of proposed corrective action and take such action to correct the noncompliance. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action is taken. No time extensions will be granted or costs or damages allowed to the Contractor for any such suspension.

3.6 RETENTION POND REMOVAL

The Contractor shall develop a retention pond removal plan and provide it to the Contracting Officer 45 days prior to removal work. The plan shall address testing the sediment collected in the retention pond and the method of removal of the sediment. The plan shall comply with Federal, State, and local transport and disposal regulations. The Contractor shall remove and dispose of the retention pond sediment in accordance with the approved plan.

3.7 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed pollution control facilities and portable pollution control devices for the duration of the Contract or for the length of time construction activities create the particular pollutant.

3.8 TRAINING OF CONTRACTOR PERSONNEL

Contractor personnel shall be trained in environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel bimonthly . The training and meeting agenda shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, installation and care of facilities (vegetative covers, etc.), and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control. Anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants, shall also be discussed. Other items to be discussed shall include recognition and protection of archaeologic sites and artifacts.

-- End of Section --

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY, NORTHEAST
NAVAL FACILITIES ENGINEERING COMMAND
10 INDUSTRIAL HIGHWAY
MAIL STOP, #82
LESTER, PA 19113-2090

RECEIVED
SEP 13 2001
BY: mg

IN REPLY REFER TO
5090
Ser 1538/EV33/ANK
04 SEP 2001

From: Commanding Officer, Engineering Field Activity Northeast
To: District Engineer, Philadelphia District, U.S. Army Corps of Engineers

Subj: ALTERATION AND REPAIR OF LIFT BRIDGE, NAVAL RESERVE BASIN, PHILADELPHIA NAVAL BUSINESS CENTER, PHILADELPHIA, PA

Encl: (1) COE Philadelphia District, Regulatory Branch, ltr of 28 Jun 01, Department of the Army Permit No. CENAP-OP-R-200100641-57 (NW15)
(2) DEP, Southeast Regional Office, Section 401 Water Quality Certification Letter of 2 Jul 01
(3) DEP, Coastal Zone Management Consistency Concurrence Letter of 19 Jun 01
(4) USCG, Fifth Coast Guard District, ltr of 16 Aug 01, Coast Guard Bridge Permit 2-01-5

1. Written authorizations for the subject project have been received from the U.S. Army Corps of Engineers (COE), Pennsylvania Department of Environmental Protection (DEP), and U.S. Coast Guard (USCG); they are forwarded as enclosures (1) through (4), respectively. It is imperative that the contractor complies with all of the conditions of these approvals.

2. Note that the USCG requires a 45-day advance notification and the COE requires a 10-day advance notification prior to commencement of construction activities.

3. Questions or requests for additional information may be directed to me at the Environmental Department at (610) 595-0567 ext. 194.

Nancy Kuntzleman

A. N. KUNTZLEMAN
By direction

Copy to: (w/o encl)
P. Chiu, USCG, OBA, G-OPT/35
K. Ede, NSWCCD-SSES, Code 3632

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

RECEIVED
JUL - 6 2001
BY: jgg

REPLY TO
ATTENTION OF

JUN 28 2001

Regulatory Branch
Application Section II

SUBJECT: CENAP-OP-R-200100641-57 (NW15)
PADEP #:
Project Name: US COAST GUARD
Applicant: Department of the Navy
Waterway: Schuylkill River
Location: Reserve Basin Lift Bridge, Structure 915
Philadelphia Naval Business Center and Naval
Inactive Ship Maintenance Facility City and
County Of Philadelphia
Pennsylvania

Mr. Philip Chiu
U.S. Coast Guard, Office of Bridge Administration
U.S. Department of Transportation
2100 Second Street, S.W.
Staff Symbol: G-OPT/35
Washington, District of Columbia 20593-0001

Dear Mr Chiu:

This is in regard to the proposal submitted by your office on behalf of the Department of the Navy, Naval Facilities Engineering Command, to discharge 894 cubic yards of concrete into twelve drilled shafts extending below the high tide line within the Naval Reserve Basin, an artificial lagoon connected to the Schuylkill River. Three, 3 foot diameter by approximately 47 foot deep shafts will be drilled in each abutment and three, 6 foot diameter by approximately 90 foot deep shafts will be drilled in each pier to extend the foundations as required to support the modifications to the lift bridge structure. This discharge of material is incidental to the reconstruction and modification of the lift bridge to be authorized by U.S. Coast Guard permit pursuant to Section 9 of the Rivers and Harbors Act of 1899. The authorized work will be performed on the Lift Bridge, Structure 915, located at the Philadelphia Naval Business Center, Philadelphia, Pennsylvania.

Under current Federal regulations, a Department of the Army permit is required for work or structures in navigable waters of the United States and/or the discharge of dredged or fill material into waters of the United States including adjacent and isolated wetlands. Based upon our review of the information you have provided, it has been determined that the proposed work is approved by the existing Department of the Army nationwide permit (NWP) described below, provided the work is conducted in compliance with the general and special conditions specified in this letter.

Be advised that no work is authorized under this permit until an authorization has been issued by the U.S. Coast Guard for the proposed reconstruction of the lift bridge.

Nationwide Permit 15. U.S. Coast Guard Approved Bridges: Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the United States, including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills provided such discharges have been authorized by the U.S. Coast Guard as part of the bridge permit. Causeways and approach fills are not included in this NWP and will require an individual or regional Section 404 permit. (Section 404)

This authorization does not affect your responsibility to obtain any other Federal, State or local approval(s) required by law for the proposed work before beginning work.

The enclosed table (Enclosure 1) identifies those NWPs which require a preconstruction notification (PCN) to the Corps of Engineers, those which have been regionally conditioned by the Division Engineer, and those which have been denied 401 Water Quality Certification (WQC) and/or Coastal Zone Management (CZM) consistency by the State. It is noted that CZM consistency from the State is only required for those activities in or affecting a State's coastal zone. Additionally, some of the NWPs do not involve a discharge of dredged or fill material, and as such, do not require a 401 WQC. For those NWPs not requiring a 401 WQC, the appropriate rows and columns have been identified with the term "NA". If the State has denied the required WQC and/or not concurred with the Corps' CZM consistency determination, the NWP authorization is considered denied without prejudice until an individual project specific WQC and/or CZM approval is obtained. This approval must be obtained in order for the activity to be authorized under the NWP and a copy provided to this office before work begins. Any project specific conditions required by the State for the WQC and/or CZM approval will automatically become part of the NWP authorization.

You should carefully note that this NWP authorization is based upon your agreement to comply with the terms and conditions of this NWP (Enclosure 2), including any and all attached project specific special conditions listed below. Initiation of any authorized work shall constitute your agreement to comply with all of the NWP's conditions. You should also note that the authorized work may be subject to periodic inspections by a representative of this office.

PROJECT SPECIFIC SPECIAL CONDITIONS:

1. All work performed in association with the above noted project shall be conducted in accordance with the project plans identified as: "Alteration of the Lift Bridge across the Reserve Basin, Philadelphia Naval Business Center, Philadelphia, PA"; Sheets: G-001, General Notes, undated; C-1 through C-4, Detour Plan, Channel Sections, South Approach, and North Approach, all dated April 30, 2001 with no revisions; S-002 through S-005, Existing Bridge Plan and Elevation, Altered Bridge Plan and Elevation, Proposed Construction Sequence 1, and Proposed Construction Sequence 2, all undated; S-007 through S-010A, Existing Abutment, Existing Pier, Altered Pier, Altered Abutment, and Pier and Abutment Drilled Shafts, all undated; scales various, prepared by Modjeski and Masters, Consulting Engineers, Mechanicsburg, PA and U.S.Army, Corps of Engineers, Philadelphia District. The project plans provide for the discharge of 894 cubic yards of concrete into twelve borings, three borings in each pier and three borings in each abutment. The stated purpose of the project is to increase the vertical clearance of the lift bridge from 41 meters above MHW to a minimum of 46 meters above MHW in order to allow passage of larger vessels into the Reserve Basin. The extension of the foundations is required to support the additional weight and loadings generated by the increased size of the reconstructed lift bridge.

2. Construction activities shall not result in the disturbance or alteration of greater than 0.010 of waters of the United States.

3. Any deviation in construction methodology or project design from that shown on the above noted drawings must be approved by this office, in writing, prior to performance of the work. All modifications to the above noted project plans shall be approved, in writing, by this office. No work shall be performed prior to written approval of this office.

4. This office shall be notified at least 10 days prior to the commencement of authorized work by completing and signing the enclosed Notification/ Certification of Work Commencement Form (Enclosure 3). This office shall also be notified within 10 days of the completion of the authorized work by completing and signing the enclosed Notification/Certification of Work Completion/Compliance Form (Enclosure 4). All notifications required by this condition shall be in writing and shall be transmitted to this office by registered mail. Oral notifications are not acceptable. Similar notification is required each time maintenance work is to be done under the terms of this Corps of Engineers permit.

5. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration. (This special condition is applicable to Corps of Engineers permits that provide authorization under Section 10 of the Rivers and Harbors Act of 1899.)

6. That efforts shall be made to keep construction debris from entering the waterway. Debris in the waterway shall be removed immediately.

7. That this permit does not authorize any dredging at the project site.

8. That the permittee is responsible for ensuring that the contractor and/or workers executing the activity(s) authorized by this permit have knowledge of the terms and conditions of the authorization and that a copy of the permit document is at the project site throughout the period the work is underway.

You are advised that this verification of NWP authorization is valid for two (2) years from the date of this letter, unless the NWP authorization is modified, suspended, or revoked. In the event that the NWP authorization is reissued and/or modified during that time period, this two-year expiration date will remain valid, provided the activity complies with any subsequent reissuance and/or modification of the NWP authorization.

The existing NWPs will expire on February 11, 2002. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon a NWP, will remain authorized provided the activity is completed within 12 months of the date of the NWP's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization. As such, any work to be completed beyond this date in reliance upon this existing NWP must be completed by February 11, 2003. Activities completed under the authorization of a NWP which was in effect at the time the activity was completed, continue to be authorized by that NWP. Accordingly, it is incumbent upon you to remain informed of any changes to the NWP authorization(s).

Also enclosed is a pre-addressed postal card (Enclosure 5) soliciting your comments on the processing of your application. Any comments, positive or otherwise, on the procedures, timeliness, fairness, etc., may be made on this card. If you should have any questions regarding this matter, please contact Mr. Kevin W. Dougherty of this office at (215) 656-5733 or write to the above address.

Sincerely,

Frank J. Cianfrani
Chief, Regulatory Branch

Enclosures

Copies Furnished:

PADEP (Conshohocken, PA)
Applicant
NP Single Copy File

STATUS TABLE FOR NWPs IN DELAWARE, NEW JERSEY AND PENNSYLVANIA

NWP #	PCN	DE CZM	DE WQC	NJ CZM	NJ WQC	PA CZM	PA WQC
NWP 1	NO	ISSUED	N/A	ISSUED	N/A	ISSUED	N/A
NWP 2	NO	ISSUED	N/A	DENIED	N/A	ISSUED	N/A
NWP 3	YES *	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 4	NO	ISSUED	WAIVED	ISSUED	ISSUED	ISSUED	ISSUED
NWP 5	YES *	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 6	NO	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 7	YES	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 8	YES	ISSUED	N/A	DENIED	N/A	ISSUED	N/A
NWP 9	NO	ISSUED	N/A	DENIED	N/A	ISSUED	N/A
NWP 10	YES *	ISSUED	N/A	DENIED	N/A	ISSUED	N/A
NWP 11	YES	ISSUED	N/A	DENIED	N/A	ISSUED	N/A
NWP 12	YES *	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 13	YES	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 14	YES	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 15	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 16	NO	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 17	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 18	YES *	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 19	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 20	NO	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 21	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 22	YES *	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 23	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 24	NO	ISSUED	N/A	ISSUED	N/A	ISSUED	N/A
NWP 25	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 27	YES *	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 28	YES	ISSUED	N/A	DENIED	N/A	ISSUED	N/A
NWP 29	YES	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 30	YES	ISSUED	WAIVED	ISSUED	ISSUED	ISSUED	ISSUED
NWP 31	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 32	N/A	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 33	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 34	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 35	NO	ISSUED	N/A	DENIED	N/A	ISSUED	N/A
NWP 36	YES *	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 37	YES	ISSUED	WAIVED	ISSUED	ISSUED	ISSUED	ISSUED
NWP 38	YES	ISSUED	WAIVED	DENIED	DENIED	ISSUED	ISSUED
NWP 39	YES *	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 40	YES	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 41	YES *	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 42	YES	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 43	YES *	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED
NWP 44	YES	DENIED	DENIED	DENIED	DENIED	ISSUED	ISSUED

Note: This table reflects NWP approvals and PCN requirements as published in the Federal Register on December 13, 1996 and March 9, 2000. It also reflects the State WQC and CZM determinations in the absence of any approved regional conditions

*** A PCN is required under certain circumstances. Review the terms and conditions of the NWP or general conditions to identify those circumstances.**

ENCLOSURE 1

Nationwide Permit General Conditions

The following general conditions must be followed in order for any authorization by an NWP to be valid:

1. Navigation. No activity may cause more than a minimal adverse effect on navigation.
2. Proper Maintenance. Any structure or fill authorized shall be properly maintained, including maintenance to ensure publ safety.
3. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effectiv operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mar or high tide line, must be permanently stabilized at the earliest practicable date.
4. Aquatic Life Movements. No activity may substantially disrupt the movement of those species of aquatic life indigenous to th waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impoun water. Culverts placed in streams must be installed to maintain low flow conditions.
5. Equipment. Heavy equipment working in wetlands must be placed on mats, or other measures must be taken to minimize soi disturbance.
6. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions which may have been added by the division engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the State or tribe in its Section 401 water quality certification and Coastal Zone Management Act consistency determination.
7. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status; unless the appropriate Federal agency, with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation, or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).
8. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.
9. Water Quality. (a) In certain States and tribal lands an individual 401 water quality certification must be obtained or waived (See 33 CFR 330.4(c)).

   (b) For NWPs 12, 14, 17, 18, 32, 39, 40, 42, 43, and 44, where the State or tribal 401 certification (either generically or individually) does not require or approve a water quality management plan, the permittee must include design criteria and techniques that will ensure that the authorized work does not result in more than minimal degradation of water quality. An important component of a water quality management plan includes stormwater management that minimizes degradation of the downstream aquatic system, including water quality. Refer to General Condition 21 for stormwater management requirements. Another important component of a water quality management plan is the establishment and maintenance of vegetated buffers next to open waters, including streams. Refer to General Condition 19 for vegetated buffer requirements for the NWPs.
10. Coastal Zone Management. In certain states, an individual state coastal zone management consistency concurrence must be obtained or waived (see Section 330.4(d)).
11. Endangered Species. (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which will destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the District Engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or is located in the designated critical habitat and shall not begin work on the activity until notified by the District Engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. For activities that may affect Federally-listed endangered or threatened species or designated critical habitat, the notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. As a result of formal or informal consultation with the FWS or NMFS, the District Engineer may add species-specific regional endangered species conditions to the NWPs.

   (b) Authorization of an activity by a nationwide permit does not authorize the "take" of a threatened or endangered species as defined under the Federal Endangered Species Act. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, both lethal and non-lethal "takes" of protected species are in violation of the Endangered Species Act. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. Fish and Wildlife Service and National Marine Fisheries Service or their world wide web pages at http://www.fws.gov/r9endspp/endspp.html and http://www.nfms.gov/prot_res/esahome.html, respectively.
12. Historic Properties. No activity which may affect historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the DE has complied with the provisions of 33 CFR Part 325, Appendix C. The prospective permittee must notify the District Engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g)). For activities that may affect historic properties listed in, or eligible for listing in, the National Register of Historic Places, the notification

ENCLOSURE 2

must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property.

13. Notification.

(a) Timing: Where required by the terms of the NWP, the prospective permittee must notify the District Engineer with a preconstruction notification (PCN) as early as possible. The District Engineer must determine if the PCN is complete within 30 days of the date of receipt and can request the additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the District Engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the District Engineer. The prospective permittee shall not begin the activity:

(1) Until notified in writing by the District Engineer that the activity may proceed under the NWP with any special conditions imposed by the District or Division Engineer; or

(2) If notified in writing by the District or Division Engineer that an individual permit is required; or

(3) Unless 45 days have passed from the District Engineer's receipt of the complete notification and the prospective permittee has not received written notice from the District or Division Engineer. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Notification: The notification must be in writing and include the following information:

(1) Name, address, and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) Brief description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity; and

(4) For NWPs 7, 12, 14, 18, 21, 34, 38, 39, 40, 42, and 43, the PCN must also include a delineation of affected special aquatic sites, including wetlands, vegetated shallows (e.g., submerged aquatic vegetation, seagrass beds), and riffle and pool complexes (see paragraph 13(f));

(5) For NWP 7, Outfall Structures and Maintenance, the PCN must include information regarding the original design capacities and configurations of those areas of the facility where maintenance dredging or excavation is proposed.

(6) For NWP 14, Linear Transportation Crossings, the PCN must include a compensatory mitigation proposal to offset permanent losses of waters of the United States and a statement describing how temporary losses of waters of the United States will be minimized to the maximum extent practicable.

(7) For NWP 21, Surface Coal Mining Activities, the PCN must include an Office of Surface Mining (OSM) or state-approved mitigation plan.

(8) For NWP 27, Stream and Wetland Restoration, the PCN must include documentation of the prior condition of the site that will be reverted by the permittee.

(9) For NWP 29, Single-Family Housing, the PCN must also include:

(i) Any past use of this NWP by the individual permittee and/or the permittee's spouse;

(ii) A statement that the single-family housing activity is for a personal residence of the permittee;

(iii) A description of the entire parcel, including its size, and a delineation of wetlands. For the purpose of this NWP, parcels of land measuring 1/4 acre or less will not require a formal on-site delineation. However, the applicant shall provide an indication of where the wetlands are and the amount of wetlands that exists on the property. For parcels greater than 1/4 acre in size, a formal wetland delineation must be prepared in accordance with the current method required by the Corps. (See paragraph 13(f));

(iv) A written description of all land (including, if available, legal descriptions) owned by the prospective permittee and/or the prospective permittee's spouse, within a one mile radius of the parcel, in any form of ownership (including any land owned as a partner, corporation, joint tenant, co-tenant, or as a tenant-by-the-entirety) and any land on which a purchase and sale agreement or other contract for sale or purchase has been executed;

(10) For NWP 31, Maintenance of Existing Flood Control Projects, the prospective permittee must either notify the District Engineer with a PCN prior to each maintenance activity or submit a five year (or less) maintenance plan. In addition, the PCN must include all of the following:

(i) Sufficient baseline information so as to identify the approved channel depths and configurations and existing facilities. Minor deviations are authorized, provided the approved flood control protection or drainage is not increased;

(ii) A delineation of any affected special aquatic sites, including wetlands; and,

(iii) Location of the dredged material disposal site.

(11) For NWP 33, Temporary Construction, Access, and Dewatering, the PCN must also include a restoration plan of reasonable measures to avoid and minimize adverse effects to aquatic resources.

(12) For NWPs 39, 43, and 44, the PCN must also include a written statement to the District Engineer explaining how avoidance and minimization of losses of waters of the United States were achieved on the project site.

(13) For NWP 39, Residential, Commercial, and Institutional Developments, the PCN must include a compensatory mitigation proposal that offsets unavoidable losses of waters of the United States or justification explaining why compensatory mitigation should not be required.

(14) For NWP 40, Agricultural Activities, the PCN must include a compensatory mitigation proposal to offset losses of waters of the United States.

(15) For NWP 43, Stormw...r Management Facilities, the PCN must include, for the construction of new stormwate management facilities, a maintenance plan (in accordance with State and local requirements, if applicable) and a compensator mitigation proposal to offset losses of waters of the United States.

(16) For NWP 44, Mining Activities, the PCN must include a description of all waters of the United States adversel affected by the project, a description of measures taken to minimize adverse effects to waters of the United States, a description o measures taken to comply with the criteria of the NWP, and a reclamation plan (for aggregate mining activities in isolated waters an non-tidal wetlands adjacent to headwaters and any hard rock/mineral mining activities).

(17) For activities that may adversely affect Federally-listed endangered or threatened species, the PCN must include the name(s) of those endangered or threatened species that may be affected by the proposed work or utilize the designated critical habita that may be affected by the proposed work.

(18) For activities that may affect historic properties listed in, or eligible for listing in, the National Register of Historic Places, the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property.

(19) For NWPs 12, 14, 29, 39, 40, 42, 43, and 44, where the proposed work involves discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within 100-year floodplains (as identified on FEMA's Flood Insurance Rate Maps or FEMA-approved local floodplain maps), the notification must include documentation demonstrating that the proposed work complies with the appropriate FEMA or FEMA-approved local floodplain construction requirements.

(c) Form of Notification: The standard individual permit application form (Form ENG 4345) may be used as the notification but must clearly indicate that it is a PCN and must include all of the information required in (b) (1)-(19) of General Condition 13. A letter containing the requisite information may also be used.

(d) District Engineer's Decision: In reviewing the PCN for the proposed activity, the District Engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. The prospective permittee may, optionally, submit a proposed mitigation plan with the PCN to expedite the process and the District Engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. If the District Engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, the District Engineer will notify the permittee and include any conditions the District Engineer deems necessary.

Any compensatory mitigation proposal must be approved by the District Engineer prior to commencing work. If the prospective permittee is required to submit a compensatory mitigation proposal with the PCN, the proposal may be either conceptual or detailed. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the District Engineer will expeditiously review the proposed compensatory mitigation plan. The District Engineer must review the plan within 45 days of receiving a complete PCN and determine whether the conceptual or specific proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the District Engineer to be minimal, the District Engineer will provide a timely written response to the applicant stating that the project can proceed under the terms and conditions of the nationwide permit.

If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then he will notify the applicant either: (1) that the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the District Engineer determines that mitigation is required in order to ensure no more than minimal adverse effects on the aquatic environment, the activity will be authorized within the 45-day PCN period, including the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level. When conceptual mitigation is included, or a mitigation plan is required under item (2) above, no work in waters of the United States will occur until the District Engineer has approved a specific mitigation plan.

(e) Agency Coordination: The District Engineer will consider any comments from Federal and State agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse effects on the aquatic environment to a minimal level.

For activities requiring notification to the District Engineer that result in the loss of greater than 1/2 acre of waters of the United States, the District Engineer will, upon receipt of a notification, provide immediately (e.g., via facsimile transmission, overnight mail, or other expeditious manner), a copy to the appropriate offices of the Fish and Wildlife Service, State natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO), and, if appropriate, the National Marine Fisheries Service. With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the District Engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the District Engineer will wait an additional 15 calendar days before making a decision on the notification. The District Engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The District Engineer will indicate in the administrative record associated with each notification that the resource agencies' concerns were considered. As required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act, the District Engineer will provide a response to National Marine Fisheries Service within 30 days of receipt of any

Essential Fish Habitat conservation recommendations. Applicants are encouraged to provide the Corps multiple copies of notifications to expedite agency notification.

(f) Wetlands Delineations: Wetland delineations must be prepared in accordance with the current method required by the Corps. For NWP 29 see paragraph (b)(9)(iii) for parcels less than 1/4 acre in size. The permittee may ask the Corps to delineate the special aquatic site. There may be some delay if the Corps does the delineation. Furthermore, the 45-day period will not start until the wetland delineation has been completed and submitted to the Corps, where appropriate.

14. Compliance Certification. Every permittee who has received a Nationwide permit verification from the Corps will submit a signed certification regarding the completed work and any required mitigation. The certification will be forwarded by the Corps with the authorization letter. The certification will include: a.) A statement that the authorized work was done in accordance with the Corps authorization, including any general or specific conditions; b.) A statement that any required mitigation was completed in accordance with the permit conditions; and c.) The signature of the permittee certifying the completion of the work and mitigation.

15. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3 acre.

16. Water Supply Intakes. No activity, including structures and work in navigable waters of the United States or discharges of dredged or fill material, may occur in the proximity of a public water supply intake except where the activity is for repair of the public water supply intake structures or adjacent bank stabilization.

17. Shellfish Beds. No activity, including structures and work in navigable waters of the United States or discharges of dredged or fill material, may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWP 4.

18. Suitable Material. No activity, including structures and work in navigable waters of the United States or discharges of dredged or fill material, may consist of unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.) and material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

19. Mitigation. The project must be designed and constructed to avoid and minimize adverse effects to waters of the United States to the maximum extent practicable at the project site (i.e., on site). Mitigation will be required when necessary to ensure that the adverse effects to the aquatic environment are minimal. The District Engineer will consider the factors discussed below when determining the acceptability of appropriate and practicable mitigation necessary to offset adverse effects on the aquatic environment that are more than minimal.

(a) To be practicable, the mitigation must be available and capable of being done considering costs, existing technology, and logistics in light of the overall project purposes. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferably in the same watershed;

(b) The District Engineer will require restoration, creation, enhancement, or preservation of other aquatic resources in order to offset the authorized impacts to the extent necessary to ensure that the adverse effects on the aquatic environment are minimal. An important element of any compensatory mitigation plan for projects in or near streams or other open waters is the establishment and maintenance, to the maximum extent practicable, of vegetated buffers next to open waters on the project site. The vegetated buffer should consist of native species. The District Engineer will determine the appropriate width of the vegetated buffer and in which cases it will be required. Normally, the vegetated buffer will be 25 to 50 feet wide on each side of the stream, but the District Engineer may require wider vegetated buffers to address documented water quality concerns. If there are open waters on the project site and the District Engineer requires compensatory mitigation for wetland impacts to ensure that the net adverse effects on the aquatic environment are minimal, any vegetated buffer will comprise no more than 1/3 of the remaining compensatory mitigation acreage after the permanently filled wetlands have been replaced on a one-to-one acreage basis. In addition, compensatory mitigation must address adverse effects on wetland functions and values and cannot be used to offset the acreage of wetland losses that would occur in order to meet the acreage limits of some of the NWPs (e.g., for NWP 39, 1/4 acre of wetlands cannot be created to change a 1/2 acre loss of wetlands to a 1/4 acre loss; however, 1/2 acre of created wetlands can be used to reduce the impacts of a 1/3 acre loss of wetlands). If the prospective permittee is required to submit a compensatory mitigation proposal with the PCN, the proposal may be either conceptual or detailed.

(c) To the extent appropriate, permittees should consider mitigation banking and other appropriate forms of compensatory mitigation. If the District Engineer determines that compensatory mitigation is necessary to offset losses of waters of the United States and ensure that the net adverse effects of the authorized work on the aquatic environment are minimal, consolidated mitigation approaches, such as mitigation banks, will be the preferred method of providing compensatory mitigation, unless the District Engineer determines that activity-specific compensatory mitigation is more appropriate, based on which is best for the aquatic environment. These types of mitigation are preferred because they involve larger blocks of protected aquatic environment, are more likely to meet the mitigation goals, and are more easily checked for compliance. If a mitigation bank or other consolidated mitigation approach is not available in the watershed, the District Engineer will consider other appropriate forms of compensatory mitigation to offset the losses of waters of the United States to ensure that the net adverse effects of the authorized work on the aquatic environment are minimal.

20. Spawning Areas. Activities, including structures and work in navigable waters of the United States or discharges of dredged or fill material, in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., excavate, fill, or smother downstream by substantial turbidity) of an important spawning area are not authorized.

21. Management of Water Flows. To the maximum extent practicable, the activity must be designed to maintain preconstruction downstream flow conditions (e.g., location, capacity, and flow rates). Furthermore, the activity must not permanently restrict or impede the passage of normal or expected high flows (unless the primary purpose of the fill is to impound waters) and the structure or discharge of dredged or fill material must withstand expected high flows. The activity must, to the maximum extent practicable, provide for retaining excess flows from the site, provide for maintaining surface flow rates from the site similar to preconstruction conditions, and must not increase water flows from the project site, relocate water, or redirect water flow beyond preconstruction conditions. In addition, the activity must, to the maximum extent practicable, reduce adverse effects such as flooding or erosion downstream and upstream of the project site, unless the activity is part of a larger system designed to manage water flows.

22. Adverse Effects From Impoundments. If the activity, including structures and work in navigable waters of the United States or discharge of dredged or fill material, creates an impoundment of water, adverse effects on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

23. Waterfowl Breeding Areas. Activities, including structures and work in navigable waters of the United States or discharges of dredged or fill material, into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

24. Removal of Temporary Fills. Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

25. Designated Critical Resource Waters. Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, National Wild and Scenic Rivers, critical habitat for Federally listed threatened and endangered species, coral reefs, State natural heritage sites, and outstanding national resource waters or other waters officially designated by a State as having particular environmental or ecological significance and identified by the District Engineer after notice and opportunity for public comment. The District Engineer may also designate additional critical resource waters after notice and opportunity for comment.

(a) Except as noted below, discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, and 44 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters. Discharges of dredged or fill materials into waters of the United States may be authorized by the above NWPs in National Wild and Scenic Rivers if the activity complies with General Condition 7. Further, such discharges may be authorized in designated critical habitat for Federally listed threatened or endangered species if the activity complies with General Condition 11 and the U.S. Fish and Wildlife Service or the National Marine Fisheries Service has concurred in a determination of compliance with this condition.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with General Condition 13, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The District Engineer may authorize activities under these NWPs only after he determines that the impacts to the critical resource waters will be no more than minimal.

26. Fills Within 100-Year Floodplains. For purposes of this general condition, 100-year floodplains will be identified through the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps or FEMA-approved local floodplain maps.

(a) Discharges Below Headwaters. Discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within the 100-year floodplain at or below the point on a stream where the average annual flow is five cubic feet per second (i.e., below headwaters) are not authorized by NWPs 29, 39, 40, 42, 43, and 44. For NWPs 12 and 14, the prospective permittee must notify the District Engineer in accordance with General Condition 13 and the notification must include documentation that any permanent, above-grade fills in waters of the United States within the 100-year floodplain below headwaters comply with FEMA or FEMA-approved local floodplain construction requirements.

(b) Discharges in Headwaters (i.e., above the point on a stream where the average annual flow is five cubic feet per second).

(1) Flood Fringe. Discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within the flood fringe of the 100-year floodplain of headwaters are not authorized by NWPs 12, 14, 29, 39, 40, 42, 43, and 44, unless the prospective permittee notifies the District Engineer in accordance with General Condition 13. The notification must include documentation that such discharges comply with FEMA or FEMA-approved local floodplain construction requirements.

(2) Floodway. Discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within the floodway of the 100-year floodplain of headwaters are not authorized by NWPs 29, 39, 40, 42, 43, and 44. For NWPs 12 and 14, the permittee must notify the District Engineer in accordance with General Condition 13 and the notification must include documentation that any permanent, above grade fills proposed in the floodway comply with FEMA or FEMA-approved local floodplain construction requirements.

NOTIFICATION/CERTIFICATION OF WORK COMMENCEMENT FORM

Permit Number: CENAP-OP-R-200100641-57 (NW15)
Name of Permittee: Department of the Navy
Project Name: US COAST GUARD
Waterway: Schuylkill River
County, State: Philadelphia County, Pennsylvania
Compensation/Mitigation Work Required: Yes_____ No_X___

TO: Department of the Army
U.S. Army Corps of Engineers, Philadelphia District
Wanamaker Building - 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390
Attention: CENAP-OP-R

I have received authorization to discharge 894 cubic yards of concrete into twelve borings, three borings in each pier and three borings in each abutment.. The extension of the foundations is required to support the additional weight and loadings generated by the increased size of the reconstructed lift bridge.

The work will be performed by:

Name of Person or Firm: _____

Address: _____

_____

_____

I hereby certify that I have reviewed the approved plans, have read the terms and conditions of the above referenced permit, and shall perform the authorized work in strict accordance with the permit document. The authorized work will begin on or about _____ and should be completed on or about _____.

Please note that the permitted activity is subject to compliance inspections by the Army Corps of Engineers. If you fail to return this notification form or fail to comply with the terms or conditions of the permit, you are subject to permit suspension, modification, revocation, and/or penalties.

_____ _____
Permittee (Signature and Date) Telephone Number

_____ _____
Contractor (Signature and Date) Telephone Number

NOTE: This form shall be completed/signed and returned to the Philadelphia District Office a minimum of 10 days prior to commencing work.

Enclosure 3

NOTIFICATION/CERTIFICATION OF WORK COMPLETION/COMPLIANCE FORM

Permit Number: CENAP-OP-R-200100641-57 (NW15)
Name of Permittee: Department of the Navy
Name of Contractor:
Project Name: US COAST GUARD
County: Philadelphia
State: Pennsylvania
Waterway: Schuylkill River

Within 10 days of completion of the activity authorized by this permit, please sign this certification and return it to the following address:

Department of the Army
U.S. Army Corps of Engineers, Philadelphia District
Wanamaker Building - 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390
Attention: CENAP-OP-R

Please note that the permitted activity is subject to a compliance inspection by an Army Corps of Engineers representative. If you fail to return this notification form or fail to perform work in compliance with the permit, you are subject to administrative, civil and/or criminal penalties. Further, the subject permit may be suspended or revoked.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the above noted permit.

The authorized work was commenced on _____.

The authorized work was completed on _____.

Dredging authorized: Yes_____ No__X__. If yes, see ***NOTE*** below.

The volume of dredged material was __N/A__ cubic yards.

The dredged material was placed at ____N/A_____.

_____	_____
Signature of Contractor	Signature of Permittee
Address: _____	Address: _____
_____	_____
Telephone Number: _____	Telephone Number: _____

SPECIAL NOTE FOR MAINTENANCE DREDGING:
If the above referenced permit authorizes maintenance dredging, the permittee/contractor shall notify this office of the completion of the work by submitting this form for each dredging occurrence. This form may be reproduced for this purpose.

Enclosure 4

Pennsylvania Department of Environmental Protection
Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428

Southeast Regional Office

610-832-6130
Fax 610-832-6133

July 2, 2001

RECEIVED
JUL - 9 2001
BY: ggg

Ms. Ann Deaton
Commander AOWB
LANTAREA
Federal Building
431 Crawford Street
Portsmouth, VA 23704-5004

Re: Section 401 Certification Letter
Lift Bridge, Naval Reserve Basin
City of Philadelphia
Philadelphia County

Dear Ms. Deaton:

We have reviewed a letter from the U.S. Coast Guard dated April 20, 2001, and attachments requesting the Department to certify, pursuant to Section 401 of the Federal Water Pollution Control Act, that the proposed activity associated with the modification of the Lift Bridge across the naval Reserve Basin in Philadelphia, PA will not violate the water quality standards for the Delaware Estuary, Zone 4.

The effluent limitations or standards of Sections 1311(b), 1312, 1316, and 1317 of the Federal Act do not apply to this project. However, based on our review of the supporting material under applicable State standards, we certify that the proposed activity will not violate water quality standards.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 PA C.S. Chapter 5A, to the Environmental Hearing Board, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audio tape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statues and decisional law.

Sincerely,

James Newbold, P.E.
Regional Manager
Water Management

cc: Mr. Chiu - Office of Bridge Administration
Mr. Toth - RCSOB
Mr. Goman
Re 30 (DC01)122-8

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 2063
Harrisburg, PA 17105-2063

June 19, 2001

Office for River Basin Cooperation **717-772-5622**

RECEIVED
JUN 27 2001
BY:

U.S. Coast Guard, Engineering Division
Office of Bridge Administration
2100 Second Street, S.W.
Washington, D.C. 20593-0001

Re: CZM File No. CZ7: FDP

Dear Mr.Chiu:

This letter confirms our June 8, 2001 telephone agreement between the Pennsylvania Coastal Zone Management (CZM) Program and the U.S. Coast Guard, Office of Bridge Administration (USCG). The agreement concerns the USCG proposed activity entitled "Proposed Modification of the Lift Bridge across the Naval Reserve Basin in Philadelphia, Pennsylvania". As you are aware, this federal agency activity is subject to the Pennsylvania CZM Program's federal consistency review under 15 CFR Part 930 Subpart C. CZM received your request for a consistency concurrence on April 23, 2001.

During our conversation you agreed that the USCG will not commence construction of the aforementioned entitled project, until this Department's Southeast Regional Water Management Program grants the necessary Water Quality Certification required under section 401(a) of the 1972 amendments to the Federal Water Pollution Control Act (33 U.S.C.A. Section 1341(a)). This condition is necessary in order to ensure that this USCG activity will not violate applicable state water quality standards, and will be undertaken in a manner consistent with CZM's enforceable policy 9.2: Intergovernmental Coordination / Water Quality. This policy adopts by reference the requirements of the Federal Water Pollution Control Act, and incorporates these requirements into the Pennsylvania CZM Program.

Since you have agreed to this condition, we concur with your April 23, 2001 determination that the aforementioned entitled project is consistent with the Pennsylvania CZM Program.

In conclusion, if this agreed to condition is not met, then both the USCG and the Pennsylvania CZM Program will treat this conditional concurrence as an objection pursuant to 15 CFR Part 930 Section 930.43.

If you have any questions concerning this conditional consistency determination, please contact me at 717-772-5622.

Sincerely,

Lawrence J. Toth

Lawrence J. Toth
Environmental Planner
Coastal Zone Management Program

AUG - 6 2001

(2-01-5)

WHEREAS by Title V of an act of Congress approved August 2, 1946, entitled "General Bridge Act of 1946," as amended (33 U.S.C. 525-533), the consent of Congress was granted for the construction, maintenance and operation of bridges and approaches thereto over the navigable waters of the United States;

AND WHEREAS the Secretary of Transportation has delegated the authority of Section 502(b) of that act to the Commandant, U. S. Coast Guard, by Section 1.46(c) of Title 49, Code of Federal Regulations;

AND WHEREAS before construction is commenced, the Commandant must approve the location and plans of any such bridge and may impose any specific conditions relating to the construction, maintenance and operation of the structure deemed necessary in the interest of public navigation, such conditions to have the force of law;

AND WHEREAS the – **DEPARTMENT OF THE NAVY** - has submitted for approval the location and plans of a bridge to be modified across the Naval Reserve Basin, Philadelphia, Pennsylvania;

NOW THEREFORE, This is to certify that the location and plans dated April 2001 are hereby approved by the Commandant, subject to the following conditions:

1. No deviation from the approved plans may be made either before or after completion of the proposed modification unless the modification of said plans has previously been submitted to and received the approval of the Commandant.

2. The construction of falsework, pilings, cofferdams or other obstructions, if required, shall be in accordance with plans submitted to and approved by the Commander, Fifth Coast Guard District, prior to modification of the bridge. All work shall be so conducted that the free navigation of the waterway is not unreasonably interfered with and the present navigable depths are not impaired. Timely notice of any and all events that may affect navigation shall be given to the District Commander during modification of the bridge. The channel or channels through the structure shall be promptly cleared of all obstructions placed therein or caused by the modification of the bridge to the satisfaction of the District Commander, when in the judgment of the District Commander the modification work has reached a point where such action should be taken, but in no case later than 90 days after the modified bridge has been completed.

AUG -6 2001

Bridge across the Naval Reserve Basin at Philadelphia, Pennsylvania

(2-01-5)

3. Issuance of this permit does not relieve the permittee of the obligation or responsibility for compliance with the provisions of any other law or regulation as may be under the jurisdiction of any federal, state or local authority having cognizance of any aspect of the location, modification or maintenance of said bridge.

4. The pier protection fender system shall be constructed and maintained as shown on the approved plan sheets 2, 3 and 4 (of 4) dated April 2001 for the safety of navigation.

5. Clearance gauges shall be installed and maintained in a good and legible condition by and at the expense of the owner of the modified bridge when so required by the District Commander. The type of gauges and the locations in which they are to be installed will be submitted to the District Commander for approval.

6. All parts of the existing to-be-modified Lift Bridge and fender system across the Naval Reserve Basin, mile 0.2, not utilized in the new modified bridge shall be removed in their entirety and the waterway cleared to the satisfaction of the District Commander. A period of 90 days subsequent to the completion of the modification of the Lift Bridge, mile 0.2, will be allowed for such removal and clearance.

7. When the existing to-be-modified bridge is no longer used for transportation purposes, it shall be removed down to or below the natural bottom of the waterway or an elevation deemed appropriate by the District Commander and the waterway cleared to the satisfaction of the District Commander. Such removal and clearance shall be completed by and at the expense of the owner of the bridge upon due notice from the District Commander.

8. The approval hereby granted shall cease and be null and void unless modification of the bridge is commenced within three years and completed within five years after the date of this permit.

ORIGINAL
SIGNED BY

N. E. MPRAS
Chief, Office of Bridge
Administration
U. S. Coast Guard
By direction of the Commandant

AMANGONI:sgg typed on 08/6/01 AMangoni\Public\P(02-01-5)NavalbasinPermit

U.S. Department of Transportation
United States Coast Guard

Commandant
United States Coast Guard

2100 Second Street, S.W.
Washington, DC 20593-0001
Staff Symbol: G-OPT/35
Phone: (202) 267-0368
FAX: (202) 267-4046

16592
June 9, 1999

Ms. Julie K. Van Nostern
Philadelphia Industrial Development
Corporation
2600 Center Square West
1500 Market Street
Philadelphia, PA 19102-2126

Dear Ms. Van Nostern:

Enclosed please find a copy of the determination of no hazard to air navigation from the Federal Aviation Administration regarding our lift bridge in Philadelphia. The approved heights for the lift bridge towers are 212 feet above ground level (AGL) and 226 feet above mean sea level (AMSL).

Also enclosed is a copy of the Conversion Table prepared by Mr. David Krause of the Naval Facilities Engineering Command clarifying the top elevation of the lift bridge towers with reference to Philadelphia Navy Shipyard (PNSY) Elevation Datum and National Geodetic Vertical Datum (NGVD) of 1929.

By copy of this letter Mr. Krause is requested to forward the original FAA determination to the Coast Guard.

Copies of the FAA determination and the Conversion Table are also provided to Modjeski & Masters, Inc., for information and to comply with all the stipulated conditions and limitations in a timely fashion.

A copy of this determination is also provided to Ms. Tina Dinenger of the Northern Division, Naval facilities Engineering Command, for information. In particular to highlight that the FAA determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. This equipment shall not exceed the overall heights as indicated in the determination.

Sincerely,

JACOB PATNAIK
Chief, Bridge Engineering Division
Office of Bridge Administration
U. S. Coast Guard
By direction of the Commandant

Encl: (1) FAA Determination dated May 22, 1999
(2) Conversion Table

Federal Aviation Administration
EASTERN REGION, AEA-520
BLDG 111, JFK INTL AIRPORT
JAMAICA, NEW YORK 11430

AERONAUTICAL STUDY
No: 98-AEA-3033-OE

ISSUED DATE: 05/22/99

DAVID L. KRAUSE
NORTHERN DIV,NAVAL DIVISION ENG CMD
10 INDUSTRIAL HIGHWAY, MSC # 82
LESTER, PA 19113-2090

** DETERMINATION OF NO HAZARD TO AIR NAVIGATION **

The Federal Aviation Administration has completed an aeronautical study under the provisions of 49 U.S.C., Section 44718 and, if applicable, Title 14 of the Code of Federal Regulations, part 77, concerning:

Description: BRIDGE - LIFT BRIDGE

Location: PHILADELPHIA PA
Latitude: 39-53-36.40 NAD 83
Longitude: 075-11-28.64
Heights: 212 feet above ground level (AGL)
226 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

-As a condition to this determination, the structure should be marked and/or lighted in accordance with FAA Advisory Circular 70/7460-1J, Obstruction Marking and Lighting, Chapters 3(Marked), 4, 5(Red), & 13.

-It is required that the enclosed FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

✓ At least 10 days prior to start of construction (7460-2, Part I)

✓ Within 5 days after construction reaches its greatest height (7460-2, Part II)

This determination expires on 01/01/01 unless:

(a) extended, revised or terminated by the issuing office or
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FC within 6 months of the date of this determination. In such ca the determination expires on the date prescribed by the FCC fo completion of construction or on the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATIC MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

-As a result of this structure being critical to flight safety, it is required that the FAA be kept apprised as to the status of this

project. Failure to respond to periodic FAA inquiries could invalidate this determination.

This determination is subject to review if an interested party files a petition on or before 06/21/99. In the event a petition for review is fil it must contain a full statement of the basis upon which it is made and b submitted in triplicate to the Manager, AIRSPACE & RULES DIVISION, ATA-40 Federal Aviation Administration, Washington, D.C. 20591.

This determination becomes final on 07/01/99 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, frequency(ies) or use of greater power will void this determination. Any future construction or alteration, including increase in heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than tl studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, o regulation of any Federal, State, or local government body.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; th impact on all existing and planned public-use airports, military airport and aeronautical facilities; and the cumulative impact resulting from th studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect to air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision this matter can be found on the following page(s).

A copy of this determination will be forwarded to the Federal Communicat Commission if the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at 718-553-2560. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 98-AEA-3033-OE.

for Earl Zimmermann
Manager, AIRSPACE BRANCH

(DNH)

7460-2 Attached
Attachment

Aeronautical Study 98-AEA-3033-OE

PROPOSAL: To construct an lift bridge to a height of 212 feet above ground level (AGL), 226 feet above mean sea level (AMSL).

LOCATION: The proposed structure would be located approximately 2.84 nautical miles (NM) northeast of Philadelphia International Airport (PHL), Philadelphia, PA.

PART 77 OBSTRUCTION STANDARDS EXCEEDED:

Section 77.23(a)(2) by 4 feet – a height that exceeds a specified height within three miles of an airport as applied to PHL.
Section 77.23(a)(5) Airport Surfaces by penetrating
Section 77.25(a)(Horizontal Surface) by 54 feet – a height that exceeds a takeoff or landing area of an airport, as applied to PHL Runway 26.

NEGOTIATION: was attempted with the proponent but full filed height and location was requested to meet planned coverage.

CIRCULARIZED for public comment on March 8, 1999.

AERONAUTICAL OBJECTIONS:

Philadelphia International Airport, City of Philadelphia, went on record, stating it objected to any violation of navigational airspace around PHL, or restrictions imposed on landing minimums or approach slopes to Runway 26 and 27R.

AERONAUTICAL STUDY RESULTS:

The proposal would not impact any plans on file.

The structure would not interfere with any airport traffic patterns.

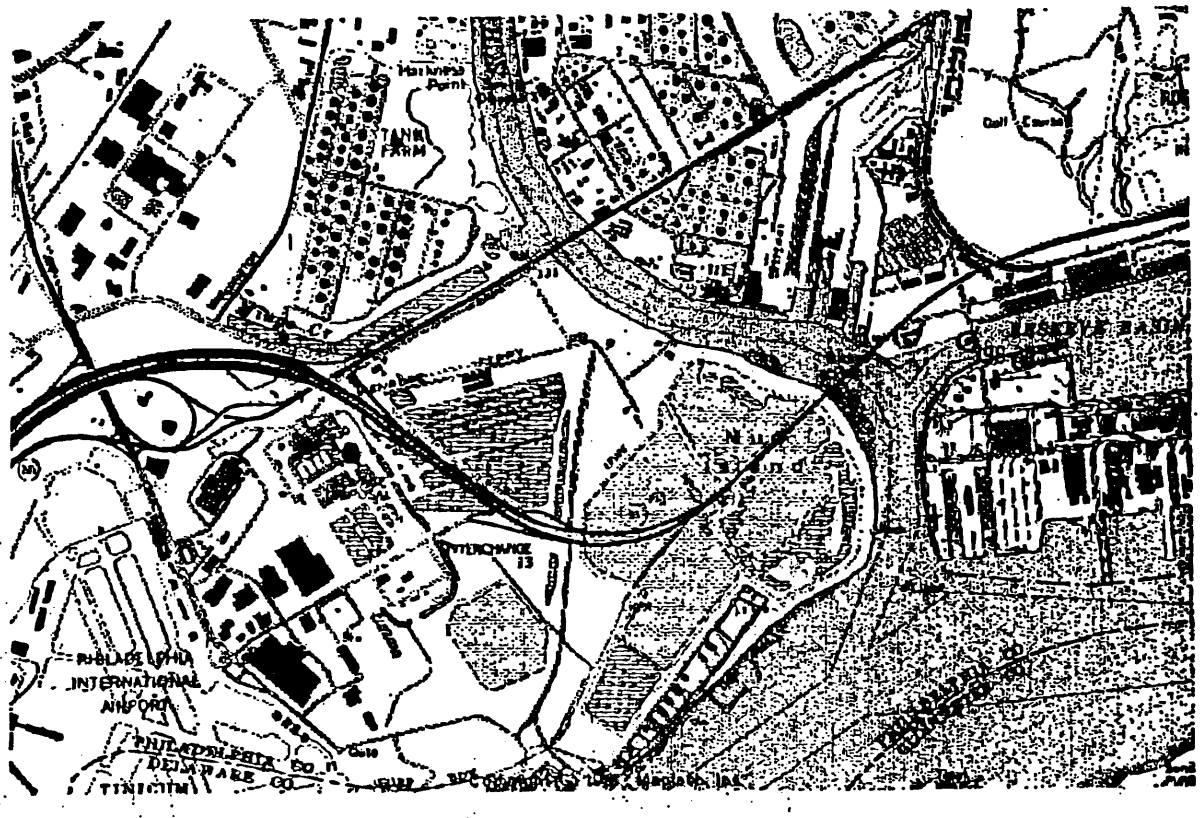
The structure would not adversely impact any present or future VFR or IFR terminal procedure, including no restrictions to landing minimums or approach slopes.

The structure would not impact any VFR or IFR enroute procedure.

The structure would not have a cumulative impact on any existing or planned airport.

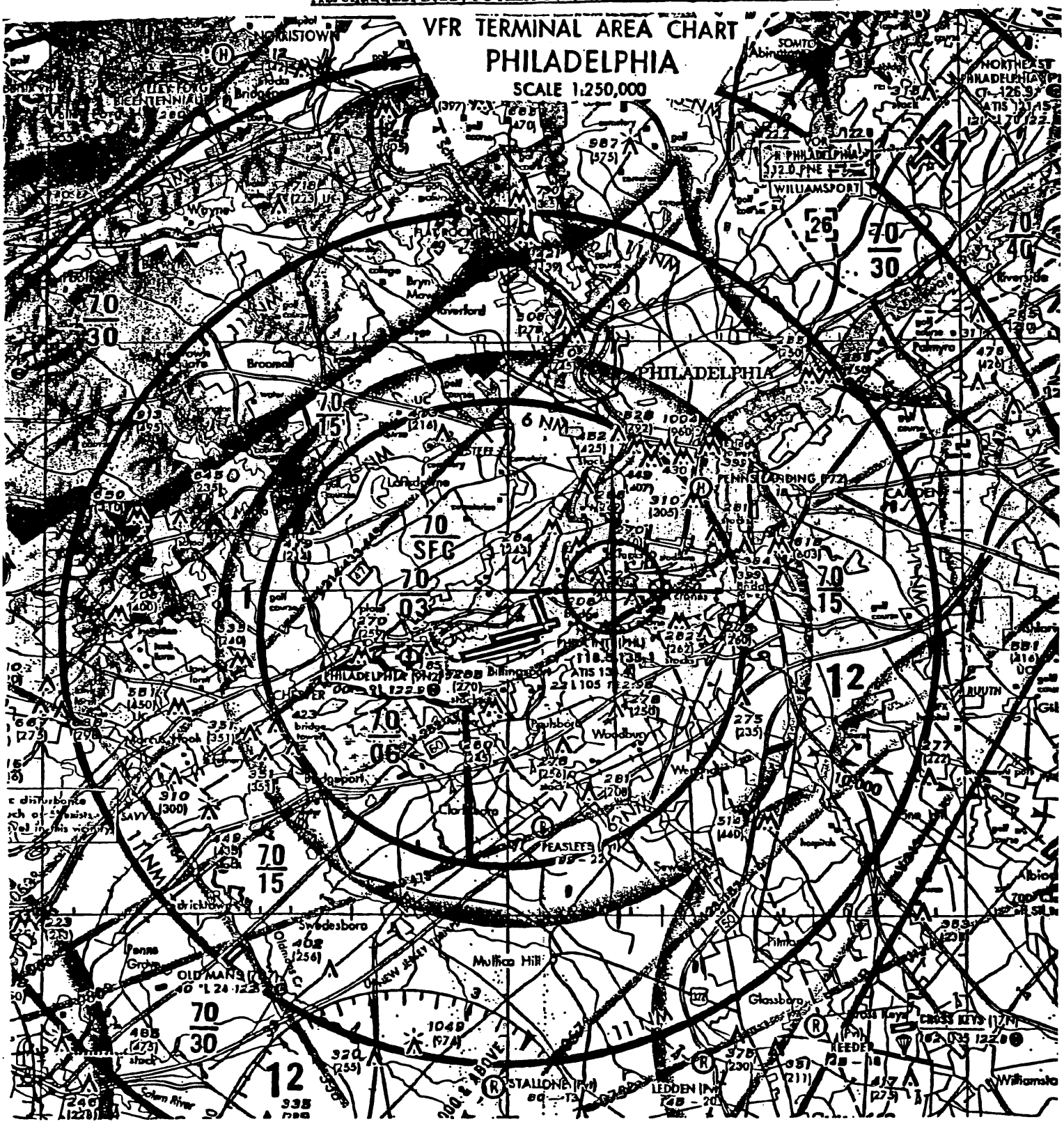
The structure would exceed obstruction standards and shall be Obstruction Marked and Lighted in accordance with FAA AC 70/7460-1J, Chapters 3, 4, 5 and 13, Red lights and paint.

AERONAUTICAL STUDY 98-AEA-3033-OE, PHILADELPHIA, PA



Also available on our website: HTTP://WWW.FAA.GOV/REGION/AEA/ATSOEAAA/FRAMEDOC.HTM

Aeronautical Study 98-AEA-3033-OE, Philadelphia, Pennsylvania



Also available on our website,
HTTP://WWW.FAA.GOV/REGION/AEA/ATSOEAAA/FRAMEDOC.HTM

Airspace Branch

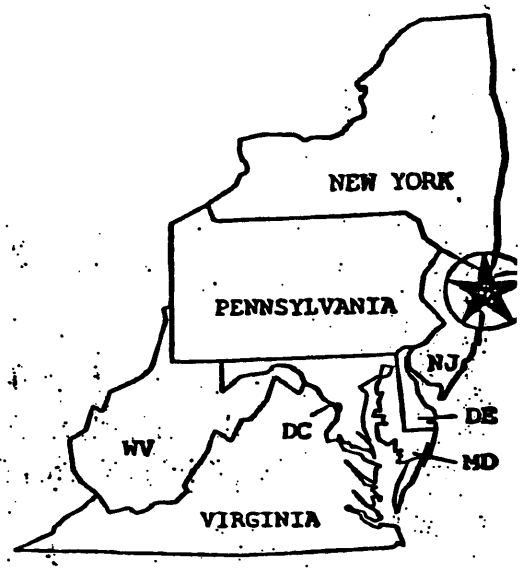
Carl Zimmermann, Branch Manager (x-2616)
Robert P. Alexander, O/E Specialist NY, NJ, WV (x-4546)
Bill Merritt, O/E-Airspace Specialist, DC, DE, MD, PA (x-2560)
Frank Jordan, O/E-Airspace Specialist, VA (x-4521)
Teresita Patterson, Airspace Tech, VA, DC, DE, MD (x-2610)
Angelique Lastrad, Airspace Tech, NJ, PA (x-2611)
Kathleen Cunningham, Airspace Tech, NY, WV (x-2614)
Sue Cohen, Environmental Specialist (x-4522)

Dial 718-553+extension for person listed.

Federal Aviation Administration
Eastern Region Air Traffic Division

Airspace Branch, AEA-520

Fitzgerald Federal Building # 111
J.F. Kennedy Int'l Airport
Jamaica, NY 11430



AIRSPACE BRANCH WEBSITE

HTTP://WWW.FAA.GOV/REGION/AEA/ATSOEAAA/FRAMEDOC.HTM

E-Mail Bill.Merritt@faa.gov

APPENDIX 2. OBSTACLE ACCURACY STANDARDS, CODES AND SOURCES

HORIZONTAL

Code	Tolerance	
1	+20'	(6 m)
2	+50'	(15 m)
3	+100'	(30 m)
4	+250'	(75 m)
5	+500'	(150 m)
6	+1000'	(300 m)
7	+1/2 NM	(900 m)
8	+1 NM	(1800 m)
9	Unknown	

VERTICAL

Code	Tolerance	
A	+3'	(1
B	+10'	(3
C	+20'	(6
D	+50'	(15
E	+125' (ARMY 100')	(38
F	+250'	(75
G	+500'	(150
H	+1000'	(300
I	Unknown	

Federal Aviation Administration
EASTERN REGION, AEA-520
1 AVIATION PLAZA
JAMAICA, N.Y. 11434-4809

AERONAUTICAL STUDY
No: 98-AEA-3033-OE

ISSUED DATE: 12/04/00

DAVID L. KRAUSE
NORTHERN DIV,NAVAL DIVISION ENG CMD
10 INDUSTRIAL HIGHWAY, MSC # 82
LESTER, PA 19113-2090

** EXTENSION **

A Determination was issued by the Federal Aviation Administration (FAA) concerning:

Description: BRIDGE - LIFT BRIDGE

Location: PHILADELPHIA PA
Latitude: 39-53-36.40 NAD 83
Longitude: 075-11-28.64
Heights: 212 feet above ground level (AGL)
226 feet above mean sea level (AMSL)

In response to your request for an extension of the effective period of the determination, the FAA has reviewed the aeronautical study in light of current aeronautical operations in the area of the structure and finds that no significant aeronautical changes have occurred which would alter the determination issued for this structure.

Accordingly, pursuant to the authority delegated me, the effective period of the determination issued under the above cited aeronautical study number is hereby extended and will expire on 07/13/02 unless extended, revised, or terminated by this office.

This extension is subject to review if an interested party files a petition on or before 01/03/01. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and should be submitted in triplicate to the Manager, AIRSPACE & RULES DIVISION, ATA-400 Federal Aviation Administration, Washington, D.C. 20591.

This extension becomes final on 01/13/01 unless a petition is timely filed. If so, this extension will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review.

This extension issued in accordance with 49 U.S.C., Section 44718 and, if applicable, Title 14 of the Code of Federal Regulations, part 77, concerns the effect of the structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

NOTE: All conditions of the original aeronautical study still apply unless expressly indicated in this correspondence.

A copy of this extension will be forwarded to the Federal Communications Commission if the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at 718-553-2616. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 98-AEA-3033-OE.

MIKE SAMMARTINO
Manager, AIRSPACE BRANCH

(EXT)

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01356

STORM WATER POLLUTION PREVENTION MEASURES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4439	(1997) Standard Terminology for Geosynthetics
ASTM D 4491	(1999) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1996) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999) Determining Apparent Opening Size of a Geotextile
ASTM D 4873	(1995) Identification, Storage, and Handling of Geosynthetic Rolls

1.2 GENERAL

The Contractor shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01354 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit attached to that Section.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-13 Certificates

Mill Certificate or Affidavit; FIO

1.4 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the Contractor are described below.

1.4.1 Stabilization Practices

The stabilization practices to be implemented shall include geotextiles, etc. On his daily CQC Report, the Contractor shall record the dates when the major grading activities occur, e.g., clearing and grubbing, and excavation, when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, stabilization practices shall be initiated as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.4.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather, stabilization practices shall be initiated as soon as practicable after conditions become suitable.

1.4.1.2 No Activity for Less Than 21 Days

Where construction activity will resume on a portion of the site within 21 days from when activities ceased (e.g., the total time period that construction activity is temporarily ceased is less than 21 days), then stabilization practices do not have to be initiated on that portion of the site by the fourteenth day after construction activity temporarily ceased.

1.4.2 Structural Practices

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices. Location and details of installation and construction are shown on the drawings.

1.4.2.1 Silt Fences

The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the Contracting Officer.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments

resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)		30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

The Contractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.1.4 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Contracting Officer.

3.2 MAINTENANCE

The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

3.2.1 Silt Fence Maintenance

Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade.

3.3 INSPECTIONS

3.3.1 General

The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

3.3.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.3.3 Inspection Reports

For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.1 SUMMARY

The work specified in this section consists of construction photographs showing the progress of work during the contract period.

1.2 REFERENCES (Not Applicable)

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals not having a "GA" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Photography Plan; GA.

A plan detailing the Contractor's approach to fulfilling the requirements of this section, including qualifications of the proposed photographer.

SD-18 Records

Photographs; GA.

Photographs shall be submitted periodically in accordance with the requirements of this section.

1.4 QUALITY ASSURANCE

All photography shall be performed by a qualified, established commercial photographer.

PART 2 PRODUCTS

2.1 PRINTS AND DIGITAL PHOTOS

Prints shall be 5" x 7", color, on single weight paper with smooth surface, glossy finish. Identification information on back of each print shall include: name and location of project, item/action being photographed, General Contractor, orientation of view, date and time of exposure, and name and address of photographer. A 3.5 inch, double-sided, high-density floppy disk containing the same photographs in digital .jpg format with a minimum resolution of 1 million pixels shall be provided with each set of prints.

PART 3 EXECUTION

3.1 PHOTOGRAPHY

A total of 48 photographs shall be taken during the contract period showing the progress of work at the following times:

a. Prior to commencement of work the Contractor shall photograph the existing conditions of the work site.

b. During the progress of the work at the start, during the progress, and at the completion of each definable feature of work.

c. After completion of the work the Contractor shall photograph the site from the same locations used to determine the existing conditions prior to construction.

d. Special events throughout the contract period as directed by the Contracting Officer's Representative.

The photography shall be spaced out, as appropriate, over each activity's duration during actual work to provide "action shot" views representative of the entire project work.

3.2 PHOTOGRAPH SUBMITTAL

The prints and their negatives, with appropriate identification and other information as directed, and digital photo floppy disks shall be furnished to the Government within 15 days of when they are taken throughout the contract period. Two sets of prints with accompanying floppy disks and negatives shall be submitted to the Philadelphia District Office at the following address:

U.S. Army Corps of Engineers
Philadelphia District
Attn: Doug Lucas (CENAP-EC-CQ)
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3391

-- End of Section --

SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1999c) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(1995b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-09 Reports

Quality Control Plan; GA

Submit a narrative of the proposed Quality Control Plan

Daily CQC Reports; GA

Submit the daily CQC Reports on the following business day.

Preparatory, Initial, and Final Phase Meeting Minutes; GA

Submit draft and final minutes for each of the three indicated meetings

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. The project superintendent in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.

3.2 QUALITY CONTROL PLAN

The Contractor shall furnish for review by the Government, not later than 20 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 60 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.1 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing

submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Laboratory facilities will be approved by the Contracting Officer.

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and

the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, or a graduate of construction management, with a minimum of 5 years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, mechanical, civil, structural, environmental, architectural, submittals clerk. These individuals shall be directly employed by the prime Contractor and may not be employed by a supplier or sub-contractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

	Area	Qualifications
a.	Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience

Experience Matrix

	Area	Qualifications
b.	Mechanical	Graduate Mechanical Engineer with 2 yrs experience
c.	Electrical	Graduate Electrical Engineer with 2 yrs related experience or person with 5 yrs related experience
d.	Structural	Graduate Structural Engineer with 2 yrs experience
e.	Architectural	Graduate Architect with 2 yrs experience or person with 5 yrs related experience
f.	Environmental	Graduate Environmental Engineer with 3 yrs experience
g.	Submittals	Submittal Clerk with 1 yr experience
h.	Concrete, Pavements and Soils	Materials Technician with 2 yrs experience for the appropriate area

3.4.4 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall

include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 72 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of $100.00 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the laboratory provided by the Contractor.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the Special Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall

conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 12 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Site Plan

The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

1.1.2 Identification of Employees

The Contractor shall be responsible for furnishing to each employee, and for requiring each employee engaged on the work to display, identification as approved and directed by the Contracting Officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.1.3 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the military installation.

1.2 AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1 Payment for Utility Services

The Government will not make any required utilities available to the Contractor from existing outlets and supplies. The Contractor will make all inquiries for utility service from the utilities. The amount of each utility service consumed shall be paid for by the Contractor at prevailing rates charged by the utilities.

1.2.2 Meters and Temporary Connections

The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain necessary temporary connections, distribution lines, and meter bases required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall not make the final electrical connection.

1.2.3 Advance Deposit

An advance deposit for utilities shall be paid by the Contractor as required by each utility.

1.2.4 Sanitation

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.2.5 Telephone

The Contractor shall make arrangements and pay all costs for telephone facilities desired.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "GA" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-09 Reports

Temporary Facilities Layout and Work Plan; GA

Submit a narrative of the proposed Temporary Facilities Layout and Work Plan.

1.4 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.4.1 Bulletin Board

Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

1.4.2 Project and Safety Signs

The requirements for the signs, their content, and location shall be as shown on the drawings. The signs shall be erected within 15 days after receipt of the notice to proceed. The data required by the safety sign shall be corrected daily, with light colored metallic or non-metallic numerals. Upon completion of the project, the signs shall be removed from the site.

1.5 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary

relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.5.1 Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

1.5.2 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.6 CONTRACTOR'S TEMPORARY FACILITIES

1.6.1 Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.6.2 Storage Area

Area within the project limits is available for use by the Contractor, for work, storage of equipment, materials and trailers during the life of this contract. Contractor work and storage areas will be located adjacent to the roadway-railroad bridge in the vicinity of the north and south abutments, as shown on the drawings. The Contractor shall confine his storage areas to the limits as designated or approved by the Contracting Officer and shall be responsible for the security of the areas.

The Contractor shall construct a temporary 6 foot high chain link fence around trailers and materials. The fence shall include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the military boundaries. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. Mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area at the end of each work day.

1.6.3 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but shall be within the military boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor shall be responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

1.6.4 Appearance of Trailers

Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on the military property.

1.6.5 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

1.6.6 New Building

In the event a new building is constructed for the temporary project field office, it shall be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. It shall be equipped with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. It shall be provided with a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building shall be waterproof, shall be supplied with heater, shall have a minimum of two

doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities shall be furnished. The windows and doors shall be screened and the doors provided with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door. Door hinge pins shall be non-removable. The windows shall be arranged to open and to be securely fastened from the inside. Glass panels in windows shall be protected by bars or heavy mesh screens to prevent easy access to the building through these panels. In warm weather, air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F, shall be furnished. Any new building erected for a temporary field office shall be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work shall become the property of the Contractor and shall be removed from the site. All charges for telephone service for the temporary field office shall be borne by the Contractor, including long distance charges up to a maximum of $75.00 per month.

1.6.7 Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

1.7 GOVERNMENT FIELD OFFICE

1.7.1 Resident Engineer's Office

The Contractor shall provide the Government Resident Engineer with an office, approximately 1000 square feet in floor area, located where directed and providing space heat, electric light and power, and toilet facilities consisting of one lavatory and one water closet complete with connections to water and sewer mains. A mail slot in the door or a lockable mail box mounted on the surface of the door shall be provided. At completion of the project, the office shall remain the property of the Contractor and shall be removed from the site. Utilities shall be connected and disconnected in accordance with local codes and to the satisfaction of the Contracting Officer.

1.7.2 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. The trailer shall be securely anchored to the ground at all four corners to guard against movement during high winds.

1.8 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. The devices shall be made available for use by Government personnel.

1.9 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.10 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

1.11 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01570

TRAFFIC CONTROL

PART 1 GENERAL

1.1 SCOPE

1.1.1 Maintenance and Protection of Traffic

1.1.1.1 Final Traffic Plan

The work covered by this Section consists of the temporary maintenance and protection of the traveling public approaching, adjacent to and leaving the construction work area for the duration of the contract. The final traffic patterns that will be established after the project has been completed.

1.1.1.2 Construction Traffic

The Contractor's traffic on roads selected for hauling material to and from the site and the remote Lift Span work site shall interfere as little as possible with public traffic. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations at no additional cost to the Government.

1.1.1.3 Temporary Traffic Control

The Contractor shall provide, maintain and remove temporary traffic control devices, as required, to inform the travelling public of the rehabilitation construction work and to restrict traffic access until permanent traffic control devices are installed when the project is completed.

1.1.2 Traffic Control Devices

The work includes the installation of all traffic control devices that are required to remain in effect after this contract is completed including the roadway signs, pavement markings, guide rail, guide rail end sections, chain link fencing and other safety devices as required.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION (PennDOT)

PennDOT Publication 203 (1994) Work Zone Traffic Control

PennDOT Publication 408 (2000) Standard Specifications

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Traffic Control Devices Plan; GA.

Drawings shall include detailed positioning of temporary and permanent concrete barriers, guide rail, guide rail end sections, and fencing, indicating materials, shape, finish and method of anchoring.

Concrete Barriers; GA

Detailed plans of the temporary and permanent concrete barriers shall be submitted to the Contracting Officer for review and concurrence before construction proceeds. Drawing shall provide dimensioning of the concrete barriers along with details of reinforcing bars, lifting hardware, and connecting devices.

SD-08 Statements

Traffic Control Plan; FIO.

The Contractor shall develop and submit a Traffic Control Plan to the Philadelphia Authority for Industrial Development (PAID). The plan shall include, but not be limited to: the lane closure schedule; proposed signage; alternate routes; sign placement locations; cone placement and spacing; standards being used, POC's notified, including 911 centers; POC method of contacting Contractor; procedures for giving emergency vehicles the right-of-way; device (dedicated telephone number or travel advisory radio) to provide continuous travel advisory information to the public; qualifications of traffic control manager; and flagger certifications. Two copies of the approved Traffic Control Plan shall be submitted to the Contracting Officer prior to the start of work.

SD-09 Reports

Daily Condition Log; GA.

Record of daily condition of signs, warning lights, barricades and other traffic control devices.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Traffic Control Devices

Traffic control devices (signs, lights, reflectors, barricades) shall conform to the requirements of the PennDOT Publication 203 for the safety of the travelling public and protection of the work area. The Contractor shall be responsible for the maintenance of all traffic control and warning signs and devices in a high order of legibility, cleanliness and visibility for the duration of the project.

2.1.2 Concrete Barrier

Concrete barrier shall be of the typical 24 inch wide at the base and a minimum of 32 inch high, double-faced Jersey shaped concrete barrier. Permanent concrete barriers may be previously used concrete barriers that are in serviceable condition. The Contracting Officer will determine the serviceability of each permanent barrier.

2.1.3 Guide Rail and End Sections

See Section 620 of the PennDOT Publication 408.

2.1.4 Pavement Markings

See Sections 961, 962, and 963 of the PennDOT Publication 408.

2.1.5 Roadway Signs

2.1.5.1 Temporary Signs

Traffic control signs shall conform to the requirements of the PennDOT Publication 203. The special sign indicating "Vertical Lift Bridge Closed" shall be prepared on sheet aluminum that is attached to exterior grade plywood.

2.1.5.2 Permanent Signs

Traffic control signs shall conform to the requirements of the PennDOT Publication 408. The special sign indicating "Slippery When Wet" shall be installed on each approach to the bridge at a location that is close to the location of the existing "Slippery When Wet" signs..

2.1.6 Sign Posts

Signpost shall be either galvanized tubular "telescoping" signpost material or 4" x 4" treated lumber.

2.1.7 Sign Mounting Hardware

Stainless steel (Type 304) bolts, nuts and washers shall be used to fasten the signs to the sign posts.

PART 3 EXECUTION

3.1 GENERAL

During construction, the bridge is permanently closed to all traffic. The Contractor shall provide access to maintain local traffic on either side of the channel. Through traffic shall be diverted to roadways that travel around the Reserve Basin. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer and with the approval of the PAID. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of temporary barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the PennDOT Publication 408 and PennDOT Publication 203. The traveling public shall be protected from damage to person and property.

3.2 PERMITS

The Contractor shall obtain all necessary permits from the Philadelphia Naval Business Center. The contract plans contain a "Traffic Control" drawing, indicating a scheme for lane closure and traffic management (traffic control plan) on the bridge approach roadways. Prior to beginning work, the Contractor shall submit to PAID detailed plans for traffic control, which may be similar to the drawings included in the contract plans or shall be amplified, as required by the Traffic Control Manager. After obtaining approval of its traffic control plan, the Contractor shall provide copies of the approved plan to the Contracting Officer, as specified in paragraph 1.3, SUBMITTALS.

3.3 SPEED LIMIT

The entire construction work zone shall be posted by the Contractor for a 25 mph speed limit for the duration of temporary traffic operation. The Contractor shall notify the Philadelphia Naval Business Center at least two weeks prior to implementation of temporary operation and at the end of construction when the permanent traffic patterns will be set into operation.

3.4 GUIDE RAIL AND END SECTIONS

The guard rail shall be erected in accordance with Section 620 of the PennDOT Publication 408. The guide rail and end sections shall be erected at the locations shown on the contract drawings.

3.5 PAVEMENT MARKINGS

3.5.1 Existing Pavement Markings

Existing pavement markings shall be eradicated at locations where the existing pavement markings would interfere with the temporary and final pavement markings.

3.5.2 Final Pavement Markings

The pavement markings shall be placed in accordance with Sections 961 and 962 of the PennDOT Publication 408. The pavement markings shall be placed at the locations shown on the contract drawings.

3.6 ERECTION OF SIGNS

Roadway signs shall be mounted on posts that are placed in holes that are a minimum of three feet deep into the existing ground. The ground shall be tamped around the sign posts. The signs shall be connected to the sign posts by means of stainless steel hardware. One post shall be used for signs less than 36 inches wide and with an area of less than 10 square feet. All other signs shall be mounted on two posts, except for the special "Vertical Lift Bridge Closed" signs which shall be mounted on three posts. The roadway signs shall be erected at the locations shown on the contract drawings (DETOUR PLAN) prior to closing the bridge to all traffic.

3.7 PERMANENT CONCRETE BARRIER

Permanent concrete barriers shall be erected at the locations shown on the contract drawings, by placing the concrete barriers on the pavement. If the concrete barriers are to be placed off the pavement, a 24inch wide by

12 inch deep trench shall be cut into the barrier location. The trench shall be filled with compacted base, which shall be compacted to a firm density by small mechanical tamper. The Contracting Officer will determine if the compacted base is firm.

3.8 HAZARDS

The Contractor shall erect the necessary signs, lights, reflectors, barricades, guard rail or other traffic safety items in a manner conducive to a high order of warning and protection of the travelling public and the Contractor's work force. The erection and alignment of the guard rail in the crossover transitions shall follow smooth curves to increase driver perception and to minimize the incidents of collision with protective devices.

3.9 FINAL CONDITION

At the end of the bridge rehabilitation project, the Contractor shall leave the bridge deck and the approaches striped for thee traffic lanes.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01576

PROTECTION OF MARINE AND AERIAL NAVIGATION

PART 1 GENERAL

1.1 SCOPE

The work covered by this Section consists of the protection of all vessels navigating the waterway pass the bridge into and out of the Reserve Basin.

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Equipment List; GA.

A list of equipment items to be used in the work, including brand names, model, capacity, performance characteristics, quantities and other pertinent information.

SD-08 Statements

Sweeping Procedure; GA.

The procedure for sweeping the channel before the lift span "float-out", tower demolitions, and fender removals and after the fender constructions,tower erections, and lift span "float-in".

SD-09 Reports

Notification of Work Schedule; FIO.

Copies of all notifications that were sent to agencies and individuals concerning work schedule. Along with these notifications include a list of the persons who will be notified.

Sweepings and Soundings Report; GA.

A log of the initial pre-construction channel sweeping and the final post-construction and post-cleanup channel sweeping shall be submitted. This report shall consist of a plan for both channel sweeping indicating the location of each set of channel sweepings. The bottom of the channel elevations shall be indicated at a minimum of ten foot spacings.

Minutes of Coordination Meetings; FIO.

The minutes of all coordination meetings with Federal, State, local and navigation associations.

Notification Letters; FIO.

Copies of all notifications sent to agencies and individuals concerning channel closures for "float-out and "float-in" operations.

Requests for Channel Closure; FIO.

Copies of requests for channel closures and list of persons of contact.

1.3 MARINE PILOTS

All major marine navigational vessels travelling through the Delaware River into and out of the Reserve Basin shall be operated by a professional marine pilot that is a member of the Pilots Association for the Bay and River Delaware.

1.4 POINTS OF CONTACT

1.4.1 U.S. Army Corps of Engineers

U.S. Army Corps of Engineers
Philadelphia District
ATTN: CENAP-EC-CQ (Lucas)
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

1.4.2 U.S. Coast Guard

All work affecting navigation shall be coordinated with Coast Guard Headquarters.

U.S. Coast Guard Headquarters
2100 Second Street, S.W.
Washington, DC 20593-0001

1.4.2.1 Captain of the Port - Philadelphia

Aids to Navigation Team
1 Washington Avenue
Philadelphia, Pennsylvania 19147
215-271-4913 or 215-271-4800

1.4.3 U.S. Navy

Rich Wood
U.S. Navy
4701 S. 16th Street
Philadelphia, PA 19112
215-897-6747

1.4.4 Marine Pilots

McAlister Tug Boats
Philadelphia, Pennsylvania 19107
215-922-7165

1.5 EMERGENCY COMMUNICATIONS

1.5.1 City of Philadelphia Emergency Communications

Ms. Leslie K. Knott
Philadelphia Industrial Development Corporation
Philadelphia Naval Business Center
1413 Langley Avenue
Philadelphia, PA 19112
215-218-2844 (phone)
215-551-1014 (fax)

1.5.2 Federal Aviation Administration

Federal Aviation Administration
Eastern Region Air Traffic Division
Airspace Branch, AEA-520
One Aviation Plaza
Jamaica, NY 11434-4809

1.6 CONSTRUCTION OPERATIONAL RESTRICTIONS

a. The lift span is normally in the down position. The span is raised for all marine traffic.

b. Railroad and roadway traffic across the Bridge will be suspended during the work of this contract.

c. All work shall be scheduled and performed in a manner to ensure that no restriction will be placed on the normal flow of marine navigation.

1.7 CONTRACTOR USE OF RESERVE BASIN CHANNEL

All activities of the Contractor and his employees, while on the Reserve Basin Channel, shall be conducted in strict accordance with all channel regulations. The Contractor shall acquaint himself with all regulations.

PART 2 PRODUCTS

The channel warning signs shall be a minimum of 4 feet by 8 feet. The signs shall indicate overhead bridge construction 500 feet ahead. The signs shall be constructed of exterior grade, 3/4-inch thick plywood.

PART 3 EXECUTION

3.1 REQUIREMENTS

The following requirements shall be adhered to when there is work over the navigational channel.

3.1.1 Passing Marine Traffic

All work, including flame-cutting, welding, and similar spark-producing operations, shall be suspended whenever a marine vessel, regardless of size, is approaching the bridge and is within 500 feet of the bridge and shall remain suspended until the entire marine vessel has completely passed away from the bridge area.

3.1.2 Coordination

Coordination shall be made with the U. S. Army Corps of Engineers'

concerning notification of traffic passing through the channel. The Contractor shall notify the dispatcher whenever workers are in a position to be affected by marine traffic. The dispatcher will notify the Contractor's observer that vessels are approaching and from which direction.

3.1.3 Signs

Two channel warning signs shall be securely erected, one on each channel bank approaching the Reserve Basin at 500 feet from the centerline of the bridge.

The signs shall be painted with two coats of exterior grade white enamel paint. The lettering shall be painted with black exterior grade paint. The letters shall be a minimum of 8 inches high, using uppercase block lettering.

3.1.4 Observer

Whenever construction is in operation over the channel, one observer shall be positioned to watch for oncoming marine vessels from either direction. An audible signal shall be sounded for all work over the channel to cease when a marine vessel is 500 feet from the bridge. An all clear signal shall be sounded when the vessel has passed the construction area and work may resume. The observer shall have a radio that can be used to communicate with the marine vessel.

3.1.5 Temporary Bridge Operation

The Contractor shall be prepared to assume responsibility to operate and maintain the lift span in good operational condition not more than 30 days after he is given the Notice to Proceed. The Contractor shall be relieved of that responsibility upon acceptance of the completed bridge. Upon de-energizing the bridge in preparation for "float-out", the lift span shall be floated out as soon as possible in order not to obstruct the navigation channel longer than the permitted duration. Whenever the lift span is operational, the Contractor is responsible for keeping the lift span in a balanced state and operational to allow the Navy unhindered access in and out of the Reserve Basin, as required. For normal operation, it shall be the Contractor's responsibility to arrange with the Navy for the advance notice given by the Navy for a bridge opening. In general, the Contractor shall be prepared to open the bridge given a 24-hour advance notice. When the Navy requests an emergency opening, the Contractor shall be prepared to open the bridge as soon as possible.

The current operators of the lift span are Navy employees assigned to the Public Works Center Detachment. It is unlikely that they will be available to assist the Contractor with the bridge operation after the Contractor assumes that responsibility. The Contractor shall provide his own qualified bridge operator for the duration of construction.

3.2 "FLOAT-OUT & 'FLOAT-IN" PHASE

The lift span shall be "floated-out" to clear the channel at the work site.

3.2.1 Demolition of the Towers and Tower Spans

The vertical lift towers and tower spans shall be dismantled in small pieces at the Contractor's option, as described in Section 02220 DEMOLITION. The work of removing the towers and tower spans shall commence

soon after the "float-out".

3.2.2 Notifications of Work Schedule

3.2.2.1 Action Affecting Navigation

The Director, U. S. Coast Guard District; U. S. Coast Guard Captain of the Port; the District Commander, U. S. Army Corps of Engineers District,; and the U.S. Navy shall be given sufficient notification in advance of any action that may impede navigation. Any revision of work schedule which impacts the 2 week channel closure for "float-out" and one week closure for "float-in" will be reviewed by the Contracting Officer to determine an appropriate reschedule date. Notification shall be updated by telephone, if necessary, to assure that navigation interests are aware of impending events that may affect the movement of channel traffic. These notifications shall be sent to the addressees listed in Paragraph 1.5 a minimum of 30 days prior to the time selected for channel closure. Failure to complete this phase within the channel closure time specified above will result in damages as specified in Section 00810 SCR-9, paragraph b.

3.2.2.2 Requests for Channel Closure

The Contractor shall provide the details and notify the Contracting Officer and the U.S. Coast Guard Headquarters in writing, not less than thirty (30) days before the planned date for suspension of marine traffic for lift span "float-in" and "float-out." Fifteen (15) days prior to the scheduled channel closure, the Contractor shall confirm in writing with the project engineer and the U.S. Coast Guard Headquarters of the proposed schedule.

3.2.2.3 Tug Boat Contract

The McAllister Tug Boat Company shall be informed of all meetings and critical dates concerning closings of the channel. The McAllister Tug Boat Company has a contract with the U.S. Navy to provide Tug Boat Service as required. There is a representative of McAllister Tug Boat Company located in the Philadelphia Naval Business Center. Their addresses are listed in Paragraph 1.5.

3.2.2.4 City of Philadelphia Emergency Communications

The Contractor shall notify the City of Philadelphia Emergency Communication Office that the Vertical Lift Bridge will be closed for a period of time for rehabilitation.

3.3 U. S. COAST GUARD REQUIREMENTS FOR DEMOLITION

The Contractor shall adhere to the following requirements in order to conform to the U. S.Coast Guard Permit for the rehabilitation of the Vertical Lift Bridge over the Reserve Basin Channel.

3.3.1 Free Navigation

All work shall be so conducted that the free navigation of the waterway shall not be unreasonably interfered with and the existing navigable depths are not impaired, except when a closure of the channel is permitted.

3.3.2 Precautions

If bridge deck concrete, excess steel members and similar materials are

separately removed from the lift span and adjacent towers, precautions such as shielding and/or positioning a "pickup" barge and crane near the work site shall be taken to ensure that nothing falls into the channel.

3.3.3 Obstructions

3.3.3.1 Reporting of Obstructions

Any obstruction that may constitute a hazard to navigation accidentally dropped into the channel shall be immediately reported to the Captain of the Port (COTP) of the Coast Guard in Philadelphia, and promptly and completely removed to the satisfaction of the U. S. Army Corps of Engineers. Material that falls into the channel shall be removed within 2 hours

3.3.3.2 Obstruction Buoys

If any obstructions to navigation are placed or accidentally dropped into the channel, such obstructions shall be marked by one or more lighted buoys. Such buoys shall be horizontally striped orange and white, with the top stripe orange; they shall be aligned cross-channel at intervals of about 35 feet or as close as practicable to the obstruction in the channel. Each such buoy shall be lighted at night with a quick-flashing white light (60 flashes per minute). If steel is extending above water, orange flags by day and quick-flashing white lights by night may be displayed on the steel in lieu of any buoy.

3.3.4 Navigational Lighting

T he present marine and aerial navigational lighting shall be maintained as described in the Demolition Plan and shall be kept in service until each tower and fender is removed.The lighting shall be reinstalled during the construction of each new tower and fender.

3.3.4.1 Removed Aerial Lighting

The Contractor shall inform the Federal Aviation Administration immediately prior to or in advance of demolition of the top of each tower that the aerial navigation lighting is temporarily out of service and that the lift span are no longer visible.

3.3.4.2 New Aerial Lighting

The Contractor shall inform the Federal Aviation Administration immediately prior to or in advance of construction of the top of each tower that the aerial navigation lighting is permanently in service and at the time that the lift span is now visible.

3.3.5 Equipment Lighting

Barges and other craft engaged in this demolition and construction effort shall display such lights and signals as required by the "Inland Navigational Rules of 1980".

3.3.6 Floating Plant

Floating plant shall may be moored in the channel, except when actually engaged in demolition and construction activities. Floating plant shall only be moored on the land side of the fenders. The minimum channel width

is 200 feet. The Contractor shall not encroach upon this width without written permission from the U.S. Coast Guard. The position of the barge shall be approved by the Contracting Officer's representative. The "parked" barge shall be lighted at night and in the daylight so that it is visible for a minimum of 500 feet in either direction along the channel. The Pilot Association shall also be notified of the presence of such floating plant.

3.3.7 Explosives

Explosives are not permitted on this project.

3.4 CHANNEL SWEEPING

Immediately upon completion of the removal of the towers, a thorough sweeping of the area shall be made. The Contractor shall submit a survey plan of the channel which shall be approved by the Contracting Officer, and the sweeping operation shall be performed while an authorized representative of that the Contracting Officer is present to observe results. Mutually agreed upon tentative dates for each sweep shall be made with the U. S. Army Corps of Engineers prior to removing the lift span. The sweep of the channel shall be performed as soon as possible after the completion of the removal operation.

3.4.1 Sweeping/Multi-beam/Side Scan Sonar and Magnetometer

The channel shall be surveyed utilizing the above listed methods. The multi-beam, magnetometer and side scan coverages shall consist of a minimum of 200% overlap. The Contractor shall not generate side scan data from the multi-beam data. A separate scan unit shall be towed at the appropriate depth to meet the requirements. Other methods may be proposed by the Contractor for approval by the Contracting Officer's representative.

3.4.2 Soundings

Soundings shall be generated from the multi-beam data, and provided in the appropriate format.

3.4.3 Following Removal Operations

After the towers have been removed, the full-width of the channel shall again be surveyed, as stated above. The Contractor shall have on site the capabilities to collect, edit, post process and formulate all required data into reports for the initial and post removal survey efforts to be submitted for approval.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01580

PROJECT AND SAFETY SIGNS

PART 1 GENERAL

1.1 SUMMARY

This section covers the requirements for project identification and safety performance signs at the project site.

1.2 REFERENCES

The following publication forms a part of this specification to the extent referenced. The publication is referred to in the text by basic designation only.

CORPS OF ENGINEERS PUBLICATION (COE)

COE EP 310-1-6	(Rev a and b) Sign Standards Manual with Appendices

PART 2 PRODUCTS

2.1 FABRICATION

All project identification and safety performance signs shall be fabricated with the materials indicated on the sheets attached to this section of the specifications. Layout of signs including coloring, lettering, and insignias shall be as shown on the attached sheets. All letter and word spacing shall be in accordance with Appendix D of COE EP 310-1-6.

PART 3 EXECUTION

3.1 INSTALLATION

The Contractor shall provide a project identification sign and safety performance sign at the locations directed by the Contracting Officer. The signs shall be installed in accordance with mounting details shown on the sheet attached to this section of the specification. The signs shall be installed within 15 days of the date of Notice to Proceed and shall be maintained in good condition throughout the contract period. The information contained on the face of the safety performance sign regarding the Contractor's safety record shall be updated on a daily basis throughout the contract period. Upon completion of the contract work, the Contractor shall remove the signs from the work site and backfill all resulting holes.

-- End of Section --

-

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

Below are two samples of the construction project identification sign showing how this panel is adaptable for use to identify either military (top) or civil works projects (bottom). The graphic format for this 4'x 6' sign panel follows the legend guidelines and layout as specified below. The large 4'x 4' section of the panel on the right is to be white with black legend. The 2'x 4' section of the sign on the left with the full Corps Signature (reverse version) is to be screen printed Communications Red on the white background The designation of a sponsor in the area indicated is optional with Military or Civil Works construction signs. Signs may list one sponsoring entity. If agreement on a sponsor designation cannot be achieved, the area should be left blank.

This sign is to be placed with the Safety Performance sign shown on the following page. Mounting and fabrication details are provided on page 16.4.

Special applications or situations not covered in these guidelines should be referred to the District/Division Sign Program Manager.

Legend Group 1: One- to two-line description of Corps relationship to project.
Color: White
Typeface: 1.25″ Helvetica Regular
Maximum line length: 19″

Legend Group 2: Division or District Name (optional). Placed below 10.5″ reverse Signature (6″ Castle).
Color: White
Typeface: 1.25″ Helvetica Regular

Legend Group 2a: One- to three-line identification of Military or Civil Works sponsor (optional). Place below Corps Signature to cross-align with Group 5a-b.
Color: White
Typeface: 1.25" Helvetica Regular
Maximum line length: 19"

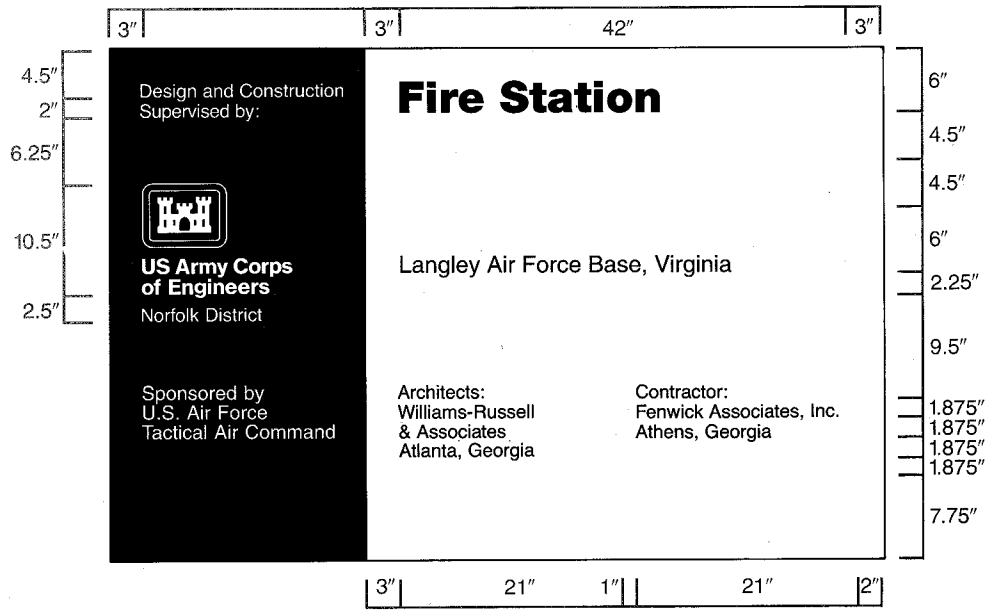
Legend Group 3: One- to three-line project title legend describes the work being done under this contract.
Color: Black
Typeface: 3″ Helvetica Bold
Maximum line length: 42″

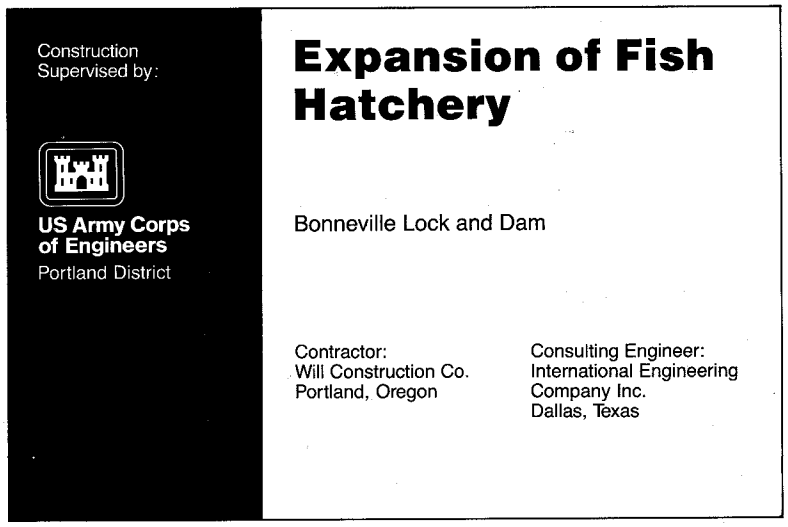
Legend Group 4: One- to two-line identification of project or facility (civil works) or name of sponsoring department (military).
Color: Black
Typeface: 1.5″ Helvetica Regular
Maximum line length: 42″

Cross-align the first line of Legend Group 4 with the first line of the Corps Signature (US Army Corps) as shown.

Legend Groups 5a-b: One- to five-line identification of prime contractors including: type (architect, general contractor, etc.), corporate or firm name, city, state. Use of Legend Group 5 is optional.
Color: Black
Typeface: 1.25″ Helvetica Regular
Maximum line length: 21″

All typography is flush left and rag right, upper and lower case with initial capitals only as shown. Letter- and word-spacing to follow Corps standards as specified in Appendix D.





Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-01	various	4′x 6′	4″x 4″	HDO-3	48″	WH-RD/BK

Each contractor's safety record is to be posted on Corps managed or supervised construction projects and mounted with the construction project identification sign specified on page 16.2.

The graphic format, color, size and type-faces used on the sign are to be reproduced exactly as specified below.

The title with First Aid logo in the top section of the sign, and the performance record captions are standard for all signs of this type. Legend groups 2 and 3 below identify the project and the contractor and are to be placed on the sign as shown.

Safety record numbers are mounted on individual metal plates and are screw-mounted to the background to allow for daily revisions to posted safety performance record.

Special applications or situations not covered in these guidelines should be referred to the District/Division Sign Program Manager.

Legend Group 1: Standard two-line title "Safety is a Job Requirement" with (8" od.) Safety Green First Aid logo.
Color: To match PMS 347
Typeface: 3" Helvetica Bold
Color: Black

Legend Group 2: One- to two-line project title legend describes the work being done under this contract and name of host project.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

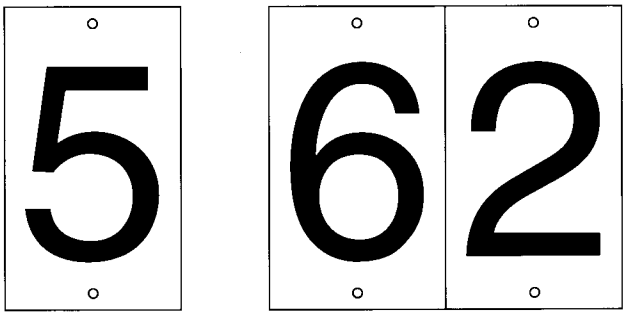
Legend Group 3: One- to two-line identification: name of prime contractor and city, state address.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Legend Group 4: Standard safety record captions as shown.
Color: Black
Typeface: 1.25" Helvetica Regular

Replaceable numbers are to be mounted on white .060 aluminum plates and screw-mounted to background.
Color: Black
Typeface: 3" Helvetica Regular
Plate size: 2.5" x 4.5"

All typography is flush left and rag right, upper and lower case with initial capitals only as shown. Letter and word spacing to follow Corps standards as specified in Appendix D.

Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-02	various	4'x 4'	4"x 4"	HDO-3	48"	WH/BK-SG



All Construction Project Identification signs and Safety Performance signs are to be fabricated and installed as described below. The signs are to be erected at a location designated by the Contracting Officer Representative and shall conform to the size, format, and typographic standards shown on pages 16.2-3. Detailed specifications for HDO plywood panel preparation are provided in Appendix B.

Shown below the mounting diagram is a panel layout grid with spaces provided for project information. Photocopy this page and use as a worksheet when preparing sign legend orders.

For additional information on the proper method to prepare sign panel graphics, contact the District/Division Sign Program Manager.

The sign panels are to be fabricated from .75″ High Density Overlay Plywood. Panel preparation to follow HDO specifications provided in Appendix B.

Sign graphics to be prepared on a white non-reflective vinyl film with positionable adhesive backing.

All graphics except for the Communications Red background with Corps signature on the project sign are to be die-cut or computer-cut non-reflective vinyl, pre-spaced legends prepared in the sizes and typefaces specified and applied to the background panel following the graphic formats shown on pages 16.2-3.

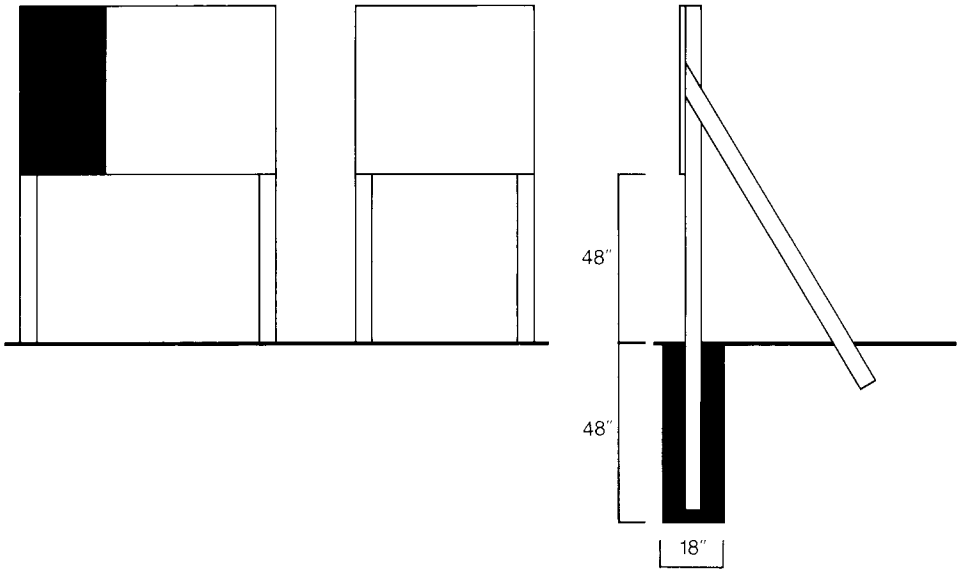
The 2′ x 4′ Communications Red panel (to match PMS-032) with full Corps signature (reverse version) is to be screen printed on the white background. Identification of the district or division may be applied under the signature with white cut vinyl letters prepared to Corps standards. Large scale reproduction artwork for the signature is provided on page 4.8 (photographically enlarge from 6.875″ to 10.5″).

Drill and insert six (6) .375″ T-nuts from the front face of the HDO sign panel. Position holes as shown. Flange of T-nut to be flush with sign face.

Apply graphic panel to prepared HDO plywood panel following manufacturers' instructions.

Sign uprights to be structural grade 4″ x 4″ treated Douglas Fir or Southern Yellow Pine, No.1 or better. Post to be 12′ long. Drill six (6) .375″ mounting holes in uprights to align with T-nuts in sign panel. Countersink (.5″) back of hole to accept socket head cap screw (4″ x .375″).

Assemble sign panel and uprights. Imbed assembled sign panel and uprights in 4′ hole. Local soil conditions and/or wind loading may require bolting additional 2″ x 4″ struts on inside face of uprights to reinforce installation as shown.



Construction Project Sign
Legend Group 1: Corps Relationship

1. _____
2. _____

Legend Group 2: Division/District Name

1. _____
2. _____

Legend Group 2a: Military/Civil Works Sponsor

1. _____
2. _____

Legend Group 3: Project Title

1. _____
2. _____
3. _____

Legend Group 4: Facility Name

1. _____
2. _____

Legend Group 5a: Contractor/A&E

1. _____
2. _____
3. _____
4. _____
5. _____

Legend Group 5b: Contractor/A&E

1. _____
2. _____
3. _____
4. _____
5. _____

Safety Performance Sign
Legend Group 1: Project Title

1. _____
2. _____

Legend Group 2: Contractor/A&E

1. _____
2. _____

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 01780

CLOSEOUT SUBMITTALS

Includes Special Change (Submittal Paragraph)(June 2000)

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-18 Records

As-Built Drawings; GA.

Drawings showing final as-built conditions of the project. The final CADD as-built drawings shall consist of one set of electronic CADD drawing files in the specified format, one set of mylar drawings, 2 sets of blue-line prints of the mylars, and one set of the approved working as-built drawings. The manually prepared drawings shall consist of 1 set of completed final as-built original transparency drawings, 2 sets of blue-line prints of the transparencies, and the approved marked working as-built prints.

As-Built Record of Equipment and Materials; GA.

Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.

Warranty Management Plan; GA.

Two sets of the warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. The Contractor shall furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

Final Clean-Up; GA.

Two copies of the listing of completed final clean-up items.

1.2 PROJECT RECORD DOCUMENTS

1.2.1 As-Built Drawings

This paragraph covers as-built drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built drawings" and "final as-built drawings" refer to contract drawings which are revised to be used for final as-built drawings.

1.2.1.1 Government Furnished Materials

One set of electronic CADD files in the specified software and format revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring CADD file as-built drawings.

1.2.1.2 Working As-Built and Final As-Built Drawings

The Contractor shall revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a weekly basis and at least one set shall be available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. Final as-built drawings shall be prepared after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final as-built drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final as-built drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. The working and final as-built drawings shall show, but shall not be limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

b. The location and dimensions of any changes within the structure.

c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

f. Changes or modifications which result from the final inspection.

g. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints.

h. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.

i. Systems designed or enhanced by the Contractor, such as electrical controls and mechanical systems.

j. Modifications (change order price shall include the Contractor's cost to change working and final as-built drawings to reflect modifications) and compliance with the following procedures.

(1) Directions in the modification for posting descriptive changes shall be followed.

(2) A Modification Circle shall be placed at the location of each deletion.

(3) For new details or sections which are added to a drawing, a Modification Circle shall be placed by the detail or section title.

(4) For minor changes, a Modification Circle shall be placed by the area changed on the drawing (each location).

(5) For major changes to a drawing, a Modification Circle shall be placed by the title of the affected plan, section, or detail at each location.

(6) For changes to schedules or drawings, a Modification Circle shall be placed either by the schedule heading or by the change in the schedule.

(7) The Modification Circle size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.2.1.3 Drawing Preparation

The as-built drawings shall be modified as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints shall be neat, legible and accurate. These drawings are part of the permanent records of this project and shall be returned to the Contracting Officer after approval by the Government. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the Government.

1.2.1.4 Computer Aided Design and Drafting (CADD) Drawings

Only personnel proficient in the preparation of CADD drawings shall be employed to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings shall be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols shall be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If additional drawings are required, they shall be prepared using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing

border to be used for any new final as-built drawings shall be identical to that used on the contract drawings. Additions and corrections to the contract drawings shall be accomplished using CADD files. The electronic files will be supplied on 3-1/2 inch high density floppy disks (for projects with electronic digital files or sets of files less than or equal to 4 diskettes), compact disc, or read-only memory (CD-ROM). The Contractor shall be responsible for providing all program files and hardware necessary to prepare final as-built drawings. The Contracting Officer will review final as-built drawings for accuracy and the Contractor shall make required corrections, changes, additions, and deletions.

a. CADD colors shall be the "base" colors of red, green, and blue. Color code for changes shall be as follows:

(1) Deletions (red) - Deleted graphic items (lines) shall be colored red with red lettering in notes and leaders.

(2) Additions (Green) - Added items shall be drawn in green with green lettering in notes and leaders.

(3) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes shall be in blue.

b. The Contract Drawing files shall be renamed in a manner related to the contract number (i.e., 98-C-10.DGN) as instructed in the Pre-Construction conference. Marked-up changes shall be made only to those renamed files. All changes shall be made on the layer/level as the original item. There shall be no deletions of existing lines; existing lines shall be over struck in red. Additions shall be in green with line weights the same as the drawing. Special notes shall be in blue on layer #63.

c. When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 3/16 inch high. All other contract drawings shall be marked either "AS-Built" drawing denoting no revisions on the sheet or "Revised As-Built" denoting one or more revisions. Original contract drawings shall be dated in the revision block.

d. Within 20 days after Government approval of all of the working as-built drawings for a phase of work, the Contractor shall prepare the final CADD as-built drawings for that phase of work and submit two sets of blue-lined prints of these drawings for Government review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 days, the Contractor shall revise the CADD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 20 days of substantial completion of all phases of work, the Contractor shall submit the final as-built drawing package for the entire project. The submittal shall consist of one set of electronic files on 3-1/2 inch high density floppy disks (for projects with electronic digital files or sets of files less than or equal to 4 diskettes) and compact disc, read-only memory (CD-ROM), one set of mylars, two sets of blue-line prints and one set of the approved working as-built drawings. They shall be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with

the customer's CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final as-built drawing files and marked prints as specified shall be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.2.1.5 Manually Prepared Drawings

Only personnel proficient in the preparation of manually prepared drawings shall be employed to modify the original contract drawing or prepare additional new drawings. Additions and corrections to the contract drawings shall be neat, clean and legible, shall be done to the same level of detail, and shall match the adjacent existing line work, and lettering being annotated in type, density, size and style. Drafting work shall be done using the same medium (pencil, plastic lead or ink) that was employed on the original contract drawings and with graphite lead on paper base material. The Contracting Officer will review as-built drawings for accuracy and conformance to the above specified drafting standards. Corrections, changes, additions, and deletions required shall meet these standards. The title block to be used for any new as-built drawings shall be similar to that used on the original drawings.

a. When final revisions have been completed, each drawing shall be lettered or stamped with the words "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 3/16 inch high. Original contract drawings shall be marked either "As-Built" drawings denoting no revisions on the sheet or "Revised As-Built" denoting one or more revisions All original contract drawings shall be dated in the revision block.

b. Within 20 days after Government approval of all of the working as-built drawings for a phase of work, the Contractor shall prepare the final as-built drawings for that phase of work and submit two sets of blue-line prints of these drawings for Government review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 days the Contractor shall revise the drawings accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 20 days of substantial completion of all phases of work, the Contractor shall submit the final as-built drawing package for the entire project. The submittal shall consist of the completed final as-built drawings, two blue-line prints of these drawings and the return of the approved marked as-built prints. The drawings shall be complete in all details. Paper prints and reproducible drawings will become the property of the Government upon final approval. Failure to submit final as-built drawings and marked prints, as required herein, will be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.2.1.6 Payment

No separate payment will be made for as-built drawings required under this contract, and all costs accrued in connection with such drawings shall be considered a subsidiary obligation of the Contractor.

1.2.2 As-Built Record of Equipment and Materials

The Contractor shall furnish two copies of preliminary record of equipment

and materials used on the project 20 days prior to final inspection. This preliminary submittal will be reviewed and returned 5 days after final inspection with Government comments. Two sets of final record of equipment and materials shall be submitted 10 days after final inspection. The designations shall be keyed to the related area depicted on the contract drawings. The record shall list the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA

Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

1.2.3 Final Approved Shop Drawings

The Contractor shall furnish final approved project shop drawings 30 days after transfer of the completed facility.

1.2.4 Construction Contract Specifications

The Contractor shall furnish final as-built construction contract specifications, including modifications thereto, 30 days after transfer of the completed facility.

1.2.5 Real Property Equipment

The Contractor shall furnish a list of installed equipment furnished under this contract. The list shall include all information usually listed on manufacturer's name plate. The "EQUIPMENT-IN-PLACE LIST" shall include, as applicable, the following for each piece of equipment installed: description of item, location, model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. A draft list shall be furnished at time of transfer. The final list shall be furnished 30 days after transfer of the completed facility.

1.3 WARRANTY MANAGEMENT

1.3.1 Warranty Management Plan

The Contractor shall develop a warranty management plan which shall contain information relevant to the clause Warranty of Construction in Section 00700. At least 30 days before the planned pre-warranty conference, the Contractor shall submit the warranty management plan for Government approval. The warranty management plan shall include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase shall be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Approved information shall be assembled in a binder and shall be turned over to the Government upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. A joint 4 month and 9 month warranty inspection shall be conducted, measured

from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Information contained in the warranty management plan shall include, but shall not be limited to, the following:

a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subcontractors, manufacturers or suppliers involved.

b. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, motors, transformers, and for all commissioned systems such as lightning protection systems, etc.

c. A list for each warranted equipment, item, feature of construction or system indicating:

1. Name of item.
2. Model and serial numbers.
3. Location where installed.
4. Name and phone numbers of manufacturers or suppliers.
5. Names, addresses and telephone numbers of sources of spare parts.
6. Warranties and terms of warranty. This shall include one-year overall warranty of construction. Items which have extended warranties shall be indicated with separate warranty expiration dates.
7. Cross-reference to warranty certificates as applicable.
8. Starting point and duration of warranty period.
9. Summary of maintenance procedures required to continue the warranty in force.
10. Cross-reference to specific pertinent Operation and Maintenance manuals.
11. Organization, names and phone numbers of persons to call for warranty service.
12. Typical response time and repair time expected for various warranted equipment.

d. The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

e. Procedure and status of tagging of all equipment covered by extended warranties.

f. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.3.2 Performance Bond

The Contractor's Performance Bond shall remain effective throughout the construction period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, the Contractor shall respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.3.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor shall furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, shall be continuously available, and shall be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.3.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Contracting Officer, the Contractor shall respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. The Contractor shall submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframes specified, the Government will perform the work and backcharge the construction warranty payment item established.

a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Air Conditioning Systems
(1) Recreational support.

(2) Air conditioning leak in part of building, if causing damage.
(3) Air conditioning system not cooling properly.

Code 1-Doors
(1) Exterior doors not operational, causing a security, fire, or safety problem.
(2) Interior doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors
(1) Overhead doors not operational.
(2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical
(1) Power failure (entire area or any building operational after 1600 hours).
(2) Security lights
(3) Smoke detectors

Code 2-Electrical
(1) Power failure (no power to a room or part of building).
(2) Receptacle and lights (in a room or part of building).

Code 3-Electrical
Street lights.

Code 1-Heat
(1). Area power failure affecting heat.
(2). Heater in unit not working.

Code 3-Interior
(1) Floors damaged.
(2) Paint chipping or peeling.
(3) Casework.

Code 1-Roof Leaks
Temporary repairs will be made where major damage to property is occurring.

Code 2-Roof Leaks
Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

Code 3-All other work not listed above.

1.3.5 Warranty Tags

At the time of installation, each warranted item shall be tagged with a durable, oil and water resistant tag approved by the Contracting Officer. Each tag shall be attached with a copper wire and shall be sprayed with a silicone waterproof coating. The date of acceptance and the QC signature shall remain blank until project is accepted for beneficial occupancy. The tag shall show the following information.

a. Type of product/material_____.

b. Model number_____.

c. Serial number_____.

d. Contract number_____.

e. Warranty period_____from_____to_____.

f. Inspector's signature_____.

g. Construction Contractor_____.

Address_____.

Telephone number_____.

h. Warranty contact_____.

Address_____.

Telephone number_____.

i. Warranty response time priority code_____.

j. WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.

1.4 MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

Prior to final inspection and transfer of the completed facility; all reports, statements, certificates, and completed checklists for testing, adjusting, balancing, and commissioning of mechanical systems shall be submitted to and approved by the Contracting Officer as specified in applicable technical specification sections.

1.5 OPERATION AND MAINTENANCE MANUALS

Operation manuals and maintenance manuals shall be submitted as specified. Operation manuals and maintenance manuals provided in a common volume shall be clearly differentiated and shall be separately indexed.

1.6 FINAL CLEANING

The premises shall be left broom clean. Stains, foreign substances, and temporary labels shall be removed from surfaces. Equipment and fixtures shall be cleaned to a sanitary condition. Filters of operating equipment shall be cleaned or replaced. Debris shall be removed from roofs, drainage systems, gutters, and downspouts. Paved areas shall be swept. The site shall have waste, surplus materials, and rubbish removed. The project area shall have temporary structures, barricades, project signs, concrete barriers, and construction facilities removed. A list of completed clean-up items shall be submitted on the day of final inspection.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION 02111

EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1556	(1990; R 1996e1) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996e1) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 5434	(1993) Guide for Field Logging of Subsurface Explorations of Soil and Rock

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 302	Designation, Reportable Quantities, and Notification

1.2 SURVEYS

Surveys shall be performed immediately prior to and after excavation of contaminated material to determine the volume of contaminated material removed. The Contractor shall provide cross-sections on 15 foot intervals and at obvious break points for all excavated areas. Locations of confirmation samples shall also be surveyed.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Excavation and Handling Work Plan; GA.

Work Plan within 30 calender days after notice to proceed. No work at the site, with the exception of site inspections and surveys, shall be performed until the Work Plan is approved. The Contractor shall allow 30 calender days in the schedule for the Government's review. No adjustment for time or money will be made if resubmittals of the Work Plan are required due to deficiencies in the plan. At a minimum, the Work Plan shall include:

a. Schedule of activities.

b. Method of excavation and equipment to be used.

c. Certification that personnel meet the requirements of 29 CFR 1910.120 and 29 CFR 1926.1101 in relation to hazardous materials and conditions.

d. Shoring or side-wall slopes proposed.

e. Dewatering plan.

f. Storage methods and locations for contaminated material.

g. Sampling plan for contaminated soils.

h. Borrow sources and haul routes.

i. Decontamination procedures.

j. Spill contingency plan.

SD-09 Reports

Surveys; GA.

Cross-sections and areas of excavation.

Sample Testing; GA

Results of laboratory testing of relieving platform overfill.

Backfill Material; GA. Confirmation Sampling and Analysis; GA. Sampling of Stored Material; GA.Compaction GA. Chemical Testing; GA.

Test results.

Closure Report; GA.

Five copies of Closure Report within 14 calender days of work completion at the site.

1.4 REGULATORY REQUIREMENTS

1.4.1 Permits and Licenses

The Contractor shall obtain required federal, state, and local permits for excavation and storage of contaminated material. Permits shall be obtained at no additional cost to the Government.

1.4.2 Air Emissions

Air emissions shall be monitored and controlled in accordance with Section 13280 ASBESTOS ABATEMENT and Section 13281 LEAD HAZARD CONTROL ACTIVITIES.

1.5 DESCRIPTION OF WORK

The work shall consist of excavation and temporary storage of contaminated material, volume as indicated. Approximate locations of contaminated material are shown on the drawings. The Contractor shall perform an independent evaluation of the site characterization data. The Contracting Officer shall be notified within 48 hours if contaminated material is discovered which has not been previously identified or if other discrepancies between data provided and actual field conditions are discovered. Backfill material is not available onsite. Ground water is approximately 10 feet below pre-excavation ground surface and is expected to be encountered during excavation activities.

1.6 CHEMICAL TESTING

Required sampling and chemical analysis shall be conducted in accordance with this Section.

1.7 SCHEDULING

The Contractor shall notify the Contracting Officer 10 calender days prior to the start of excavation of contaminated material. The Contractor shall be responsible for contacting regulatory agencies in accordance with the applicable reporting requirements.

PART 2 PRODUCTS

2.1 BACKFILL MATERIAL

Backfill material shall be obtained from offsite. Backfill shall be classified in accordance with ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, ML, MH, CL, or CH and shall be free from roots and other organic matter, trash, debris, snow, ice or frozen materials. Backfill material shall be tested for Atterberg limits (ASTM D 4318), grain-size distribution (ASTM D 422), and compaction characteristics (ASTM D 1557) at a frequency of once for this project. A minimum of one set of classification tests shall be performed per borrow source and 1 backfill sample shall be collected and tested for contaminants.

Backfill shall not be used until borrow source chemical and physical test results have been submitted and approved.

2.2 SPILL RESPONSE MATERIALS

The Contractor shall provide spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times in which hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

PART 3 EXECUTION

3.1 EXISTING STRUCTURES AND UTILITIES

No excavation shall be performed until site utilities have been field located. The Contractor shall take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired at no additional cost to the Government. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without written approval from the Contracting Officer.

3.2 CLEARING AND GRUBBING

Clearing and grubbing is not necessary.

3.3 CONTAMINATED MATERIAL REMOVAL

3.3.1 Excavation

Excavation shall be performed in a manner that will limit the potential for contaminated material to be mixed with uncontaminated material. The Contractor shall maintain an excavation of sufficient size to allow workers ample room to complete the work. A log of the materials and any visible signs of contamination encountered during excavation shall be maintained for each area of excavation. Excavation logs shall be prepared in accordance with ASTM D 5434.

Upon removal, excavated material shall be segregated for stockpiling in accordance with applicable state solid waste regulations. The material will be divided between 'Clean Fill' and 'Construction/Demolition Waste'. 'Clean Fill' is defined as "...uncontaminated soils, rock, stone, gravel, unused brick and block, concrete, and used asphalt." 'Construction/Demolition Waste' is defined as "solid waste resulting from the construction or demolition of buildings and other structures, including, but not limited to, wood, plaster, metals, asphalt substances, bricks, block, and unsegregated concrete."

3.3.2 Shoring

Sheeting, bracing, or shoring shall be installed in the absence of adequate side slopes if there is a need for workers to enter the excavated area.

3.3.3 Dewatering

Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, and to ensure that compaction requirements can be met.

Groundwater pumped from excavations shall be either discharged into the

sanitary sewer system if permitted by the City or discharged into storm drains or directly into adjacent surface waters with written permission of the Pennsylvania DEP.

3.4 CONTAMINATED MATERIAL STORAGE

Excavated material shall be separately stored based on classification according to applicable state solid waste regulations.. The material will be classified as either 'Clean Fill' or 'Construction/Demolition Waste'.

Material shall be placed in temporary storage immediately after excavation. The following paragraphs describe acceptable methods of material storage. Storage units shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each temporary storage unit.

3.4.1 Stockpiles

Stockpiles shall be constructed to isolate stored contaminated material from the environment. The maximum stockpile size shall be 100 cubic yards. Stockpiles shall be constructed to include:

a. A chemically resistant geomembrane liner. Non-reinforced geomembrane liners shall have a minimum thickness of 20 mils. Scrim reinforced geomembrane liners shall have a minimum weight of 40 lbs. per 1000 square feet. The ground surface on which the geomembrane is to be placed shall be free of rocks greater than 0.5 inches in diameter and any other object which could damage the membrane.

b. Geomembrane cover to prevent precipitation from entering the stockpile. Non-reinforced geomembrane covers shall have a minimum thickness of 10 mils. Scrim reinforced geomembrane covers shall have a minimum weight of 26 lbs. per 1000 square feet. The cover material shall be anchored to prevent it from being removed by wind.

c. Berms surrounding the stockpile, a minimum of 12 inches in height. Vehicle access points shall also be bermed.

d. Storage and removal of liquid which collects in the stockpile, in accordance with paragraph Liquid Storage.

3.4.2 Roll-Off Units

Water-tight roll-off units shall be used to temporarily store contaminated material. An impermeable cover shall be placed over the units to prevent precipitation from contacting the stored material. The units shall be located as shown on the drawings. Liquid which collects inside the units shall be removed and stored in accordance with paragraph Liquid Storage.

3.4.3 Liquid Storage

Water collected from stockpiles and roll-off units shall be pumped into the sanitary sewer system, if permitted by the local authority, or discharged into storm drains or directly into the adjacent waterway with prior written permission from the State regulatory agency and in compliance with Federal,

State, and local requirements.

3.5 SAMPLING

3.5.1 Sampling of Stored Material

Samples of stored material shall be collected at a frequency of once per 100 cubic yards. Samples shall be laboratory tested using EPA methodology Toxicity Characteristics Leaching Procedure (TCLP). This analytical data will be compared to Resource Conservation and Recovery Act (RCRA) standards for hazardous characteristics and/or to treatment, storage, or disposal (TSD) facility requirements. Stored material with contaminant levels below applicable action levels will be either used as surface fill on site or transported offsite to a residual disposal facility.

Stored material with contaminant levels that exceed the action levels shall be treated offsite. Analyses for contaminated material to be taken to an offsite treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Contracting Officer. Additional sampling and analyses to the extent required by the approved offsite treatment, storage or disposal (TSD) facility shall be the responsibility of the Contractor and shall be subject to approval by the Contracting Officer.

3.6 SPILLS

In the event of a spill or release of a hazardous substance as designated in 40 CFR 302, pollutant, contaminant, or oil, the Contractor shall notify the Contracting Officer immediately. If the spill exceeds the reporting threshold, the Contractor shall follow the pre-established procedures as described in the Base Wide Contingency Plan for immediate reporting and containment. Immediate containment actions shall be taken to minimize the effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local regulations. As directed by the Contracting Officer, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the Government.

3.7 BACKFILL

3.7.1 Compaction

Approved backfill shall be placed in lifts with a maximum loose thickness of 8 inches. Soil shall be compacted to 95 percent of ASTM D 1557 maximum dry density for cohesive soils and 95 percent of ASTM D 1557 maximum dry density for cohesionless soils. Density tests shall be performed at a frequency of once per lift. A minimum of one density test shall be performed on each lift of backfill placed. Field in-place dry density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. If ASTM D 2922 is used, a minimum of one in ten tests shall be checked using ASTM D 1556 or ASTM D 2167. Test results from ASTM D 1556 or ASTM D 2167 shall govern if there is a discrepancy with the ASTM D 2922 test results.

3.8 DISPOSAL REQUIREMENTS

3.8.1 Regulated Construction/Demolition Waste Disposal

Excavated material that has been classified as 'Construction/Demolition Waste' in accordance with applicable state solid waste regulations or with contaminant levels above applicable action levels for 'Clean Fill', but non-hazardous, shall be transported offsite for disposal at an approved residual waste facility.

3.8.2 Regulated Dredge Spoil Disposal

Excavated material from the drilled caissons below the footing bottoms of the existing substructure that has been classified as 'Clean Fill' in accordance with applicable state solid waste regulations and with contaminant levels below applicable action levels may be disposed of off site, as regulated fill. The material may be used without a DEP permit for most purposes, such as bringing areas to grade. However, 'Clean Fill' may not be used within or on surface waterbodies or groundwater. Additionally, the material can not be used as backfill in an excavation within 8 feet of average groundwater levels.

3.8.3 Hazardous Soil Disposal

Excavated material that has been determined to be hazardous based upon the comparison of laboratory results with applicable action levels shall be transported offsite for disposal at an approved hazardous waste facility in accordance with Section 02120TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.8.4 'Clean Fill' Disposal On Site

Excavated material that has been classified as 'Clean Fill' in accordance with applicable state solid waste regulations and with contaminant levels below applicable action levels may be used on site. The material may be used without a DEP permit for most purposes, such as bringing areas to grade. However, 'Clean Fill' may not be used within or on surface waterbodies or groundwater. Additionally, the material can not be used as backfill in an excavation within 8 feet of average groundwater levels.

3.8.5 'Clean Fill' Disposal Off Site

Excavated material that has been classified as 'Clean Fill' in accordance with applicable state solid waste regulations and with contaminant levels below applicable action levels may be used off site. The material may be used without a DEP permit for most purposes, such as bringing areas to grade. However, 'Clean Fill' may not be used within or on surface waterbodies or groundwater. Additionally, the material can not be used as backfill in an excavation within 8 feet of average groundwater levels.

3.9 CLOSURE REPORT

8 copies of a Closure Report shall be prepared and submitted within 21 calender days of completing work at the site. The report shall be labeled with the contract number, project name, location, date, name of general contractor, and the Corps of Engineers District contracting for the work. The Closure Report shall include the following information as a minimum:

a. A cover letter signed by a responsible company official certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents.

b. A narrative report including, but not limited to, the following:

(1) site conditions, ground water elevation, and cleanup criteria;

(2) excavation logs;

(3) field screening readings;

(4) quantity of materials removed from each area of contamination;

(5) quantities of water/product removed during dewatering;

(6) sampling locations and sampling methods;

(7) collection data such as time of collection and method of preservation;

(8) sample chain-of-custody forms; and

(9) source of backfill.

c. Copies of all chemical and physical test results.

d. Copies of all manifests and land disposal restriction notifications.

e. Copies of all certifications of final disposal signed by the responsible disposal facility official.

f. Waste profile sheets.

g. Scaled drawings showing limits of each excavation, limits of contamination, known underground utilities within 50 feet of excavation, sample locations, and sample identification numbers.

h. Progress Photographs. Color photographs shall be used to document progress of the work. A minimum of four views of the site showing the location of the area of contamination, entrance/exit road, and any other notable site conditions shall be taken before work begins. After work has been started, activities at each work location shall be photographically recorded daily. Photographs shall be a minimum of 3 x 5 inches and shall include:

(1) Soil removal, handling, and sampling.

(2) Unanticipated events such as discovery of additional contaminated material.

(3) Contaminated material storage.

(4) Site or task-specific employee respiratory and personal protection.

(5) Fill placement and grading.

(6) Post-construction photographs. After completion of work at each site, the Contractor shall take a minimum of four views of each excavation site.

Photographs shall be mounted back-to-back in double face plastic sleeves punched to fit standard three ring binders. Each print shall have an information box attached. The box shall be typewritten and arranged as follows:

Project Name:	Direction of View:
Location:	Date/Time:
Photograph No.:	Description of View:

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 02120
TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 302	Designation, Reportable Quantities, and Notification
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

On-site Hazardous Waste Management; GA.
Off-site Hazardous Waste Management; GA.

Prior to start of work, a plan detailing the manner in which hazardous wastes shall be managed.

SD-09 Reports

Recordkeeping; GA.

Information necessary to file state annual or EPA biennial reports for all hazardous waste transported, treated, stored, or disposed of under this contract. The Contractor shall not forward these data directly to the regulatory agency but to the Contracting Officer at the specified time. The submittal shall contain all the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter shall accompany the data to include the contract number, Contractor name, and project location.

Spill Response; FIO.

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), the Contractor shall notify the Contracting Officer immediately. If the spill exceeds a reporting threshold, the Contractor shall follow the pre-established procedures for immediate reporting to the Contracting Officer.

Exception Reports; GA.

In the event that a manifest copy documenting receipt of hazardous waste at the treatment, storage, and disposal facility is not received within 35 days of shipment initiation, the Contractor shall prepare and submit an exception report to the Contracting Officer within 37 days of shipment initiation.

SD-13 Certificates

Qualifications; FIO.

Copies of the current certificates of registration issued to the Contractor and/or subcontractors or written statements certifying exemption from these requirements.

Off-Site Policy Compliance Certification; GA.

A letter certifying that EPA considers the facilities to be used for all off-site disposal to be acceptable in accordance with the Off-Site policy in 40 CFR 300, Section .440. This certification shall be provided for wastes from Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901 et seq., sites as well as from Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq., responses. See Attachment A, sample certification, at the end of this section.

Certificates of Disposal; FIO.

Certificates documenting the ultimate disposal of hazardous wastes, polychlorinated biphenyls (PCBs), and/or asbestos within 90 days of initial shipment. Receipt of these certificates will be required for final payment.

Shipping Documents and Packagings Certification; GA.

All transportation related shipping documents to the Contracting Officer, including draft hazardous waste manifests, draft land disposal restriction notifications, draft asbestos waste shipment records, draft bill of ladings for hazardous materials, lists of corresponding proposed labels, packages, marks, and placards to be used for shipment, waste profiles, and supporting waste analysis documents, for review a minimum of 14 days prior to anticipated pickup. Packaging assurances shall be furnished prior to transporting hazardous material; "generator copies" of hazardous waste manifests, land disposal restriction notifications, asbestos waste shipment records, used oil invoices/shipment records, bill of ladings, and supporting waste analysis documents shall be furnished when shipments are originated; and "receipt copies" of asbestos waste shipment records at the designated disposal facility shall be furnished not later than 35 days after acceptance of the shipment.

SD-18 Records

Notices of Non-Compliance and Notices of Violation; FIO.

Notices of non-compliance or notices of violation by a Federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this contract. The Contractor shall immediately provide copies of such notices to the Contracting Officer. The Contractor shall also furnish all relevant documents regarding the incident and any information requested by the Contracting Officer, and shall coordinate its response to the notice with the Contracting Officer or his designated representative prior to submission to the notifying authority. The Contractor shall also furnish a copy to the Contracting Officer of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

1.3 QUALIFICATIONS

1.3.1 Transportation and Disposal Coordinator

The Contractor shall designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this contract. The TDC shall serve as the single point of contact for all environmental regulatory matters and shall have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of hazardous waste and hazardous

materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, asbestos waste shipment records, PCB manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC shall have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste.

1.3.2 Training

The Contractor's hazardous materials employees shall be trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 01351 SAFETY, HEALTH, AND EMERGENCY RESPONSE (HTRW/UST). The Contractor's employees transporting hazardous materials or preparing hazardous materials for transportation shall be trained, tested, and certified in accordance with 49 CFR 172.

1.3.3 Certification

The Contractor and/or subcontractors transporting hazardous materials shall possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G.

1.4 LAWS AND REGULATIONS REQUIREMENTS

Work shall meet or exceed the minimum requirements established by Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and the Contractor shall be responsible for complying with amendments as they become effective. In the event that compliance exceeds the scope of work or conflicts with specific requirements of the contract, the Contractor shall notify the Contracting Officer immediately.

1.5 DEFINITIONS

a. Hazardous Material. A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

b. Hazardous Waste. A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

PART 2 PRODUCTS

2.1 MATERIALS

The Contractor shall provide all of the materials required for the packaging, labeling, marking, placarding and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards. Details in this specification shall not be

construed as establishing the limits of the Contractor's responsibility.

2.1.1 Packagings

The Contractor shall provide bulk and non-bulk containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 8. Bulk and non-bulk packaging shall meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Each packaging shall conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and shall be compatible with the material to be packaged as required by 40 CFR 262. The Contractor shall also provide other packaging related materials such as materials used to cushion or fill voids in overpacked containers, etc. Sorbent materials shall not be capable of reacting dangerously with, being decomposed by, or being ignited by the hazardous materials being packaged. Additionally, sorbents used to treat free liquids to be disposed of in landfills shall be non-biodegradable as specified in 40 CFR 264, Section .314.

2.1.2 Markings

The Contractor shall provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D and 40 CFR 262, Section .32 for hazardous waste, and 40 CFR 61, Section .149(d) for asbestos. Markings shall be capable of withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.3 Labeling

The Contractor shall provide primary and subsidiary labels for hazardous materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels shall meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels shall be durable and weather resistant and capable of withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.4 Placards

For each off-site shipment of hazardous material/waste, the Contractor shall provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Placards shall be provided for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of withstanding, without deterioration, a 30 day exposure to open weather conditions and shall meet design requirements specified in 49 CFR 172, Subpart F.

2.1.5 Spill Response Materials

The Contractor shall provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials shall be available at all times in

which hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

The Contractor shall provide miscellaneous equipment and tools necessary to handle hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 ON-SITE HAZARDOUS WASTE MANAGEMENT

These paragraphs apply to Government owned waste only. Contractors are prohibited by 10 U.S.C. 2692 from storing contractor owned waste on site for any length of time. The Contractor shall be responsible for ensuring compliance with all Federal, state, and local hazardous waste laws and regulations and shall verify those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. The Contractor shall identify hazardous wastes using criteria set forth in 40 CFR 261 or all applicable state and local laws, regulations, and ordinances. When accumulating hazardous waste on-site, the Contractor shall comply with generator requirements in 40 CFR 262 and any applicable state or local law or regulations. On-site accumulation times shall be restricted to applicable time frames referenced in 40 CFR 262, Section .34 and any applicable state or local law or regulation. Accumulation start dates shall commence when waste is first generated (i.e. containerized or otherwise collected for discard). The Contractor shall only use containers in good condition and compatible with the waste to be stored. The Contractor shall be responsible for ensuring containers are closed except when adding or removing waste. The Contractor shall be responsible for immediately marking all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section .32 and any applicable state or local law or regulation as soon as the waste is containerized. An additional marking shall be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. The Contractor shall be responsible for inspecting containers for signs of deterioration and shall be responsible for responding to any spills or leaks. The Contractor shall inspect all hazardous waste areas weekly and shall provide written documentation of the inspection. Inspection logs shall contain date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken.

3.1.1 Hazardous Waste Classification

The Contractor, in consultation with the Contracting Officer, shall identify all waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or any applicable state or local law or regulation. The Contractor shall also identify all applicable treatment standards in 40 CFR 268 and state land disposal restrictions and shall make a determination as to whether or not the waste meets or exceeds the standards. Waste profiles, analyses, classification and treatment standards information shall be submitted to Contracting Officer for review and approval.

3.1.2 Management Plan

The Contractor shall prepare a plan detailing the manner in which hazardous

wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed as well as the management practices to be utilized. The plan shall identify the method to be used to ensure accurate piece counts and/or weights of shipments; shall identify waste minimization methods; shall propose facilities to be utilized for treatment, storage, and/or disposal; shall identify areas on-site where hazardous wastes are to be handled; shall identify whether transfer facilities are to be utilized; and if so, how the wastes will be tracked to ultimate disposal.

3.2 OFF-SITE HAZARDOUS WASTE MANAGEMENT

The Contractor shall use RCRA Subtitle C permitted facilities which meet the requirements of 40 CFR 264 or facilities operating under interim status which meet the requirements of 40 CFR 265. Off-site treatment, storage, and/or disposal facilities with significant RCRA violations or compliance problems (such as facilities known to be releasing hazardous constituents into ground water, surface water, soil, or air) shall not be used.

3.2.1 Description of TSD Facility and Transporter

The Contractor shall provide the Contracting Officer with EPA ID numbers, names, locations, and telephone numbers of TSD facilities and transporters. This information shall be contained in the Hazardous Waste Management Plan for approval prior to waste disposal.

3.2.2 Status of the Facility

Facilities receiving hazardous waste must be permitted in accordance with 40 CFR 270 or operating under interim status in accordance with 40 CFR 265 requirements, or must be permitted by an authorized state program. Additionally, prior to using a TSD Facility, the Contractor shall contact the EPA Regional Off-site Coordinator specified in 40 CFR 300, Section .440, to determine the facility's status, and document all information necessary to satisfy the requirements of the EPA Off-Site policy and furnish this information to the Contracting Officer.

3.2.3 Shipping Documents and Packagings Certification

Prior to shipment of any hazardous material off-site, the Contractor's TDC shall provide written certification to the Contracting Officer that hazardous materials have been properly packaged, labeled, and marked in accordance with Department of Transportation and EPA requirements.

3.2.4 Transportation

The Contractor shall use manifests for transporting hazardous wastes as required by 40 CFR 263 or any applicable state or local law or regulation. Transportation shall comply with all requirements in the Department of Transportation referenced regulations in the 49 CFR series. The Contractor shall acquire manifests in accordance with the hierarchy established in 40 CFR 262, Section .21. The Contractor shall prepare hazardous waste manifests for each shipment of hazardous waste shipped off-site. Manifests shall be completed using instructions in 40 CFR 262, Subpart B and any applicable state or local law or regulation. Manifests and waste profiles shall be submitted to Contracting Officer for review and approval. The Contractor shall prepare land disposal restriction notifications as required by 40 CFR 268 or any applicable state or local law or regulation for each shipment of hazardous waste. Notifications shall be submitted with the manifest to the Contracting Officer for review and approval. When

the additional cost of sending a qualified USACE representative to a remote location for a small clean up project is unwarranted, the option of requiring the on-site Contractor to sign the manifests on behalf of the generator is permitted and should be considered. This option shall only be exercised on a project specific basis, if prior to the solicitation process, written authorization of the customer and approval of the Chief, Construction Division at the executing district has been obtained, and the technical provisions of the contract solicitation provide competing contractors notice of the requirement.

3.2.5 Treatment and Disposal of Hazardous Wastes

The hazardous waste shall be transported to an approved hazardous waste treatment, storage, or disposal facility within 45 days of the accumulation start date on each container or stockpile area. The Contractor shall ship hazardous wastes only to facilities which are properly permitted to accept the hazardous waste or operating under interim status. The Contractor shall ensure wastes are treated to meet land disposal treatment standards in 40 CFR 268 prior to land disposal. The Contractor shall propose TSD facilities via submission of the Hazardous Waste Management Plan, subject to the approval of the Contracting Officer.

3.3 HAZARDOUS MATERIALS MANAGEMENT

The Contractor, in consultation with the Contracting Officer, shall evaluate, prior to shipment of any material off-site, whether the material is regulated as a hazardous waste in addition to being regulated as a hazardous material; this shall be done for the purpose of determining proper shipping descriptions, marking requirements, etc., as described below.

3.3.1 Identification of Proper Shipping Names

The Contractor shall use 49 CFR 172, Section .101 to identify proper shipping names for each hazardous material (including hazardous wastes) to be shipped off-site. Proper shipping names shall be submitted to the Contracting Officer in the form of draft shipping documents for review and approval.

3.3.2 Packaging, Labeling, and Marking

The Contractor shall package, label, and mark hazardous materials/wastes using the specified materials and in accordance with the referenced authorizations. The Contractor shall mark each container of hazardous waste of 104 gallons or less with the following:

"HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal.
If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
Generator's name _____
Manifest Document Number _____".

3.3.3 Hazardous Material Shipping Documents

The Contractor shall ensure that each shipment of hazardous material sent off-site is accompanied by properly completed shipping documents.

3.3.3.1 Asbestos Waste Shipment Documents

The Contractor shall prepare waste shipment records as required by 40 CFR 61 for shipments of asbestos. Waste shipment records shall be submitted to the Contracting Officer for review and approval. Waste shipment records shall be signed by the Contractor.

3.3.3.2 Other Hazardous Material Shipment Documents

The Contractor shall prepare a bill of lading for each shipment of hazardous material which is not accompanied by a hazardous waste manifest or asbestos waste shipment record which fulfills the shipping paper requirements. The bill of lading shall satisfy the requirements of 49 CFR 172, Subpart C, and any applicable state or local law or regulation, and shall be submitted to the Contracting Officer for review and approval. For laboratory samples and treatability study samples, the Contractor shall prepare bills of lading and other documentation as necessary to satisfy conditions of the sample exclusions in 40 CFR 261, Section .4(d) and (e) and any applicable state or local law or regulation. Bill of ladings requiring shipper's certifications shall be signed by the Contractor.

3.4 OBTAINING EPA ID NUMBERS

The Contractor shall complete EPA Form 8700-12, Notification of Hazardous Waste Activity, and submit to the Contracting Officer for review and approval. The Contractor shall allow a minimum of 30 days for processing the application and assigning the EPA ID number. Shipment shall be made not earlier than one week after receipt of the EPA ID number.

3.5 SPECIAL REQUIREMENTS FOR ASBESTOS WASTES

If work involves asbestos containing wastes, the Contractor shall manage these wastes in accordance with specification Section 13280 ASBESTOS ABATEMENT.

3.6 WASTE MINIMIZATION

The Contractor shall minimize the generation of hazardous waste to the maximum extent practicable. The Contractor shall take all necessary precautions to avoid mixing clean and contaminated wastes. The Contractor shall identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 shall apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals.

3.7 RECORDKEEPING

The Contractor shall be responsible for maintaining adequate records to support information provided to the Contracting Officer regarding exception reports, annual reports, and biennial reports. The Contractor shall be responsible for maintaining asbestos waste shipment records for a minimum of 3 years from the date of shipment or any longer period required by any applicable law or regulation or any other provision of this contract.

3.8 SPILL RESPONSE

The Contractor shall respond to any spill of hazardous material or hazardous waste which are in the custody or care of the Contractor, pursuant to this contract. Any direction from the Contracting Officer concerning a spill or release shall not be considered a change under the contract. The Contractor shall comply with all applicable requirements of

Federal, state, or local laws or regulations regarding any spill incident.

3.9 EMERGENCY CONTACTS

The Contractor shall be responsible for complying with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, the Contractor shall provide a 24 hr emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. The phone must be monitored on a 24 hour basis at all times when the hazardous materials are in transportation, including during storage incidental to transportation. The Contractor shall ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. The Contractor shall designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

a. The name of the emergency coordinator.

b. Phone number through which the emergency coordinator can be contacted on a 24 hour basis.

c. The telephone number of the local fire department.

d. The location of fire extinguishers and spill control materials.

Attachment A

SAMPLE OFF-SITE POLICY CERTIFICATION MEMO

Project/Contract #:_____

Waste Stream:_____

Primary TSD Facility, EPA ID # and Location: _____

Alter. TSD Facility, EPA ID # and Location:_____

EPA Region	Primary Contact	Secondary Contact
I	(617) 565-9446	(617) 573-1754
II	(212) 637-4139	(212) 264-2638
III	(814) 566-3450	(215) 597-8338
IV	(404) 562-8589	(404) 347-7603
V	(312) 886-3587	(312) 886-4445
VI	(214) 665-2282	(214) 655-2281
VII	(913) 551-7883	(913) 551-7667
VIII	(303) 312-6419	(303) 293-1506
IX	(415) 744-2091	(415) 744-2114
X	(206) 553-1061	(206) 553-1061

EPA representative contacted: _____

EPA representative phone number: _____

Date contacted: _____

Comment: _____

The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site Policy in 40 CFR 300.440.

Signature: _____ Date: _____

Phone number: _____

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 02220

DEMOLITION

PART 1 GENERAL

1.1 Summary

The following is a list of the significant demolition work:

a. The demolition of asbestos containing material (ACM) at indicated locations.

b. The demolition of electrical control components.

c. The demolition of mechanical components

d. The removal of the counterweight ropes.

e. The removal and demolition of counterweights.

f. The demolition of the towers and tower spans.

g. The demolition of portions of piers and abutments.

h. The demolition of fender system

i. The demolition of the deck system on the lift span.

j. The demolition of various items as indicated.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual (http://www.hq.usace.army.mil/soh/hqusace_soh.htm)

1.3 GENERAL REQUIREMENTS

The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed, to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible; salvaged items and materials shall be disposed of

as specified.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals not having a "FIO" designation are for information only. When used, a designation following the "E" designation identifies the Engineer will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Work Plan; GA.

The procedures proposed for the accomplishment of the work. The procedures shall provide for safe conduct of the work, including procedures and methods to provide necessary supports, lateral bracing and shoring when required, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1. The Contractor shall submit a work plan that details the removal of the various major components of the structure, the salvaged items, the environmentally sensitive removal items, the substructure components, and various items on the approaches to the bridge. The Contractor shall consider that removal of some components can not be removed until other components have been removed.

Counterweight Removal Plan; GA.

The drawings describe a Suggested Counterweight Jacking Sequence to be used to remove each counterweight. The Contractor shall submit a Counterweight Removal Plan which is designed by a Professional Engineer licensed in Pennsylvania. The plan shall include a list for all materials that are designed to support the weight of the entire counterweight as it is being lowered to the bridge deck level for further demolition and disposal away from the site. The types of material shall be listed, including mill test reports for tensile and Charpy V-Notch test on members subject to tensile loads. All temporary materials are at the option of the Contractor. However, due to the size of the dead load, tensile loaded material shall have a minimum factor of safety of 2 and shall have a Charpy V-Notch testing minimum result of 20 ft-lbs when tested at 40 degrees F.

1.5 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

1.6 PROTECTION

1.6.1 General

The Contractor shall protect the existing bridge structure and all utilities from damage or interruption of service. Damage or any interruption of service resulting from the Contractor's operations shall be

repaired or service restored promptly at the expense of the Contractor.

1.6.2 Debris Control

Care shall be taken that no paint containers, pieces of scaffolding, debris, or any materials whatsoever, fall into the waterway or to the ground. Should debris or construction materials fall from the bridge inadvertently, prompt corrective action shall be taken to prevent further occurrences and the fallen items shall be secured and removed. The contractor shall take all precautions practicable to prevent blast cleaning grit and paint chips from falling from the bridge. Blast cleaning debris deposited on horizontal surfaces of the superstructure and piers shall be collected and disposed of properly. Sweeping of blast cleaning debris off the bridge to the land or water below will not be permitted.

Existing structural steel, rivets, concrete, and all other materials which are removed from the bridge shall not be allowed to fall to the ground or into the channel. The Contractor shall design and install a system of nets or devise other means to catch such debris for subsequent removal.

1.6.3 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site. No area, section, or component of floors, roofs, walls, columns, platforms, steel tower and span, counterweight boxes, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.6.4 Protection of Structures

Floors and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, shall remain standing without additional bracing, shoring, of lateral support until demolished, unless directed otherwise by the Contracting Officer. The Contractor shall ensure that no elements determined to be unstable are left unsupported and shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.6.5 Protection of Existing Property

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.6.6 Protection From the Weather

Salvageable materials and equipment shall be protected from the weather at all times, until removal.

1.6.7 Environmental Protection

The work shall comply with the requirements of Section 01354 ENVIRONMENT PROTECTION FOR CIVIL WORKS.

1.7 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.8 USE OF EXPLOSIVES

Use of explosives will not be permitted.

1.9 AVAILABILITY OF WORK AREAS

Areas in which the demolition work is to be accomplished will be available in accordance with a sequence of demolition of all the components to be demolished based on the order of which components shall be removed first before any other component may be removed.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXISTING STRUCTURES

Existing structures indicated shall be removed to top of foundation walls, or as indicated. Sidewalks, roadways curbs, and gutters shall be removed as indicated.

3.2 EXISTING COUNTERWEIGHT REMOVAL

The two counterweights shall be locked in place near the top of each tower so that the lift span can be "floated out." These very heavy structures shall be removed according to the Contractor's Counterweight Removal Plan. This plan shall be prepared by a Professional Engineer. This work shall not begin without written approval of the Contracting Officer.

3.3 UTILITIES

3.3.1 General

Disconnection of utility services, with related meters and equipment. Existing utilities shall be removed as indicated.

3.3.2 Steam Line

An abandoned steam line exists near the south abutment.Portions of this steam line that interfere with the substructure construction shall be removed and shall be disposed of away from the Government property. The remaining portion of the steam line shall be capped to prevent any possibility of leakage. There may be asbestos insulation surrounding the steam pipe. The Contractor shall obtain two samples of the pipe insulation and send them to a testing laboratory to determine if asbestos

is present in the insulation. If asbestos is present in this insulation, the asbestos shall be disposed of in accordance with Section 13280.

3.3.3 Bridge Power

After the bridge has been closed to all traffic, the electric power to the bridge may be terminated at the discretion of the Contractor. The power shall be terminated at the closest utility service pole. The conductors shall be removed and shall be disposed of away from Government property.

3.3.4 Unknown Utility

When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

3.4 DISPOSITION OF MATERIAL

Title to material and equipment to be demolished, except Government salvage and historical items, is vested in the Contractor upon receipt of notice to proceed. The Government will not be responsible for the condition, loss or damage to such property after notice to proceed.

3.4.1 Salvageable Items and Material

Contractor shall salvage items and material to the maximum extent possible. and as indicated on the drawings

3.4.1.1 Material Salvaged for the Contractor

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

3.4.1.2 Items Salvaged for the Government

Salvaged items to remain the property of the Government shall be removed in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage shall be repaired or replaced to match existing items. Containers shall be properly identified as to contents. The following items reserved as property of the Government shall be delivered to the areas designated in the staging areas. The salvable items shall be stored above the ground in weatherproof containers until these items will be installed in the new portions of structure. Refer to contract drawings for items to be salvaged.

3.4.1.3 Items Salvaged for the Using Service

The following items reserved as property of the using service shall be removed prior to commencement of work under this contract. The Contractor shall verify with the using service that all of the equipment that the using service that their equipment has been removed to their satisfaction.

3.4.1.4 Historical Items

Historical items shall be removed in a manner to prevent damage. The following historical items shall be delivered to the Government for

disposition: Corner stones, contents of corner stones, and document boxes wherever located on the site.

3.4.1.5 Debris Barrier

A portion of the debris barrier control is located on the north fender system. The barrier control mechanism shall be removed from the fender during the existing fender removal. The entire system shall be safely stored away from the construction.

After the north portion of the new fender system has been constructed, the debris barrier shall be re-installed and tested to ensure that operation is satisfactory.

If construction operations interfere with the debris barrier, the debris barrier may remain out of service for as short a period of time as possible.

3.4.2 Unsalvageable Material

Concrete, masonry, and other noncombustible material, except concrete substructure portions and relieving platform timber piling permitted to remain in place, shall be disposed of in the disposal area located off the site. Combustible material shall be disposed of at an appropriate disposal area located off the site.

3.5 CLEAN UP

Debris and rubbish shall be removed from excavations. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

3.6 PAVEMENTS

Existing pavements designated for removal shall be saw cut and removed in accordance with the details shown on the drawings and to the limits and depths indicated on the drawings.

3.7 RAILROAD TRACK STRUCTURE

All rail, ties and other track materials that are removed from over each of the relieving platforms, each tower span, and the lift span shall be scrapped and shall be removed from the project site. This material becomes the property of the Contractor.

-- End of Section --

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1140	(1997) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(1990; R 1996e1) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996e1) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, and SP-SC. Satisfactory materials for grading shall be comprised of stones less than 8 inches, except for fill material for pavements and railroads which shall be comprised of stones less than 3 inches in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. The Contracting Officer shall be notified of any contaminated materials.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Testing required for classifying materials shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.2.4 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557abbreviated as a percent of laboratory maximum density.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Earthwork; GA.

Procedure and location for disposal of unused satisfactory material. Proposed source of borrow material.

SD-09 Reports

Testing; FIO.

Within 24 hours of conclusion of physical tests, 3 copies of test results, including calibration curves and results of calibration tests.

SD-13 Certificates

Testing; FIO.

Qualifications of the commercial testing laboratory or Contractor's testing facilities.

SD-18 Records

Earthwork; FIO.

Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder

construction for rigid pavements.

1.4 SUBSURFACE DATA

Subsurface soil boring logs are shown on the drawings. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.5 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.5.1 Rock Excavation

Rock excavation shall include excavating, grading, and disposing of material classified as rock and shall include the satisfactory removal and disposal of boulders 1/2 cubic yard or more in volume; solid rock; rock material that is in ledges, bedded deposits, and unstratified masses, which cannot be removed without systematic drilling and blasting; and firmly cemented conglomerate deposits possessing the characteristics of solid rock impossible to remove without systematic drilling and blasting. The removal of any concrete or masonry structures, except pavements, exceeding 1/2 cubic yard in volume that may be encountered in the work shall be included in this classification. If at any time during excavation, including excavation from borrow areas, the Contractor encounters material that may be classified as rock excavation, such material shall be uncovered and the Contracting Officer notified by the Contractor. The Contractor shall not proceed with the excavation of this material until the Contracting Officer has classified the materials as common excavation or rock excavation and has taken cross sections as required. Failure on the part of the Contractor to uncover such material, notify the Contracting Officer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Contracting Officer for the areas of work in which such deposits occur.

1.5.2 Common Excavation

Common excavation shall include the satisfactory removal and disposal of all materials not classified as rock excavation.

1.6 BLASTING

Explosive blasting is not permitted.

1.7 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be disposed of in designated waste disposal or spoil areas. Satisfactory material removed from excavations shall be used, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material authorized to be wasted shall be disposed of in designated areas approved for surplus material storage or designated waste areas as directed. Newly designated waste areas on Government-controlled land shall be cleared and grubbed before disposal of waste material thereon. Coarse rock from excavations

shall be stockpiled and used for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL EXCAVATION

The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with the typical sections shown and the tolerances specified in paragraph FINISHING. Satisfactory excavated materials shall be transported to and placed in fill or embankment within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Such excavated material and the satisfactory material ordered as replacement shall be included in excavation. Surplus satisfactory excavated material not required for fill or embankment shall be disposed of in areas approved for surplus material storage or designated waste areas. Unsatisfactory excavated material shall be disposed of in designated waste or spoil areas. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be excavated from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.1.1 Drainage Structures

Excavations shall be made to the lines, grades, and elevations shown, or as directed. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm, level, stepped, or serrated surface. Loose disintegrated rock and thin strata shall be removed. When concrete or masonry is to be placed in an excavated area, the bottom of the excavation shall not be disturbed. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed. Where pile foundations are to be used, the excavation of each pit shall be stopped at an elevation 1 foot above the base of the footing, as specified, before piles are driven. After the pile driving has been completed, loose and displaced material shall be removed and excavation completed, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry.

3.2 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from approved sources selected by the Contractor. Unless otherwise provided in the contract, the Contractor

shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.

3.3 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

The Contractor shall notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, borrow pits and other excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.4 GRADING AREAS

Where indicated, work will be divided into grading areas within which satisfactory excavated material shall be placed in embankments, fills, and required backfills. The Contractor shall not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing.

3.5 BACKFILL

Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure. Ground surface on which backfill is to be placed shall be prepared as specified in paragraph PREPARATION OF GROUND SURFACE FOR EMBANKMENTS. Compaction requirements for backfill materials shall also conform to the applicable portions of paragraphs PREPARATION OF GROUND SURFACE FOR EMBANKMENTS, EMBANKMENTS. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.6 PREPARATION OF GROUND SURFACE FOR EMBANKMENTS

3.6.1 General Requirements

Ground surface on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsatisfactory material; plowed, disked, or otherwise broken up to a depth of 8 inches; pulverized; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of embankment

materials to assure adequate bond between embankment material and the prepared ground surface.

3.6.2 Frozen Material

Embankment shall not be placed on a foundation which contains frozen material, or which has been subjected to freeze-thaw action. This prohibition encompasses all foundation types, including the natural ground, all prepared subgrades (whether in an excavation or on an embankment) and all layers of previously placed and compacted earth fill which become the foundations for successive layers of earth fill. All material that freezes or has been subjected to freeze-thaw action during the construction work, or during periods of temporary shutdowns, such as, but not limited to, nights, holidays, weekends, winter shutdowns, or earthwork operations, shall be removed to a depth that is acceptable to the Contracting Officer and replaced with new material. Alternatively, the material will be thawed, dried, reworked, and recompacted to the specified criteria before additional material is placed. The Contracting Officer will determine when placement of fill shall cease due to cold weather. The Contracting Officer may elect to use average daily air temperatures, and/or physical observation of the soils for his determination. Embankment material shall not contain frozen clumps of soil, snow, or ice.

3.7 EMBANKMENTS

Earth embankments shall be constructed from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. The material shall be placed in successive horizontal layers of loose material not more than 8 inchesin depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical with those requirements specified in paragraph SUBGRADE PREPARATION. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.8 SUBGRADE PREPARATION

3.8.1 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. After rolling, the surface of the subgrade for roadways shall not show deviations greater than 1/2 inch when tested with a 16 foot straightedge applied both parallel and at right angles to the centerline of

the area. The elevation of the finish subgrade shall not vary more than 0.05 foot from the established grade and cross section.

3.8.2 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas and railroads, each layer of the embankment shall be compacted to at least 90 percent of laboratory maximum density.

3.8.2.1 Subgrade for Railroads

Subgrade for railroads shall be compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials.

3.8.2.2 Subgrade for Pavements

Subgrade for pavements shall be compacted to at least 95 percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, the top 8 inches of subgrade shall be scarified, windrowed, thoroughly blended, reshaped, and compacted.

3.9 FINISHING

The surface of excavations, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION. Gutters and ditches shall be finished in a manner that will result in effective drainage.

3.10 TESTING

Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. If the Contractor elects to establish testing facilities, no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved by the Contracting Officer. Field in-place density shall be determined in accordance with ASTM D 1556. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.10.1 Fill and Backfill Material Gradation

One test per 50 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM D 1140.

3.10.2 In-Place Densities

a. One test per 5000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per 500 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

c. One test per 100 linear feet, or fraction thereof, of each lift of embankment or backfill for roads.

d. One test per 100 linear feet, or fraction thereof, of each lift of embankment or backfill for railroads.

3.10.3 Check Tests on In-Place Densities

If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 as follows:

a. One check test per lift for each 750 square feet, or fraction thereof, of each lift of fill or backfill compacted by other than hand-operated machines.

b. One check test per lift for each 200 square feet, of fill or backfill areas compacted by hand-operated machines.

c. One check test per lift for each 50 linear feet, or fraction thereof, of embankment or backfill for roads.

d. One check test per lift for each 50 linear feet, or fraction thereof, of embankment or backfill for railroads.

3.10.4 Moisture Contents

In the stockpile, excavation, or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions shall be performed. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer.

3.10.5 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 50 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.10.6 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.11 SUBGRADE AND EMBANKMENT PROTECTION

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain

effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, ballast, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 02451

CONCRETE FILLED STEEL PIPE PILES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 103	(1995) Specification for Steel Castings, Carbon, for General Application

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 252	(1998) Welded and Seamless Steel Pipe Piles
ASTM A 709/A 709M	(1997be1) Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges
ASTM D 4945	(2000) Test Method for High-Strain Dynamic Testing of Piles

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

1.2 BASIS FOR BIDS

Bids shall be based on the number of piles as indicated, and on lengths from estimated pile tip elevation to cutoff as follows:

Number of piles	Length per pile, feet
6	77.5

From the data obtained as a result of driving the test piles and load tests specified hereinafter, the Government will determine and will list for the Contractor the "calculated" pile tip elevations and the driving resistances for all piles. This list shall be used as the basis for ordering piles. Payment will be on the basis of length of piling from cutoff elevation to final tip elevation, established by the requirements specified elsewhere in this section. Should the total number of piles or the number of each length vary from that specified as the basis for bidding, an adjustment on

the contract price and the time for completion will be made. If excavation is made adjacent to piling and below the grade indicated and if piling is driven before backfilling of over-excavation, no payment will be made for the length of piling equal to the depth of the over-excavation. No additional payment will be made for cutting off piles, for any portion of a pile remaining above cutoff elevation, or for damaged or rejected piles.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Equipment; GA.

a. Descriptions of all pile driving equipment to be employed in the work, prior to commencement of pile installations. This shall include details of the pile hammer, power plant, leads, pile cushion, cap block, and helmet.

b. Provide WEAP analysis that verifies the adequacy of the selected pile driving equipment for this specific project. No test pile can be driven until all pile driving equipment is approved by the Engineer.

SD-04 Drawings

Concrete Filled Steel Pipe Piling; GA.

Drawings demonstrating compliance of driving equipment and steel pipe piling with contract documents. Drawings shall include shop and erection details, end closures, splices, and driving helmets.

SD-09 Reports

Test Piles; GA.

A complete report on the dynamic pile load test, within 7 days of completion of load test, including, but not limited to, a description of the pile driving equipment, driving records for test piles, complete test data, analysis of test data, and recommended pile driving resistance (blows per foot) to achieve a 425 k ultimate capacity based on the dynamic pile load test results. The report shall be prepared by or under the direct supervision of a registered professional engineer experienced in dynamic pile load testing and dynamic pile load test analysis.

SD-18 Records

Steel Pipe Piles; GA.

A complete and accurate record of each driven pile, within 3 days of completion of driving. The record shall indicate the pile location (as driven), driven length, embedded length, final elevations of tip and top, pile weight, butt and tip diameter, quantity and strength of concrete used in each pile, number of splices and locations, blows required for each foot

of penetration throughout the entire length of the pile and for the final 6 inches of penetration, and the total driving time. The record shall also include the type and size of the hammer used, the rate of operation, and the type and dimensions of driving helmet, pile cushion, and cap block used. Any unusual conditions encountered during pile installation shall be recorded and immediately reported to the Contracting Officer.

1.4 QUALIFICATIONS

The work shall be performed by a general contractor or a specialty subcontractor specializing in the specified foundation system and having experience installing the specified foundation system under similar subsurface conditions.

1.5 EQUIPMENT

1.5.1 Pile Hammers

The hammer used shall have a delivered energy suitable for the total weight of the pile, the character of subsurface material to be encountered, and the pile capacity to be developed. The driving energy of the hammer shall be not less than 12,000 foot-pounds.

1.5.2 Driving Helmets and Pile Cushions

A driving helmet, cap block, and pile cushion shall be used between the top of the pile and the ram to prevent impact damage to the pile. The driving helmet, cap block and pile cushion combination shall be capable of protecting the head of the pile, minimizing energy absorption and dissipation, and transmitting hammer energy uniformly over the top of the pile. The driving helmet shall fit loosely around the top of the pile so that the pile is not restrained if the pile tends to rotate during driving. The pile cushion and cap block may be of solid wood or of laminated construction using plywood, softwood, or hardwood boards or other cushion material as approved by the Contracting Officer. The pile cushion shall completely cover the top surface of the pile and shall be retained by the driving helmet. The minimum thickness of the pile cushion and of the cap block shall be 3 inches each and the thickness shall be increased so as to be suitable for the size and length of pile, character of subsurface material encountered, hammer characteristics, and required driving resistance.

1.6 EXISTING CONDITIONS

Subsurface soil data logs are shown on the drawings. The subsurface investigation reports are available for examination at the Army Corps of Engineers Headquarters in Philadelphia, Pennsylvania.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Concrete

Materials, mixing, and placing of concrete shall conform with the requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.1.2 Steel Pipe Piling

Steel pipes, conforming to ASTM A 252, Grade 2, having a wall thickness of 1/2 inch gage or thicker. Minimum nominal diameter shall be as indicated.

Provide end closures of forged steel, cast steel, steel plate, or other acceptable material as follows: forged steel, AISI 1020; cast steel, AASHTO M 103, Grade U-60-30. For flat steel plate end closures, provide plates not less than 3/4 inch thick, in accordance with ASTM A 709/A 709M Grade 36. Provide end enclosures not extending more than 1/4 inch beyond the surface of the shell, adequately welded to the shell.

Provide shells, preferably in one piece without splices. Where splicing is necessary, use extensions between the tip and butt end of at least 10 feet long. At the butt ends, use extensions 5 feet or more in length for approximately 75% of the shells within a footing. At the tip ends, use extensions, if required, 5 feet or more in length.

Splice shells by welding, using full penetration butt welds and acceptable backing bars, using acceptable sleeves with full perimeter fillet welds, or using another accepted design. Provide splices developing the yield strength of the shell, based on the indicated shell thickness. If the shell thickness exceeds the required indicated thickness, base the splice strength on the indicated shell thickness, unless a stronger splice is needed to resist driving forces.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Driving Steel Pipe Piles

3.1.1.1 Driving Procedure

Excavation shall be stopped at 1 foot above foundation grade before casings are driven. When pile driving is completed, excavation shall be completed to lines and grades shown. Piling shall be driven without interruption to the "calculated" tip elevation to reach a driving resistance in accordance with the schedule which the Government will prepare from the test-pile driving data. The pile hammer used for driving shall be the same type and operated at the same rate and in the same manner as that used for driving the test piles. Diesel powered hammers shall be operated at the rate recommended by the manufacturer throughout the entire driving period. Sufficient pressure shall be maintained at the steam hammer so that:

a. For a double-acting hammer, the number of blows per minute during and at the completion of driving of a pile is equal approximately to that at which the hammer is rated.

b. For a single-acting hammer, there is a full upward stroke of the ram.

c. For a differential-type hammer, there is a slight rise of the hammer base during each upward stroke.

A new pile cushion shall be used at the start of driving for each pile and the cushion shall be replaced whenever it has become highly compressed, charred, burned, or deteriorated in any manner during driving. The Contracting Officer shall be notified, and will determine what procedure shall be followed, if a pile reaches the "calculated" pile tip elevation without reaching the required driving resistance (blows per foot); or if

the required driving resistance is reached before the "calculated" pile tip elevation. Piling will not be driven within a radius of 20 feet of any other piling in which the concrete has been placed for less than 7 days.

3.1.1.2 Tolerance in Driving

Casings shall be driven with a variation of not more than 0.25 inch per foot of pile length from the vertical. Butts shall be within 4 inches of the location indicated. Manipulation of casings to force them into position will not be permitted. Piling shall be checked by the Contractor for heave, after all piles are driven in a cluster or under any conditions of relatively close spacing; those found to have heaved shall be redriven to the required tip elevation. The center of gravity of each group of footing piles shall be maintained by templates or other approved means to conform to locations shown. Pilings damaged, mislocated, or driven out of alignment shall be replaced or additional piling driven as directed.

3.1.2 Filling of Steel Pipe Piles

Each pipe pile shall be visually inspected by the Contractor after its final installation and prior to depositing the concrete and placing the reinforcement. The Contracting Officer shall be notified prior to each such inspection to allow for quality assurance inspections of all casings. The inspection will verify the integrity of the piling throughout its length and the absence of distortion and reduction in area. Concrete shall be deposited in the casing in a continuous operation by means of a funnel or hopper; after all mud, water and other extraneous material has been removed from its interior.

3.1.3 Cutting of Steel Pipe Piles

Cutting of piling shall be with an acetylene torch or saw with prior approval by the Contracting Officer.

3.1.4 Welding

Shop and field welding, qualification of welders, and inspection of welds shall be in accordance with AWS D1.1.

3.1.5 Splicing

Splices may be used after review by the Contracting Officer. No more than two splices per full length of casing will be permitted. They shall be able to transmit any vertical and lateral forces adequately, and in addition, shall develop no less than 50 percent of the flexural capacity of the ordinary pile cross section. Lateral joints shall be made with a continuous full penetration butt weld in accordance with AWS D1.1 or as approved by the Contracting Officer.

3.2 FIELD TESTS AND INSPECTIONS

3.2.1 Test Piles

3.2.1.1 Pile Driving

Test piles shall be driven in the manner specified for all piling elsewhere in this section. A record shall be kept for each test pile of the number of blows required for each foot of penetration throughout the entire length of the pile, the penetration per blow at such intervals as directed, and

the number of blows for the final 6 inches of penetration. The record shall include the type and size of the hammer used, the rate of operation, and the type and dimensions of casings. Any unusual occurrence during driving of the pile casing and any increase and decrease of driving resistance shall be recorded by the Contractor and brought to the attention of the Contracting Officer. The Government will use load test and test pile data to determine the "calculated" pile tip elevation and the necessary driving resistance (blows per foot) to provide the required 425 k ultimate capacity. Two test piles shall be driven in the locations indicated, with surrounding earth at the elevations shown. Test piles properly driven and located and with adequate driving resistance may be used in the finished work. Jetting will not be permitted.

3.2.1.2 Dynamic Pile Load Tests

Load tests shall be in accordance with ASTM D 4945, high strain dynamic testing method.

Perform dynamic testing only when the Engineer is present for witnessing. Notify the Engineer of a tentative schedule for testing at least 21 calendar days before starting the tests. Notify the Engineer of a firm date at least 48 hours before starting the tests, but give the notice between start of work on Monday and noon of the following Friday. Do not schedule dynamic test on Saturdays, Sundays, or holidays.

3.2.2 Concrete Testing

During Concrete placement, strength tests will be made by a testing service provided and paid for by the Contractor in accordance with requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. At least two specimens shall be taken from each random batch and one test will be made for every 3 piles with no less than two tests for any 1 day's operation.

-- End of Section --

SECTION 02457

ROUND TIMBER PILES

PART 1 GENERAL

1.1 ROUND TIMBER PILES

Round timber piles shall be driven for use in the timber fender system, as indicated. Four additional piles shall be driven for the clearance gauge support.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 569/A 569M	(1998) Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality
ASTM D 25	(1991) Round Timber Piles
ASTM D 1760	(1996) Pressure Treatment of Timber Products

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C3	(1997) Piles - Preservative Treatment by Pressure Processes
AWPA M4	(1999) Standard for the Care of Preservative-Treated Wood Products

FEDERAL SPECIFICATIONS (Fed. Spec.)

RR-W-410D	Wire Rope and Strand

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Pile Driving Equipment; GA.

Descriptions of all pile driving equipment to be employed in the work, prior to commencement of pile installations. This shall include details of the pile hammer, power plant, leads, cushion material, and helmet.

SD-04 Drawings

Timber Piles; GA.

Drawings, including shop and erection details, collars, and shoes as required, prior to commencing the work or ordering materials.

SD-18 Records

Pile Driving; GA.

A complete and accurate record of each driven pile within 3 days of completion of driving. The record shall indicate the pile location (as driven), diameter, driven length, embedded length, final elevations of tip and top, collars, shoes, locations, blows required for each foot of penetration throughout the entire length of the pile and for the final 6 inches of penetration, and the total driving time. The record shall also include the type and size of the hammer used, the rate of operation, and the type and dimensions of driving helmet and pile cushion used. Any unusual conditions encountered during pile installation shall be recorded and immediately reported to the Contracting Officer.

1.4 EXPERIENCE

The work shall be performed by a firm specializing in the specified foundation system and having experience installing the specified foundation system under similar subsurface conditions.

1.5 SUBSURFACE DATA

Subsurface soil data logs are shown on the drawings.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Pressure Treated Piles

Pressure treated piles shall be Douglas fir or Southern pine, clean-peeled, conforming to ASTM D 25. Piles shall be in one piece. Splices will not be permitted.

2.1.1.1 Marine Piling

Preservative treatment of piles exposed to seawater shall be in accordance with ASTM D 1760, Table 4 and ASTM D 1760, Table 3, Creosote or Creosote-Coal Tar Solution.

2.1.2 Untreated Piles

Untreated piles will not be permitted

2.1.3 Pile Shoes

Pile shoes, where required as indicated on the drawings, shall be

manufactured from steel conforming to ASTM A 569/A 569M. Welding procedures shall be in accordance with a nationally recognized welding code. Shoes shall be cleaned and painted with at least one coat of paint. The color and paint shall be the manufacturer's standard. Point-type shoes shall conform to the requirements of Table I. The length of the joints formed by the intersection of the sides shall not be less than one half of the height of the shoe and shall be fully welded.

TABLE I

POINT-TYPE STEEL SHOE FOR TIMBER PILE

		Dimensions (inches)			
Size	Pile Tip Diameter	Height	Width	Joint Length	Thickness
A	5 to 10	9.0	9.5	4.5	3/16
B	8 to 12	11.0	11.0	5.5	3/16

1. Dimensions shall be within 5 percent of values shown.

2. Boot-type shoes shall conform to the requirements of Table II.

TABLE II

BOOT-TYPE STEEL SHOE FOR TIMBER PILE

		Dimensions (inches)			
Size	Pile Tip Diameter	Top Diameter	Bottom Diameter	Height	Thickness
D	6	6.0	5.625	3.375	3/16
E	7	7.0	6.625	3.500	3/16
F	8	8.0	7.625	3.625	3/16
G	9	9.0	8.625	3.750	3/16

1. Dimensions shall be within 5 percent of values shown.

2.2 INSPECTION FOR PRESERVATIVE TREATMENT

The Contractor shall notify the Contracting Officer not less than 2 weeks prior to the start of preservative treatment, stating the place where treatment will be done. Arrangements for access and facilities in this regard shall be made by the Contractor. In lieu of the inspection specified above, the Contracting Officer may elect to accept manufacturer's certificates stating that marine piling conforms to the requirements of AWPA C3.

2.3 WIRE ROPE

Wire rope shall be galvanized, Class 1, 6x7, improved plow steel with a fiber core, in accordance with RR-W-410D.

2.4 STAPLES

Staples shall be galvanized with pointed sharp ends.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Handling

Each pile shall be fitted on the tip with a metal shoe, where required as indicated on the drawings. Piles shall be inspected in the leads, and where the protective shell or treated wood is impaired, between cutoff and a point which will be not less than 10 feet below the ground; the piles shall be repaired in accordance with AWPA M4, unless the pile is damaged to such extent that it is rejected. Pile shall be laterally supported during driving, but shall not be unduly restrained from rotation in the leads. Where pile orientation is essential, the orientation shall be maintained during driving. Battered piles shall be supported to prevent excess bending stresses in the pile. When necessary, collars shall be placed around the pile head to prevent brooming. Cant hooks shall not be used in handling treated piles. Cutting of piles shall be with pneumatic tools, sawing, or other means approved by the Contracting Officer. Holes for bolts shall be sized to ensure a driving fit. Where indicated, holes shall be counterbored for the bolt heads and washers.

3.1.2 Pile Driving

Excavation shall be stopped at 1 foot above foundation grade before piles are driven. When pile driving is completed, excavation shall be completed to lines and grades shown. Permanent piles shall be driven without interruption to the "calculated" tip elevation to reach a driving resistance in accordance with the schedule which the Government will prepare from the test-pile driving data. The pile hammer used for driving shall be the same type and operated at the same rate and in the same manner as that used for driving the test piles. Diesel powered hammers shall be operated at the rate recommended by the manufacturer throughout the entire driving period. Sufficient pressure shall be maintained at the hammer so that for double-acting hammer, the number of blows per minute during and at the completion of driving of a pile is equal approximately to that at which the hammer is rated, for single-acting hammer, there is a full upward stroke of the ram, a d for differential-type hammer, there is a slight rise of the hammer base during each upward stroke. The pile cushion or capblock shall be replaced whenever it becomes damaged, split, highly compressed, charred or burned, or has become spongy or deteriorated in any manner. The use of small wood blocks, wood chips, rope, or other material permitting excessive loss of hammer energy will not be permitted. The Contracting Officer shall be notified, and will determine what procedure shall be followed, if a pile reaches the "calculated" pile tip elevation without reaching the required driving resistance; or if the required driving resistance is reached before the "calculated" pile tip elevation.

3.1.3 Tolerances in Driving

Piles shall be driven with a variation of not more than 1/4 inch per foot of pile length from the vertical for plumb piles or more than 1/2 inch per foot of pile length from the required angle for batter piles. Butts shall be within 4 inches of the location indicated. Manipulation of piles to force them into position will not be permitted. All piles shall be checked by the Contractor for heave. Piles found to have heaved shall be redriven to the required tip elevation. Piles damaged, mislocated, or driven out of

alignment shall be replaced or additional piles driven as directed.

3.1.4 Jetting

Jetting of piles will not be permitted.

3.1.5 Surface Treatment

After piles have been driven and cut off, all cut, bored, and dapped surfaces shall be treated as specified in AWPA M4.

3.2 PILE DRIVING EQUIPMENT

3.2.1 Pile Hammers

The hammer furnished shall have a capacity at least equal to the hammer manufacturer's recommendation for the total weight of pile and character of subsurface material to be encountered. For piles of any length, the maximum driving energy of the hammer shall be 20,000 foot-pounds.

3.2.2 Driving Helmets and Pile Cushions

A driving helmet or cap, including a pile cushion or cap block, shall be used between the top of the pile and the ram to prevent impact damage to the pile. The driving helmet, or cap and pile cushion combination, shall be capable of protecting the head of the pile, minimizing energy absorption, and transmitting hammer energy uniformly and consistently during the entire driving period. The driving helmet or cap shall fit snugly on the top of the pile so that the energy transmitted to the pile is uniformly distributed over the entire surface of the pile head. During the test-pile period, the Contractor shall demonstrate to the Contracting Officer that the equipment to be used on the project performs the above functions. The pile cushion may be a solid or laminated softwood block with the grain parallel to the pile axis and enclosed in a close-fitting steel housing. The thickness of block shall be suitable for the length of pile to be driven and the character of subsurface material to be encountered. Generally, thicker blocks are required for longer piles and softer subsurface material.

3.2.3 Capblocks

The capblock used between the driving cap and the hammer ram may be of solid hardwood block with grain parallel to the pile axis and enclosed in a close fitting steel housing or may consist of aluminum and approved industrial type plastic laminate discs stacked alternately in a steel housing. Steel plates shall be used at the top and the bottom of the capblock. Where the block is other than that specified above, the Contractor shall submit to the Contracting Officer, at least 2 weeks before the start of test pile driving operations, detailed drawings of the proposed capblock accompanied by records of its successful use. If a wood capblock is used, it shall not be replaced during the final driving of any pile. The use of small wood blocks, wood chips, rope, or other material permitting excessive loss of hammer energy will not be permitted.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 02466

DRILLED FOUNDATION CAISSONS (PIERS AND ABUTMENTS)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI International (ACI)

ACI 336.1	Standard Specification for the Construction of Drilled Piers
Standards	Standards and Specifications for the Foundation Drilling Industry

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1586	(1999) Penetration Test and Split-Barrel Sampling of Soils

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

1.2 DEFINITIONS

The words and terms used in this specification conform to the definitions given in ACI 336.1 and the following:

1.2.1 Excavation

Removal of materials encountered within the indicated or specified limits, regardless of the nature of the material encountered and the method by which removed and also including:

a. Dewatering.

b. Legal disposal of waste materials and storage of suitable excavated materials as required.

1.2.2 Drilled Shaft Installation Plan

Detailed plan of the proposed methods and equipment to be used for the

shaft excavation. The Drilled Shaft Installation Plan shall be used to install the drilled shafts and shall be approved by the Contracting Officer.

1.2.3 Geotechnical Engineer

Professional Engineer specializing in soils engineering/geology and registered in the Commonwealth of Pennsylvania, who is retained by the Contractor's Testing and Inspection Agency engaged to provide geotechnical consultation for the installation of the drilled shaft foundations.

1.2.4 Obstruction

Cobble, boulder, plain or reinforced concrete, or any other natural or manmade object above the designated drilled shaft tip elevation which cannot be drilled with conventional earth augers and/or underreaming tools, and which requires the use of special rock augers, core barrels, air tools, and/or other method of hand excavation.

1.2.5 Production Drilled Shaft Foundation

Drilled shaft foundation, installed using construction methods specified in the Drilled Shaft Installation Plan, capsule of supporting the imposed structure loads.

1.2.6 Bearing Stratum

Stratum of satisfactory soil providing principle support of structure loads through friction along the shaft and end-bearing at the base of the shaft. For the abutments, the bearing stratum is the very stiff to hard, lacustrine clay while at the piers it is very dense alluvial sand and gravel.

1.2.7 Severe Water Condition

Infiltration of groundwater at or near the bottom of the excavation exceeding 1/2 inch rise per minute.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Drilled Foundation Caissons; GA.

A certified copy of the survey. Lines and levels shall be established and caisson centerline locations staked and maintained by a registered surveyor or engineer provided by the Contractor.

SD-08 Statements

Qualifications; GA.

Qualifications of the foundation system Contractor shall show by a list of

a minimum of 5 projects that he has been engaged in the successful installation of drilled foundation caissons for at least 5 years employing the installation method proposed for this Contract.

SD-09 Reports

Penetration Tests; GA.

Test Results.

SD-18 Records

Drilled Foundation Caissons; GA.

Detailed records in an approved form, for each caisson, showing shaft and bell diameters, depths of test holes, top and bottom elevations, bearing strata description, casing description, water conditions, concrete strength, concrete volume, rock elevations, dates of excavation and concrete placement, and other pertinent information. Upon completion of caisson work, the Contractor shall provide a record of centerline locations based on the survey of the registered surveyor or engineer provided by the Contractor. In addition, corrective measures shall be similarly recorded. A complete tabulation of all records pertaining to approved caissons shall be delivered to the Contracting Officer.

Drilled Shaft Installation Plan; GA

A complete drilled shaft installation shall be provided, and include the following:.

a. Catalog data for proposed auguring and drilling equipment.

b. Detailed procedures for normal concrete placement and for removal of temporary steel casing during concrete placement. Detailed procedures for tremie concrete placement or pumping of concrete, if necessary for construction,

c. Detailed schedule showing the sequence of installation to permit inspection of drilling operations, subgrade, reinforcing steel and concrete placement.

1.4 QUALIFICATIONS

1.4.1 Specialty Subcontractor

The work shall be performed by a specialty subcontractor, specializing in the specified foundation system and having experience installing the specified foundation system under similar subsurface conditions.

1.4.2 Welding

Detail and field welding shall be in accordance with AWS D1.1. Qualification of welding procedures, welders, and welding operators shall be in accordance with AWS D1.1, Section 5. Records of test results of welding procedures not prequalified and copies of records for each qualified welding operator, containing records on positions of welding and types of electrode qualifications, shall be kept by the Contractor and be available for examination by the Contracting Officer.

1.5 PROJECT/SITE CONDITIONS

1.5.1 Subsurface Data

Subsurface soil data logs are shown on the drawings. The subsurface investigation report and samples of materials, as taken from subsurface investigations, are available for examination at GTS Technologies, Inc.

1.5.2 Caisson Drilling Equipment

Caisson drilling equipment shall have the minimum torque capacity and downward force capacity for the contract site conditions.

1.6 SEQUENCE OF WORK

1.6.1 Caisson Excavation

The Slurry Displacement Method is not permitted for excavating. The drilled foundation of caissons or groups of caissons shall be performed so that reinforcing steel and concrete placement is a continuous operation performed the same day that the excavation is completed. Excavations shall not be left open overnight.

1.6.2 Acceptance

Concrete shall be placed within 3 hours after approval of the completed excavation.

1.6.3 Contaminated Materials

Contaminated materials may be present in the excavation. The excavation work shall be performed in accordance with Section 02111, EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

1.7 SUPERVISION, INSPECTION, AND SAFETY

1.7.1 Contractor Supervision

The Contractor shall provide for the supervision of all phases of drilled pier construction. Supervision shall be the Contractor's responsibility as outlined in Quality Control provisions of the SPECIAL CONTRACT REQUIREMENTS. Each drilled pier excavation shall be checked by the Contractor for its depth, water removal, cleanup, workmanship, and for all tolerance requirements before any concrete is placed.

1.7.2 Government Inspection

The Contracting Officer will inspect each drilled pier excavation. Concrete shall not be placed until the excavation has been approved by the Contracting Officer. The Contractor shall furnish the Contracting Officer all necessary equipment required for proper inspection of drilled pier excavations.

1.7.3 Safety Precautions for Workmen and Inspectors

1.7.3.1 Confined Space Entry

A confined space entry program shall be established in accordance with OSHA Section 29 CFR 1910.146, which restricts access and control entry at each

excavation.

1.7.3.2 Life Line

Each person entering a drilled pier excavation shall be provided with a life line rigged so that the person can be immediately hoisted out of the excavation in an emergency. The life line shall be suitable for instant rescue, securely fastened to a shoulder harness, and separated from any line used to remove excavated materials. No person shall be lowered into a drilled pier excavation prior to casing the shaft through the overburden.

1.7.3.3 Ventilation

Each drilled pier excavation shall be provided with a ventilating device of sufficient capacity to assure a safe and healthy atmosphere before workmen and inspectors are permitted to enter the drilled pier excavation and during all work periods. Gas testing equipment shall be provided. Each drilled shaft foundation shall be tested for both toxic and explosive gases in accordance with the established permit that is required for confined space entry. The Engineer shall be notified immediately upon discovery of toxic and/or explosive gases.

PART 2 PRODUCTS

2.1 CONCRETE WORK

Concrete work shall be in accordance with requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE, as modified herein:

2.1.1 Coarse Aggregate

Maximum size of coarse aggregate shall be 1.5 inches..

2.1.2 Covered Reinforcing Steel

Covered reinforcing steel shall conform to ASTM A 775, Grade 60 ksi. Steel shall be spliced or connected into cages inserted securely in the caissons, in position and alignment, as shown, prior to concrete placement. ASTM A 615 reinforcing bars shall be used for tie reinforcement.

2.1.3 Strength

Concrete strength shall be 3000 psi at 28 days. Slump shall be from 5 to 7 inches.

2.1.4 Retarder

A retarder admixture shall be added to the concrete mix to prevent arching of the concrete during casing withdrawal and to prevent setting of the concrete until after the casing is withdrawn.

PART 3 EXECUTION

3.1 PREPARATION

a. Caissons shall be excavated to established depths and dimensions shown. Bottoms of caissons shall be cleaned of loose or soft material and leveled. Excavated material shall be disposed of in accordance with Section 02300 EARTHWORK and Section 02111

EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.

b. In drilling caissons, the surrounding soil and the earth walls shall be adequately and securely protected against cave-ins, displacement of the surrounding earth, and retention of ground water, by means of temporary steel casings. The Contractor shall take pre-cautions to prevent damage to the concrete piers or abutments. Casings shall have outside diameters not less than indicated shaft sizes, shall be a minimum of 1/2 inch thick, and shall not be removed if the structural integrity of the caisson will be impaired, as determined by the Contracting Officer. Temporary steel casings shall be withdrawn, as the concrete is being placed, maintaining sufficient head of concrete within the casing to prevent extraneous material from falling in from the sides and mixing with the concrete. Casings may be jerked upward a maximum of 4 inches to break the bottom seal, but thereafter shall be removed with a smooth, continuous motion. The casing shall not be vibrated internally before the casing is withdrawn.

c. The steel casings shall be delivered to the site in undamaged condition. The casings shall be handled and protected to maintain round shape to within 2% tolerance.

d. The inside of steel casings shall be thoroughly cleaned and oiled before reuse. The temporary casing shall be fabricated using full penetration welds.

e. The temporary casing shall be in place from the caisson top to the ground surface until the concrete has set if the elevation of the top of the caisson is below the adjacent ground surface.

f. The outside diameter of permanent casing shall be the same as the nominal shaft diameter. The temporary steel casing shall be of adequate strength to withstand handling stresses, concrete pressure, water and soil pressures, and installation procedures to prevent water seepage.

g. Water that flows into the excavations shall be continuously removed and all water shall be removed from the excavation bottom, to the extent possible, prior to concrete placement. The maximum permissible depth of water will be 2 inches. In the event of a severe water condition that makes it impossible or impractical to dewater the excavation, concrete shall be placed using underwater tremie after water movement has stabilized.

h. A mechanical device shall be provided to continuously check the top of concrete elevation inside the casing while the casing is being withdrawn. The device shall be approved prior to its use.

i. Each caisson excavation will be inspected and approved by the Contracting Officer prior to placing concrete. A record of all inspections, with related construction changes, shall be kept by the Contractor. The Contractor shall provide support personnel for inspection and testing procedures.

j. At locations where the casing cannot be withdrawn, fill the void between the casing and the excavation shall be filled with a thick grout that is approved by the Engineer.

3.2 INSTALLATION

a. Concrete shall be continuously placed by methods that ensure against segregation and dislodging of excavation sidewalls, and shall completely fill the shaft. Concrete shall be placed by pumping or drop chutes in dry holes and by tremie or pumping in wet holes. The discharge shall be kept a minimum of 3 feet below the fresh concrete surface during placement. Drilling of caissons or driving of casings shall not be within 20 feet of concrete placed within the last 3 days.

b. Concrete shall be brought to a true level surface inside the shaft and a full width cross key formed, or dowels installed, should it become necessary to interrupt placing concrete in any caisson. Prior to placing additional concrete, surfaces shall be cleaned of laitance and slush with one-to-one portland cement grout. The grout shall have a water-cement ratio not exceeding that of the concrete.

c. Concrete shall be vibrated for full height of caisson.

3.3 TOLERANCES

a. Any caisson out of center or plumb beyond the tolerance specified shall be corrected as necessary to comply with the tolerances and the Contractor shall bear any cost of correction.

b. Cross sections of shafts shall not be less than 98% of the design dimensions.

c. Caissons shall be installed with top location deviating a maximum of 3 inches or 4.2% of the shaft diameter, whichever is less, from centerline locations.

d. Vertical caissons shall be installed plumb within a maximum of not more than 2% of the shaft length.

3.4 PENETRATION TESTS

Penetration Tests shall conform to the following:

a. Before excavation, penetration tests, in all caisson locations, to determine bearing conditions, and verify that the bearing stratum has been encountered shall be made in accordance with ASTM D 1586.

b. Minimum blow count shall be 50 per foot below the proposed caisson tip elevations at the piers and 30 blows per foot at the abutments. Penetration tests shall be taken to a depth of 20 feet below the bearing elevation. The Contractor shall obtain and retain jar samples, as directed by the Contracting Officer.

c. If the minimum blow count is not obtained at the proposed caisson tip elevation, the shaft shall be extended into the bearing stratum a minimum depth of 20 feet at piers and 10 feet at abutments.

d. Reports shall be submitted to the Contracting Officer in accordance with ASTM D 1586.

The Contracting Officer will approve tests and authorize subsequent concrete placement or initiate redesign procedures.

3.5 PROTECTION

Protection shall be provided around top of the excavation to prevent debris from being dislodged into the excavation and concrete.

-- End of Section --

SECTION 02740

BITUMINOUS ROAD PATCHING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

The work shall consist of pavement patches composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses, and typical cross sections shown on the drawings. Each course shall be constructed to the depth, section, or elevation required by the existing, adjacent pavement and shall be rolled, finished, and approved before the completion of this work.

Since the approximate surface area of the bituminous roadway patching is small, aggregate sources and gradations, and bituminous mix designs that have been accepted by the Pennsylvania Department of Transportation from approved PennDOT material suppliers, may be provided for the bituminous patching work.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 40	(1978; R 1983) Sampling Bituminous Materials

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 183	(1997) Sampling and the Amount of Testing of Hydraulic Cement
ASTM D 5	(1997) Penetration of Bituminous Materials
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 140	(1998) Sampling Bituminous Materials
ASTM D 1461	(1985; R 1994) Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 1856	(1995a) Recovery of Asphalt From Solution by Abson Method
ASTM D 2172	(1995) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock
ASTM D 2489	(1984; R 1994) Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 3381	(1992; R 1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3515	(1996) Hot-Mixed, Hot-Laid Bituminous Paving Mixtures

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION (PENNDOT)

PennDOT Publication 408	(2000) Standard Specifications

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Equipment; FIO

List of proposed equipment to be used in performance of construction work, including descriptive data.

Job-Mix Formula (JMF); GA

Mix design at least 30 days before it is to be used.

SD-09 Reports

Sampling and Testing; GA

Copies of initial and in-place test results.

Aggregates; GA. QC Monitoring; GA.

Aggregate and QC test results.

Sources of Aggregates; GA. Bituminous Materials; GA.

Copies of field tests results within 24 hours after the tests are performed. Certified copies of tests results for approval not less than 30 days before material is required for the work.

Tests; GA

Copies of all test results for bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

SD-13 Certificates

Asphalt Cement Binder; GA.

Copies of certified test data.

Testing Laboratory; FIO.

Certification of compliance.

Plant Scale Calibration Certification

SD-14 Samples

Sources of Aggregates; FIO.

Samples of a new source of aggregates for approval.

SD-18 Records

Job Mix Gradation of Aggregates; GA

Copies of proposed job mix gradation of Aggregates.

Waybills and Delivery Tickets; FIO.

Copies of waybills and delivery tickets during the progress of the work. Certified waybills and delivery tickets for all aggregates actually used.

Mix Design; GA.

Proposed PennDOT accepted mix design.

Material Acceptance; GA

Acceptance test results

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing shall be permitted until the facilities have been inspected and approved. The first inspection shall be at the expense of the Government. Cost incurred for any subsequent inspection required because of failure of the facilities to pass the first inspection will be charged to the Contractor. Tests shall be performed in sufficient numbers and at the locations and times directed to ensure that materials, mixtures and compaction meet specified requirements. Samples of finished pavement, including samples that span the longitudinal joint, shall be obtained by the Contractor. Sizes of samples shall be suitable to determine conformance to density, thickness, and other specified requirements. Samples shall be taken at start of paving operations and at intervals throughout paving operations as directed. Samples of plant mixtures will be taken and tested by the Contractor to determine conformance to specified requirements. Certified copies of the test results shall be furnished to the Contracting Officer.

1.4.1 Aggregates

Sampling shall be in accordance with ASTM D 75. Samples of aggregates shall be tested at the start of production and at intervals during production of the bituminous base course. Intervals and points of sampling will be as approved. Test results on these samples will be the basis for approval of specific lots of aggregates.

1.4.2 Mineral Filler

Sampling of mineral filler shall conform to ASTM C 183.

1.4.3 Bituminous Materials

Sampling of bituminous materials shall conform to ASTM D 140.

1.5 PLANT, EQUIPMENT, MACHINES, TOOLS, AND PERSONNEL

1.5.1 Bituminous Plant

The bituminous plant shall be of such capacity, as specified herein, to produce the quantities of bituminous mixtures required for the project within the completion time of the contract. Hauling equipment, paving machines, rollers, miscellaneous equipment, and tools shall be provided in sufficient numbers and capacity and in proper working condition to place the bituminous paving mixtures at a rate equal to the plant output. A sufficient number of adequately trained personnel shall be available during paving operations to produce a pavement meeting the requirements in this specification.

1.5.2 Mixing Plants

Mixing plants shall be an automatic or semiautomatic controlled, commercially manufactured unit designed, coordinated, and operated to consistently produce a mixture within the job-mix formula (JMF). Drum mixers will be prequalified at the production rate to be used during actual mix production. The prequalification tests will include extraction in accordance with ASTM D 2172 and recovery of the asphalt cement in accordance with ASTM D 1856. The penetration of the recovered asphalt binder shall not be less than 60 percent of the original penetration in accordance with ASTM D 5.

1.6 PLANT, EQUIPMENT, MACHINES AND TOOLS

1.6.1 General Requirements

Plant, equipment, machines and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times.

1.6.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a

separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.4.3 Power Brooms and Power Blowers

Power brooms and power blowers shall be suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.7 WEATHER LIMITATIONS

The hot-mix asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than 45 degrees F. The temperature requirements may be waived by the Contracting Officer, if requested; however, all other requirements, including compaction, shall be met.

PART 2 PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of crushed stone, crushed gravel, screenings, natural sand and mineral filler, as required. The portion of material retained on the No. 4 sieve is coarse aggregate. The portion of material passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate. The portion passing the No. 200 sieve is defined as mineral filler.

2.1.1 Coarse Aggregate

Coarse aggregate shall consist of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances.

2.1.2 Fine Aggregate

Fine aggregate shall consist of clean, sound, tough, durable particles. The aggregate particles shall be free from coatings of clay, silt, or any objectionable material and shall contain no clay balls.

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to ASTM D 3381 Table 2, Viscosity Grade AC-20.

2.3 MIX DESIGN

The Contractor may propose to use bituminous pavement courses and descriptions that are produced by local asphalt plants that provide bituminous pavement for projects constructed for the Pennsylvania Department of Transportation.

2.3.1 Bituminous Wearing Course

The bituminous wearing course shall be PennDOT ID-2 wearing course mix, which meets the requirements of PennDOT Publication 408, Section 401. The use of reclaimed asphalt pavement or flyash is not permitted.

2.3.2 Bituminous Binder Course

The bituminous binder course shall be PennDOT ID-2 binder course mix, which meets the requirements of PennDOT Publication 408, Section 401. The use of reclaimed asphalt pavement or flyash is not permitted.

2.3.3 Bituminous Base Course

The bituminous base course shall be PennDOT standard bituminous concrete base course mix, which meets the requirements of PennDOT Publication 408, Section 305. The use of reclaimed asphalt pavement or flyash is not permitted.

2.3.4 Subbase Course

The subbase course shall be PennDOT standard subbase course, which meets the requirements of PennDOT Publication 408, Section 350. Aggregates shall consist of crushed stone or slag, gravel, shell, sand, or other sound, durable, approved materials processed and blended or naturally combined. Aggregates shall be durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material.

2.3.5 Required Testing

If the Contractor is planning on using PennDOT approved bituminous mixes and aggregates course, the requirements for testing stated above. may be waived, provided that the Contractor submits a copy of a PennDOT certification that the proposed bituminous mixes and aggregate course where inspected, tested and certified by PennDOT inspectors. The Government reserves the option to require the submittal of materials for testing by the Government.

2.3.6 PRIME COAT

The bituminous prime coat shall be PennDOT prime coat, which meets the requirements of PennDOT Publication 408, Section 461.

PART 3 EXECUTION

3.1 PREPARATION OF UNDERLYING MATERIAL

Prior to constructing the subbase course, the underlying course or subgrade shall be cleaned of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the subbase course is placed.

3.2 PREPARATION OF ASPHALT BINDER MATERIAL

The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates. Modified asphalts shall be no more than 350 degrees F when added to the aggregates.

3.3 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the mix design The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to at least achieve 95 percent of coated particles. The moisture content of all hot-mix asphalt upon discharge from the plant shall not exceed 0.5 percent by total weight of mixture as measured by ASTM D 1461.

3.4 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt, the underlying course shall be cleaned of dust and debris. A tack coat shall be applied in accordance with the contract specifications.

3.5 TRANSPORTING AND PLACING

3.5.1 Transporting

The hot-mix asphalt shall be transported from the mixing plant to the site in clean, tight vehicles. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F. To deliver mix to the paver, the Contractor shall use a material transfer vehicle which shall be operated to produce continuous forward motion of the paver.

3.5.2 Placing

The mix shall be placed and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, the mixture shall be placed to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 feet. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface course shall be at the centerline of the

pavement. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

3.6 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.7 JOINTS

The formation of joints shall be made ensuring a continuous bond between the courses and to obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.7.1 Transverse Joints

The roller shall not pass over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing material at the joint . The cutback material shall be removed from the project. In both methods, all contact surfaces shall be given a light tack coat of asphalt material before placing any fresh mixture against the joint.

3.8 Grade

The final wearing surface of pavement shall conform to the elevations and cross sections shown and shall vary not more than 0.02 inches from the adjacent new and existing pavements.

3.9 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated.

When a compacted layer of 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall exceed 6 inches nor be less than 3 inches when compacted.

3.10 COMPACTION

Each layer of the subbase course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 1.5 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer is compacted through the full depth to at least 95 percent of laboratory maximum density. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory subbase course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.11 EDGES

Approved material shall be placed along the edges of the subbase course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1 foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the subbase course, as directed.

3.12 MAINTENANCE

The subbase course shall be maintained in a satisfactory condition until accepted.

3.13 CONDITIONING OF UNDERLYING COURSE

Prior to placing the bituminous base course, the underlying surface shall be cleaned of foreign or objectionable matter. The condition of the underlying course will be inspected and approved.

3.14 MIXING

3.14.1 Preparation of Mineral Aggregates

Each aggregate stockpile shall be placed and maintained in such a manner to prevent segregation. Rates of feed of aggregates shall be regulated so that the moisture content and temperature of aggregates will be within tolerances specified herein. Dry storage shall be provided for mineral filler.

3.14.2 Preparation of Bituminous Mixtures

Aggregates, mineral filler, and bitumen shall be conveyed into the mixer in proportionate quantities required to meet the JMF. The mixing time shall be as required to obtain a uniform coating of the aggregate with the bituminous material. The temperature of bitumen at time of mixing shall not exceed 300 degrees F. The temperature of aggregate and mineral filler

in the mixer shall not exceed 325 degrees F when bitumen is added. Overheated and carbonized mixtures or mixtures that foam will be rejected.

3.14.3 Water Content of Aggregates

Drying operations shall reduce the water content of mixture to less than 0.75 percent. The water content test will be conducted in accordance with ASTM D 2216. If the water content is determined on hot bin samples, the water content will be a weighted average based on composition of blend.

3.14.4 Storage of Bituminous Paving Mixture

The mixture shall be stored according to the requirements of ASTM D 3515.

3.15 TRANSPORTATION OF BITUMINOUS MIXTURE

Transportation of bituminous mixture from the paving plant to the site shall be in trucks having tight, clean, smooth beds lightly coated with an approved releasing agent to prevent adhesion of mixture to truck bodies. Excessive releasing agent will be drained prior to loading. Each load shall be covered with canvas or other approved material of ample size to protect mixture from weather and prevent loss of heat. Loads that have crusts of cold, unworkable material or have become wet by rain will be rejected. Hauling over freshly placed material will not be permitted.

3.16 PLACING

Bituminous mixtures shall not be placed without ample time to complete spreading and rolling during daylight hours, unless satisfactory artificial lighting is provided.

3.16.1 Spraying of Contact Surfaces of Structures

Contact surfaces of previously constructed pavement, curbs, manholes, and similar structures shall be sprayed with a thin coat of bituminous material conforming to the requirements of this section.

3.16.2 General Requirements for Use of Mechanical Spreader

The range of temperatures of mixtures, when dumped into the mechanical spreader, shall be as approved. Mixtures having temperatures less than 225 degrees F when dumped into the mechanical spreader will be rejected. The mechanical spreader shall be adjusted and speed regulated so that the surface of the course being laid will be smooth and continuous without tears and pulls, and of such depth that, when compacted, the surface will conform to the cross section, grade, and contour indicated. Placing with respect to the center line, areas with crowned sections, or the high side of areas with one-way slope shall be as directed. Placing of the mixture shall be as nearly continuous as possible, and the speed of placing shall be adjusted, as directed, to permit proper rolling. When segregation occurs in the mixture during placing, the spreading operation shall be suspended until the cause is determined and corrected. Irregularities in alignment of the course left by the mechanical spreader shall be corrected by trimming directly behind machine. Immediately after trimming, the edges of the course shall be thoroughly compacted by tamping laterally with a lute. Distortion of the course during tamping will not be permitted.

3.16.3 Special Requirements for Placing Strips Succeeding Initial Strips

In placing each succeeding strip after the initial strip has been spread and compacted as specified below, the screed of the mechanical spreader shall overlap previously placed strip 3 to 4 inches and shall be sufficiently high so that compaction will produce a smooth, dense joint. The mixture placed on the edge of the previously placed strip by the mechanical spreader shall be pushed back to the edge of the strip being placed by using a lute. Excess mixture shall be removed and wasted.

3.16.4 Handwork Behind Machine Spreading

A sufficient number of shovelers and rakers shall follow the spreading machine, adding or removing hot mixture and raking mixtures as required to obtain a course that, when completed, will conform to all requirements specified herein. Excessive handwork will not be permitted. Broadcasting or fanning of the mixture over areas being compacted will not be permitted.

3.16.5 Hand Spreading in Lieu of Machine Spreading

In areas where the use of machine spreading is impractical, the mixture shall be spread by hand. Spreading shall be in a manner to prevent segregation. The mixture shall be spread uniformly with hot rakes in a loose layer of thickness that, when compacted, will conform to the required grade and thickness.

3.17 GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS

Finished surfaces of bituminous base courses, when tested as specified below, shall conform to the gradeline and elevations shown and to surface-smoothness requirements specified.

3.17.1 Plan Grade

Finished surfaces shall conform, within tolerances specified, to the lines, grades, and cross sections indicated.

3.17.2 Surface Smoothness

Finished surfaces shall not deviate from the testing edge of a 12 foot straightedge more than 1/4 inch in any direction.

3.17.3 Equipment

The Contractor shall furnish and maintain at the site, in good condition, one straightedge for each bituminous paver for use in testing the finished surface. Straightedges shall be aluminum and have blades of box or box-girder cross section with flat bottom reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on pavement.

3.18 COMPACTION OF MIXTURE

Rolling shall begin as soon after placing as the mixture will bear roller without undue displacement. Delays in rolling freshly spread mixture will not be permitted. After the initial rolling, preliminary tests of the crown, grade, and smoothness shall be made by the Contractor. Deficiencies shall be corrected so that the finished course will conform to requirements for the grade and smoothness specified herein. After the Contractor assures himself of meeting crown, grade, and smoothness requirements, rolling shall be continued until a density of at least 96 percent of

laboratory compacted specimens of the same mixture is obtained. Places inaccessible to rollers shall be thoroughly compacted with hot hand tampers.

3.18.1 Correcting Deficient Areas

Mixtures that become contaminated or are defective shall be removed. Skin patching of an area that has been rolled will not be permitted. Holes shall be cut the full thickness of the base course so that the sides are perpendicular and parallel to the direction of traffic and the edges are vertical. Bulges shall be sprayed with bituminous materials conforming to requirements of this section. Fresh paving mixture shall be placed in holes in sufficient quantity so that the finished surface will conform to grade, smoothness, and density requirements.

3.19 JOINTS

3.19.1 General

Joints between old and new pavements or joints that have become cold because of delay, shall be made carefully to insure continuous bond between old and new sections of course. All joints shall have the same texture, density, and smoothness as other sections of the course. Contact surfaces of previously constructed pavements that have become coated with dust, sand, or other objectionable material shall be cleaned by brushing or cut back with approved power saw, as directed. The surface against which new material is placed shall be sprayed with a thin, uniform coat of bituminous material conforming to requirements of this section. The material shall be applied far enough in advance of placement of the fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of sprayed surface.

3.19.2 Transverse Joints

The roller shall pass over the unprotected end of freshly placed mixture only when placing of the course is discontinued or when delivery of the mixture is interrupted to the extent that the unrolled material may become cold. In all cases, the edge of the previously placed course shall be cut back to expose an even, vertical surface for the full thickness of the course. In continuing placement of the strip, the mechanical spreader shall be positioned on the transverse joint so that sufficient hot mixture will be spread to obtain a joint after rolling that conforms to the required density and smoothness specified herein.

3.19.3 Longitudinal Joints

Edges of a previously placed strip that have cooled or are irregular, honeycombed, poorly compacted, damaged, or otherwise defective, and unsatisfactory sections of the joint shall be cut back to expose a clean, sound surface for the full thickness of the course as directed.

3.20 EDGES OF PAVEMENT

Bulges adjacent to shoulders shall be trimmed neatly to the line.

3.21 PROTECTION OF PAVEMENT

After final rolling of the pavement, no vehicular traffic of any kind shall be permitted until the pavement has cooled to ambient temperature.

3.22 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated. The surface shall be dry and clean at the time of treatment.

3.23 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.23.1 Prime Coat

Bituminous material for the prime coat shall be applied in quantities of not less than 0.15 gallon nor more than 0.40 gallon per square yard of pavement surface.

3.24 APPLICATION TEMPERATURE

3.24.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. The temperature viscosity relation shall be furnished to the Contracting Officer.

3.24.2 Temperature Ranges

The viscosity requirements shall determine the application temperature to be used. The following is a normal range of application temperatures:

Liquid Asphalts	
MC-30	85-190 degrees F
MC-70	120-225 degrees F

*These temperature ranges exceed the flash point of the material and care should be taken in their heating.

3.25 APPLICATION

Following preparation and subsequent inspection of the surface, the bituminous coat shall be applied at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray. Until the succeeding layer of pavement is placed, the surface shall be maintained by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment shall be permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions.

3.26 CURING PERIOD

Following application of the bituminous material and prior to application

of the succeeding layer of pavement, the bituminous coat shall be allowed to cure and to obtain evaporation of any volatiles or moisture. Prime coat shall be allowed to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course.

3.7 SAMPLING AND TESTING

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.27 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140 or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Contracting Officer within 15 days after the award of the contract.

3.28 Prime Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous materials shall be applied in the amount of 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.29 Sampling and Testing During Construction

Quality control sampling and testing shall be performed as required in paragraph FIELD QUALITY CONTROL.

-- End of Section --

SECTION 02770

CONCRETE SIDEWALKS AND CURBS AND GUTTERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 1996) Burlap Cloth Made from Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 143	(1998) Slump of Hydraulic Cement Concrete
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 173	(1994ae1) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 231	(1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 920	(1998e1) Elastomeric Joint Sealants
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 3405	(1996) Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used,

a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-09 Reports

Field Quality Control; GA.

Copies of all test reports within 24 hours of completion of the test.

SD-18 Records

Concrete; GA.

Copies of certified delivery tickets for all concrete used in the construction.

1.3 WEATHER LIMITATIONS

1.3.1 Placing During Cold Weather

Concrete placement shall not take place when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Provisions shall be made to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited. Mixing water and aggregates shall be heated as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating shall be approved. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.3.2 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

1.4 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.4.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Contracting Officer shall have access at all times to the plant and equipment to ensure proper operation

and compliance with specifications.

PART 2 PRODUCTS

2.1 CONCRETE

Concrete shall conform to the applicable requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE, except as otherwise specified. Maximum size of aggregate shall be 3/4 inches.

2.1.1 Air Content

Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

2.1.2 Slump

The concrete slump shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C 143.

2.1.3 Reinforcement Steel

Reinforcement bars shall conform to Section 03200 CONCRETE REINFORCEMENT, paragraph REINFORCEMENT.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Impervious sheet materials shall conform to ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.

2.2.2 Burlap

Burlap shall conform to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C 309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Contraction Joint Filler for Curb and Gutter

Contraction joint filler for curb and gutter shall consist of hard-pressed fiberboard.

2.4.2 Expansion Joint Filler, Premolded

Expansion joint filler, premolded, shall conform to ASTM D 1751 or ASTM D 1752, 3/8 inch thick, unless otherwise indicated.

2.5 JOINT SEALANTS

2.5.1 Joint Sealant, Cold-Applied

Joint sealant, cold-applied shall conform to ASTM C 920.

2.5.2 Joint Sealant, Hot-Poured

Joint sealant, hot-poured shall conform to ASTM D 3405.

2.6 FORM WORK

Form work shall be designed and constructed to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.6.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.6.2 Curb Forms

Curb outside forms shall have a height equal to the full depth of the curb . The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted as directed.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope as indicated with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Concrete shall be placed in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The

concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished with a wood float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators.

3.4.2 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.3 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler shall be placed with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with joint sealant. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length. Contraction joints shall be constructed

by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not exceeding 20 feet. Expansion joints shall be provided in nonreinforced concrete gutter at locations indicated. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit. Expansion joints and the top 1 inch depth of curb and gutter contraction-joints shall be sealed with joint sealant. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

The entire exposed surface shall be covered with 2 or more layers of burlap. Mats shall overlap each other at least 6 inches.The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.7.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet per gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to insure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.7.4 Protective Coating

Protective coating of linseed oil mixture shall be applied to the exposed-to-view concrete surface.

3.7.4.1 Application

Curing and backfilling operation shall be completed prior to applying two coats of protective coating. Concrete shall be surface dry and clean before each application. Coverage shall be by spray application at not more than 50 square yards per gallon for first application and not more than 70 square yards per gallon for second application, except that the number of applications and coverage for each application for commercially prepared mixture shall be in accordance with the manufacturer's instructions. Coated surfaces shall be protected from vehicular and pedestrian traffic until dry.

3.7.4.2 Precautions

Protective coating shall not be heated by direct application of flame or electrical heaters and shall be protected from exposure to open flame, sparks, and fire adjacent to open containers or applicators. Material shall not be applied at ambient or material temperatures lower than 50 degrees F.

3.8 FIELD QUALITY CONTROL

3.8.1 General Requirements

The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to insure that the requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

The Contractor shall provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 250 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C 172. Cylinders for acceptance shall be molded in conformance with ASTM C 31/C 31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.8.2.2 Air Content

Air content shall be determined in accordance with ASTM C 173 or ASTM C 231. ASTM C 231 shall be used with concretes and mortars made with relatively dense natural aggregates. Two tests for air content shall be made on randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman or the Government inspector. If results are out of tolerance, the placing foreman shall be notified and he shall take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each

truckload of material until such time as the air content is within the tolerance specified.

3.8.2.3 Slump Test

Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

3.8.4 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 03100

STRUCTURAL CONCRETE FORMWORK

Includes Special Change (Submittal Paragraph)(June 2000)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 347R	(1994) Guide to Formwork for Concrete

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA ANSI/AHA A135.4	(1995) Basic Hardboard

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1996) Voluntary Product Standard - Construction and Industrial Plywood

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Design; GA.

Design analysis and calculations for form design and methodology used in the design.

Form Materials; GA.

Manufacturer's data including literature describing form materials, accessories, and form releasing agents.

SD-04 Drawings

Concrete Formwork; GA.

Drawings showing details of formwork, including dimensions joints, supports, studding and shoring, and sequence of form and shoring removal.

SD-06 Instructions

Form Releasing Agents; GA.
Manufacturer's recommendation on method and rate of application of form releasing agents.

1.3 DESIGN

Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

1.4 STORAGE AND HANDLING

PART 2 PRODUCTS

2.1 FORM MATERIALS

2.1.1 Forms For Class A and Class B Finish

Forms for Class A and Class B finished surfaces shall be plywood panels conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels. Forms for round columns shall be the prefabricated seamless type.

2.1.2 Forms For Class C Finish

Forms for Class C finished surfaces shall be shiplap lumber; plywood conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II; tempered concrete form hardboard conforming to AHA ANSI/AHA A135.4; other approved concrete form material; or steel, except that steel lining on wood sheathing shall not be used. Forms for round columns may have one vertical seam.

2.1.3 Forms For Class D Finish

Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

2.1.4 Form Ties

Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inchin diameter. Removable tie rods shall be not more than 1-1/2 inches in diameter.

2.1.5 Form Releasing Agents

Form releasing agents shall be commercial formulations that will not bond

with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Formwork

Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE and conforming to construction tolerance given in TABLE 1. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved. Where forms for continuous surfaces are placed in successive units, the forms shall fit over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond breaker.

3.2 CHAMFERING

Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms.

3.3 COATING

Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.4 REMOVAL OF FORMS

Forms shall be removed preventing injury to the concrete and ensuring the complete safety of the structure. Formwork for columns, walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed from decks and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads. Supporting forms or shores shall not be removed before the concrete strength has reached 70 percent of design strength, as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring

system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

TABLE 1

TOLERANCES FOR FORMED SURFACES

1. Variations from the plumb:	In any 10 feet of length ---------- 1/4 inch
a. In the lines and surfaces of columns, piers, walls and in arises	Maximum for entire length ---------- 1 inch
b. For exposed corner columns,control-joint grooves, and other conspicuous lines	In any 20 feet of length ---------- ---- 1/4 inch Maximum for entire length---------- 1/2 inch
2. Variation from the level or from the grades indicated on the drawings:	In any 10 feet of length ----------1/4 inch In any bay or in any 20 feet of length---------- 3/8 inch
a. In slab soffits, and in arises, measured before removal of supporting shores	Maximum for entire length ---------- 3/4 inch
b. In exposed parapets, horizontal grooves, and other conspicuous lines	In any bay or in any 20 feet of length ---------- 1/4 inch Maximum for entire length---------- 1/2 inch
3. Variation of the linear building lines from established position in plan	In any 20 feet --------- 1/2 inch Maximum ----------1 inch
4. Variation of distance between walls, columns, partitions	1/4 inch per 10 feet of distance, but not more than 1/2 inch in any one bay,and not more than 1 inch total variation
5 Variation in cross-sectional dimensions of columns and in the thickness of slabs and walls	Minus ---------- 1/4 inch Plus ---------- 1/2 inch
6 Footings:	
a. Variation of dimensions	Minus ---------- 1/2 inch

TABLE 1

TOLERANCES FOR FORMED SURFACES

in plan	Plus ---------- 2 inches when formed or plus 3 inches when placed against unformed excavation
b. Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than 2 inches
c. Reduction in thickness of specified thickness	Minus ---------- 5 percent
8. Variation in steps:	Riser ---------- 1/8 inch
a. In a flight of stairs	Tread ---------- 1/4 inch

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 82	(1997a) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 184/A 184M	(1996) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 675/A 675M	(1990a; R 1995e1) Steel Bars, Carbon, Hot-Wrought Special Quality, Mechanical Properties
ASTM A 706/A 706M	(1998) Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 775/A 775M	(1997e1) Epoxy-Coated Reinforcement Steel Bars

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4	(1998) Structural Welding Code - Reinforcing Steel

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI MSP-1 (1996) Manual of Standard Practice

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Concrete Reinforcement System; GA.

Detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-08 Statements

Welding; GA.

A list of qualified welders names.

SD-13 Certificates

Reinforcing Steel; GA.

Certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

1.3 WELDING

Welders shall be qualified in accordance with AWS D1.4. Qualification test shall be performed at the worksite and the Contractor shall notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4.

1.4 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

Dowels shall conform to ASTM A 675/A 675M, Grade 80. Steel pipe conforming to ASTM A 53, Schedule 80, may be used as dowels provided the ends are closed with metal or plastic inserts or with mortar.

2.2 FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184/A 184M.

2.3 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M or ASTM A 706/A 706M, Grade 60 and sizes as indicated. Cold drawn wire used for spiral reinforcement shall conform to ASTM A 82. All reinforcement steel shall conform to ASTM A 775/A 775M unless noted.

2.4 MECHANICAL COUPLERS

Mechanical couplers for reinforcing steel shall conform to the requirements of ACI 318 for mechanical splicers.

2.5 WIRE TIES

Wire ties shall be 16 gauge or heavier black or plastic-coated annealed steel wire.

2.6 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318/318R. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.2 WELDED-WIRE FABRIC PLACEMENT

Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints. Fabric placement at joints shall be as indicated. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of supports.

3.3 DOWEL INSTALLATION

Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

-- End of Section --

SECTION 03300

CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 Description

The following is a summary of the several locations where concrete will be used on this project:

a. Underwater (tremie) concrete in the lower portions of the 6-foot and 3-foot diameter caissons.

b. Regular structure concrete shall be placed in the dry to fill the tops of the two sizes of caissons and for the full depth of the pipe piles.

c. Regular structure concrete shall be used to reconstruct the piers and abutments and to construct the pile caps.

d. Very high strength concrete shall be used to construct the prestressed concrete box girders at an off site prestressing plant.

e. High strength superstructure deck concrete shall be used to construct the lift span sidewalk; the tower span deck, railroad filled grid, and sidewalk; approach slabs and prestressed beam railroad deck.

f. Medium strength structure concrete shall be used to construct the tower span parapets and the floor slabs for the machinery houses and operator/electrical rooms.

g. Regular structure concrete shall be used to construct the counterweights and the off structure cubs and sidewalks.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117/117R	(1990; Errata) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214.3R	(1988) Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete

ACI 301	(1996) Standard Specifications for Structural Concrete
ACI 305R	(1991) Hot Weather Concreting
ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary

AMERICAN RAILWAY ENGINEEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 1996) Burlap Cloth Made from Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999ae1) Concrete Aggregates
ASTM C 39	(1996) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	(1999) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 78	(1994) Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 94	(1999) Ready-Mixed Concrete
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143	(1998) Slump of Hydraulic Cement Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 192/C 192M	(1998) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete

ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	(1999a) Chemical Admixtures for Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 920	(1998e1) Elastomeric Joint Sealants
ASTM C 940	(1998a) Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
ASTM C 1017	(1998) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1064/C 1064M	(1999) Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	(1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	(1999) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1240	(1999) Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar and Grout
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

CORPS OF ENGINEERS (COE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
COE CRD-C 540	(1976) Nonbituminous Inserts for Contraction Joints in Portland Cement Concrete Airfield Pavements, Sawable Type
COE CRD-C 572	(1974) Corps of Engineers Specifications

for Polyvinylchloride Waterstop

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(1997) NIST Handbook 44: Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(1996) Concrete Plant Standards
NRMCA TMMB 100	(1994) Truck Mixer Agitator and Front Discharge Concrete Carrier Standards
NRMCA QC 3	(1984) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Mixture Proportions; GA.

The results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of each strength or class of concrete, at least 14 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. The statement shall be accompanied by test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

SD-09 Reports

Testing and Inspection for Contractor Quality Control; GA.

Certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

Concrete; FIO.

The results of concrete strength testing by the contractor shall be submitted not more than 5 days after the tests are completed.

SD-13 Certificates

Qualifications; GA.

Written documentation for Contractor Quality Control personnel.

1.4 QUALIFICATIONS

Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) Certified Workmen in one of the following grades or shall have written evidence of having completed similar qualification programs:

Concrete Field Testing Technician, Grade I
Concrete Laboratory Testing Technician, Grade I or II
Concrete Construction Inspector, Level II
Concrete Transportation Construction Inspector

The foreman or lead journeyman of the flatwork finishing crew shall have similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation.

1.5 GENERAL REQUIREMENTS

1.5.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117/117R. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.5.2 Strength Requirements and W/C Ratio

1.5.2.1 Strength Requirements

Specified compressive strength (f'c) shall be as follows:

28-DAY STRUCTURAL DESIGN COMPRESSIVE STRENGTH (PSI)	STRUCTURE OR PORTION OF STRUCTURE
6000	Prestressed box beams
4000	Deck slab, grid fill, sidewalk (towers and lift span) railroad approach slab and approach slab
3500	Parapets and building floors
3000	Caisson tremie and all other concrete

See Section 03415 for additional precast concrete requirements.

Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance

with ASTM C 39. Flexural strength shall be determined in accordance with ASTM C 78.

a. Evaluation of Concrete Compressive Strength. Compressive strength specimens (6 by 12 inch cylinders) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

b. Investigation of Low-Strength Compressive Test Results. When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) shall not be used as a basis for acceptance or rejection. The Contractor shall perform the coring and repair the holes. Cores will be tested by the Government.

c. Load Tests. If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318/318R. Concrete work evaluated by structural analysis or by results of a load test as being understrength shall be corrected in a manner satisfactory to the Contracting Officer. All investigations, testing, load tests, and correction of deficiencies shall be performed by and at the expense of the Contractor and must be approved by the Contracting Officer, except that if all concrete is found to be in compliance with the drawings and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

1.5.2.2 Concrete Cylinders

Concrete shall be sampled and cylinders made in accordance with ASTM C 172 and ASTM C 31/C 31M.

a. Concrete Test Cylinders. A minimum of four concrete test cylinders

per pour shall be made to verify the strength of concrete.

b. Cylinder Making. Cylinders shall be made at the pour site and shall not be disturbed in any way from 1/2 hour after casting until they are either 24 hours old or ready to be tested. Concrete in cylinders may be consolidated by rodding or by vibration as specified in ASTM C 31/C 31M.

c. Cylinder Curing

(1) Test cylinders shall be cured with similar methods as the elements they represent. In lieu of actual curing with the members, cylinders may be cured in curing chambers correlated in temperature and humidity with the pour location.

(2) Test cylinders to indicate compliance with specified 28-day or earlier strength shall remain with the member. At that time, the cylinders shall be removed from their molds and placed in storage in a moist condition at 73.4 degrees plus or minus 3 degrees F.

d. Testing of Cylinders

(1) Testing of cylinders to determine compressive strength shall be performed in accordance with ASTM C 39. The strength of concrete at any given age shall be determined as the average of two cylinders, except a single cylinder test can be used to determine predictive strengths at less than 28 days.

(2) Testing machines shall be calibrated in accordance with ASTM C 39.

1.5.2.3 Water-Cement Ratio

Maximum water-cement ratio (w/c) for normal weight concrete shall be as follows:

WATER-CEMENT RATIO, BY WEIGHT	STRUCTURE OR PORTION OF STRUCTURE
0.43	Bridge deck slab, railroad approach slab, and approach slabs
0.47	Parapets and sidewalks (towers and lift span only)
0.50	All other concrete
0.65	Caisson tremie

These w/c's may cause higher strengths than that required above for compressive or flexural strength. The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and GGBF slag shall be included in the equations of ACI 211.1 for the term P which is used to denote the weight of pozzolan.

1.5.3 Air Entrainment

Except as otherwise specified for lightweight concrete, all normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent. Air content for normal weight concrete shall be determined in accordance with ASTM C 231.

1.5.4 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143.

STRUCTURAL ELEMENT	SLUMP, inches MINIMUM	MAXIMUM
Concrete filled steel pipe piles	2.5	4.5
All other concrete	1	3
Any structural concrete approved for placement by pumping:		
At pump	2	6
At discharge of line	1	4

When use of a plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C 494 is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

1.5.5 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.5.6 Size of Coarse Aggregate

The largest feasible nominal maximum size aggregate (NMSA) specified in paragraph AGGREGATES shall be used in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.5.7 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.6 MIXTURE PROPORTIONS

Concrete shall be composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as

specified.

1.6.1 Proportioning Studies for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Except as specified for flexural strength concrete, mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test reports indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratios required in subparagraph Water-Cement Ratio will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and GGBF slag shall be included in the equations in ACI 211.1 for the term P, which is used to denote the weight of pozzolan. If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent. Laboratory trial mixtures shall be designed for maximum permitted slump and air content. Separate sets of trial mixture studies shall be made for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either shall be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies shall also be made for concrete for any conveying or placing method proposed which requires special properties and for concrete to be placed in unusually difficult placing locations. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance withASTM C 192/C 192M. They shall be tested at 7 and 28 days in accordance with ASTM C 39. From these test results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition, a curve shall be plotted showing the relationship between 7 day and 28 day strengths. Each mixture shall be designed to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.

1.6.2 Average Compressive Strength Required for Mixtures

The mixture proportions selected during mixture design studies shall produce a required average compressive strength (f'cr) exceeding the specified compressive strength (f'c) by the amount indicated below. This required average compressive strength, f'cr, will not be a required acceptance criteria during concrete production. However, whenever the daily average compressive strength at 28 days drops below f'cr during concrete production, or daily average 7-day strength drops below a strength correlated with the 28-day f'cr, the mixture shall be adjusted, as approved, to bring the daily average back up to f'cr. During production,

the required f'cr shall be adjusted, as appropriate, based on the standard deviation being attained on the job.

1.6.2.1 Computations from Test Records

Where a concrete production facility has test records, a standard deviation shall be established in accordance with the applicable provisions of ACI 214.3R. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected; shall represent concrete produced to meet a specified strength or strengths (f'c) within 1,000 psi of that specified for proposed work; and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. Required average compressive strength f'cr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

f'cr = f'c + 1.34S where units are in psi

f'cr = f'c + 2.33S - 500 where units are in psi

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03
30 or more	1.00

1.6.2.2 Computations without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f'cr shall be determined as follows:

b. If the specified compressive strength f'c is 3,000 to 5,000 psi,

f'cr = f'c + 1,200 psi

1.7 STORAGE OF MATERIALS

Cement and other cementitious materials shall be stored in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Reinforcing bars and accessories shall be stored above the ground on platforms, skids or other supports. Other materials

shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are opened.

1.8 GOVERNMENT ASSURANCE INSPECTION AND TESTING

Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Government inspection or testing will not relieve the Contractor of any of his CQC responsibilities.

1.8.1 Materials

The Government will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

1.8.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172 and tested in accordance with these specifications, as considered necessary.

1.8.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.8.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious Materials shall be portland cement, portland-pozzolan cement, or portland cement in combination with pozzolan or silica fume and shall conform to appropriate specifications listed below. Use of cementitious materials in concrete which will have surfaces exposed in the completed structure shall be restricted so there is no change in color, source, or type of cementitious material.

2.1.1 Portland Cement

ASTM C 150, Type I shall meet the above requirements.

2.1.2 Silica Fume

Silica fume shall conform to ASTM C 1240. Available alkalies shall conform to the optimal limit given in Table 2 of ASTM C 1240. Silica fume may be furnished as a dry, densified material or as a slurry. In accordance with paragraph Technical Service for Specialized Concrete, the Contractor shall provide at no cost to the Government the services of a manufacturer's technical representative experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume.

2.2 AGGREGATES

Aggregates shall conform to the following.

2.2.1 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33.

2.2.2 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33, Class 1S or 4S, size designation 57 or 67.

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

2.3.4 High-Range Water Reducer

ASTM C 494, Type F or G, except that the 6-month and 1-year strength requirements are waived. The admixture shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.3.5 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017, Type I or II. These admixtures shall be used only when

approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 CURING MATERIALS

2.4.1 Impervious-Sheet

Impervious-sheet materials shall conform to ASTM C 171, type optional, except, that polyethylene sheet shall not be used.

2.4.2 Membrane-Forming Compound

Membrane-Forming curing compound shall conform to ASTM C 309, Type 1-D or 2, except that only a styrene acrylate or chlorinated rubber compound meeting Class B requirements shall be used for surfaces that are to be painted or are to receive bituminous roofing, or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing, or flooring specified. Nonpigmented compound shall contain a fugitive dye, and shall have the reflective requirements in ASTM C 309 waived.

2.4.3 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.6 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107, Grade A and shall be a commercial formulation suitable for the proposed application.

2.7 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

2.8 EMBEDDED ITEMS

Embedded items shall be of the size and type indicated or as needed for the application. Dovetail slots shall be galvanized steel.

2.9 JOINT MATERIALS

2.9.1 Joint Fillers, Sealers, and Waterstops

Expansion joint fillers shall be preformed materials conforming to ASTM D 1751 or ASTM D 1752.

2.9.2 Contraction Joints in Slabs

Sawable type contraction joint inserts shall conform to COE CRD-C 540. Nonsawable joint inserts shall have sufficient stiffness to permit

placement in plastic concrete without undue deviation from a straight line and shall conform to the physical requirements of COE CRD-C 540, with the exception of Section 3.4 "Resistance to Sawing". Plastic inserts shall be polyvinyl chloride conforming to the materials requirements of COE CRD-C 572.

2.10 ELASTOMERIC SEALANTS

Elastomeric sealants shall be exterior grade, single component, sealant conforming to ASTM C 920, Grade NS.

2.11 ASPHALT PLANKING

Asphalt planks shall be a multi-ply semi-rigid asphaltic panel composed of a mineral-fortified asphaltic core between two liners of asphaltic-saturated felt. One liner shall be weather-coated and shall have a polyethylene film facing. Installation shall be in accordance with the AREMA Manual, Chapter 29.

2.12 COMPRESSION SEAL

Compression seal shall be an elastomeric seal with hollow core that is manufactured as a deck joint seal. The seal shall be supplied with structural steel angles as armoring or in a slot in the concrete deck.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Before commencing concrete placement, the following shall be performed. Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03100 STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03200 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Concrete on Earth Foundations

Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.

3.1.1.2 Preparation of Rock

Rock surfaces upon which concrete is to be placed shall be free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and

loose, semidetached or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Contracting Officer, and to firm rock on the sides. Immediately before the concrete is placed, rock surfaces shall be cleaned thoroughly by the use of sandblasting as specified below for Previously Placed Concrete. Rock surfaces shall be kept continuously moist for at least 24 hours immediately prior to placing concrete thereon. All horizontal and approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. Concrete shall be placed before the mortar stiffens.

3.1.2 Previously Placed Concrete

Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the construction joint surface with either sandblasting, high-pressure water jet, or other approved method. Concrete at the side of vertical construction joints shall be prepared as approved by the Contracting Officer. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10-percent of the surface area, distributed uniformly throughout the surface. The edges of the coarse aggregate shall not be undercut. The surface of horizontal construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete. The surface shall be washed completely clean as the last operation prior to placing the next lift. For heavy duty floors and two-course floors a thin coat of neat cement grout of about the consistency of thick cream shall be thoroughly scrubbed into the existing surface immediately ahead of the topping placing. The grout shall be a 1:1 mixture of portland cement and sand passing the No. 8 sieve. The topping concrete shall be deposited before the grout coat has had time to stiffen.

3.1.2.1 High-Pressure Water Jet

A stream of water under a pressure of not less than 3,000 psi shall be used for cutting and cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the waterjet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3.1.2.2 Wet Sandblasting

Wet sandblasting shall be used after the concrete has reached sufficient strength to prevent undercutting of the coarse aggregate particles. After wet sandblasting, the surface of the concrete shall then be washed thoroughly to remove all loose materials.

3.1.2.3 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

3.1.2.4 Preparation of Previously Placed Concrete

Concrete surfaces to which other concrete is to be bonded shall be abraded in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Laitance and loose particles shall be removed. Surfaces shall be thoroughly washed and shall be moist but without free water when concrete is placed.

3.1.3 Vapor Barrier

Vapor barrier shall be provided beneath the interior on-grade concrete floor slabs. The greatest widths and lengths practicable shall be used to eliminate joints wherever possible. Joints shall be lapped a minimum of 12 inches. Torn, punctured, or damaged vapor barrier material shall be removed and new vapor barrier shall be provided prior to placing concrete. For minor repairs, patches may be made using laps of at least 12 inches. Lapped joints shall be sealed and edges patched with pressure-sensitive adhesive or tape not less than 2 inches wide and compatible with the membrane. Vapor barrier shall be placed directly on underlying subgrade, base course, or capillary water barrier, unless it consists of crushed material or large granular material which could puncture the vapor barrier. In this case, the surface shall be choked with a light layer of sand, as approved, before placing the vapor barrier. A 2 inch layer of compacted, clean concrete sand (fine aggregate) shall be placed on top of the vapor barrier before placing concrete. Concrete placement shall be controlled so as to prevent damage to the vapor barrier, or any covering sand.

3.1.4 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 1 feet of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

3.2 CONCRETE PRODUCTION

3.2.1 Batching, Mixing, and Transporting Concrete

Concrete shall either be batched and mixed onsite or shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete.

3.2.1.1 Scales

The weighing equipment shall conform to the applicable requirements of CPMB Concrete Plant Standard, and of NIST HB 44, except that the accuracy shall be plus or minus 0.2 percent of scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. The tests shall be made at the specified frequency in the

presence of a Government inspector. The weighing equipment shall be arranged so that the plant operator can conveniently observe all dials or indicators.

3.2.1.2 Batching Tolerances

(A) Tolerances

MATERIAL	WEIGHT
Cementitious materials	0 to plus 2
Aggregate	plus or minus 2
Water	plus or minus 1
Chemical admixture	0 to plus 6

(B) Tolerances with Volumetric Equipment

For volumetric batching equipment used for water and admixtures, the following tolerances shall apply to the required volume of material being batched:

MATERIAL	PERCENT OF REQUIRED MATERIAL
Water:	plus or minus 1 percent
Chemical admixtures:	0 to plus 6 percent

3.2.1.3 Moisture Control

The plant shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched.

3.2.1.4 Concrete Mixers

Mixers shall be stationary mixers or truck mixers. Mixers shall be capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. The mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

3.2.1.5 Stationary Mixers

Concrete plant mixers shall be drum-type mixers of tilting, nontilting, horizontal-shaft, or vertical-shaft type, or shall be pug mill type and shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to all the requirements in ASTM C 94 applicable to central-mixed concrete.

3.2.1.6 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94. A truck mixer may be used either for complete mixing (transit-mixed). Each truck shall be equipped with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Or, if

approved in lieu of this, the number of revolutions shall be marked on the batch tickets. Water shall not be added at the placing site unless specifically approved; and in no case shall it exceed the specified w/c. Any such water shall be injected at the base of the mixer, not at the discharge end.

3.3 CONCRETE PRODUCTION, SMALL PROJECTS

Batch-type equipment shall be used for producing concrete. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete. Site-mixed concrete shall be produced in accordance with ACI 301, and plant shall conform to NRMCA CPMB 100.

3.4 TRANSPORTING CONCRETE TO PROJECT SITE

Concrete shall be transported to the placing site in truck mixers, transporting equipment conforming to NRMCA TMMB 100. Nonagitating equipment, and pumps, shall not be used for transporting lightweight aggregate concrete.

3.5 CONVEYING CONCRETE ON SITE

Concrete shall be conveyed from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

3.5.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet.The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yardsshall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.5.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. The transfer hopper shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.5.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94. Nonagitating equipment shall be used only for transporting

plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.5.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.5.5 Belt Conveyors

Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means, such as discharge baffle or hopper , for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

3.5.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.6 PLACING CONCRETE

Mixed concrete shall be discharged within 1-1/2 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 85 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Adequate scaffolding, ramps and walkways shall be provided so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing. Sufficient placing capacity shall be provided so that concrete can be kept free of cold joints.

3.6.1 Depositing Concrete

Concrete shall be deposited as close as possible to its final position in the forms, and there shall be no vertical drop greater than 5 feet except

where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Concrete for beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as concrete for adjoining slabs.

3.6.2 Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrators, except for slabs 4 inches thick or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; a spare vibrator shall be kept at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Vibrators shall be inserted vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segregation or flotation of coarse aggregate shall be prevented. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.6.3 Cold Weather Requirements

Special protection measures, approved by the Contracting Officer, shall be used if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C 494, Type C or E may be used, provided it contains no calcium chloride. Calcium chloride shall not

be used.

3.6.4 Hot Weather Requirements

When the ambient temperature during concrete placing is expected to exceed 85 degrees F, the concrete shall be placed and finished with procedures previously submitted and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	90 F
40-60	85 F
Less than 40	80 F

3.6.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Particular care shall be taken if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.6.6 Placing Concrete Underwater

Concrete shall be deposited in water by a tremie or concrete pump. The methods and equipment used shall be subject to approval. Concrete buckets shall not be used for underwater placement of concrete except to deliver concrete to the tremie. The tremie shall be watertight and sufficiently large to permit a free flow of concrete. The concrete shall be deposited so that it enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete. The discharge end of the pump line or tremie shaft shall be kept continuously submerged in the concrete. The underwater seal at start of placing shall not produce undue turbulence in the water. The tremie shaft shall be kept full of concrete to a point well above the water surface. Placement shall proceed without interruption until the concrete has been

brought to the required height. The tremie shall not be moved horizontally during a placing operation, and a sufficient number of tremies shall be provided so that the maximum horizontal flow of concrete will be limited to 15 feet. Concrete shall not be deposited in running water or in water with a temperature below 35 degrees F.

3.6.7 Placing Concrete in Congested Areas

Special care shall be used to ensure complete filling of the forms, elimination of all voids, and complete consolidation of the concrete when placing concrete in areas congested with reinforcing bars, embedded items, waterstops and other tight spacing. An appropriate concrete mixture shall be used, and the nominal maximum size of aggregate (NMSA) shall meet the specified criteria when evaluated for the congested area. Vibrators with heads of a size appropriate for the clearances available shall be used, and the consolidation operation shall be closely supervised to ensure complete and thorough consolidation at all points. Where necessary, splices of reinforcing bars shall be alternated to reduce congestion. Where two mats of closely spaced reinforcing are required, the bars in each mat shall be placed in matching alignment to reduce congestion. Reinforcing bars may be temporarily crowded to one side during concrete placement provided they are returned to exact required location before concrete placement and consolidation are completed.

3.6.8 Placing Flowable Concrete

If a plasticizing admixture conforming to ASTM C 1017 is used or if a Type F or G high range water reducing admixture is permitted to increase the slump, the concrete shall meet all requirements of paragraph GENERAL REQUIREMENTS in PART 1. Extreme care shall be used in conveying and placing the concrete to avoid segregation. Consolidation and finishing shall meet all requirements of paragraphs Placing Concrete, Finishing Formed Surfaces, and Finishing Unformed Surfaces. No relaxation of requirements to accommodate flowable concrete will be permitted.

3.7 JOINTS

Joints shall be located and constructed as indicated or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. In general, such joints shall be located near the middle of the spans of supported slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs, unless otherwise approved. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or through construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. Except where otherwise indicated, construction joints between interior slabs on grade and vertical surfaces shall consist of 30 pound asphalt-saturated felt, extending for the full depth of the slab. The perimeters of the slabs shall be free of fins, rough edges, spalling, or other unsightly appearance. Reservoir for sealant for construction and contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts, by sawing sawable inserts, or by sawing to widen the top portion of sawed joints.

3.7.1 Construction Joints

For concrete other than slabs on grade, construction joints shall be located so that the unit of operation does not exceed 30 feet. Concrete shall be placed continuously so that each unit is monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Construction joints shall be located as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Contracting Officer. Unless otherwise indicated and except for slabs on grade, reinforcing steel shall extend through construction joints. Construction joints in slabs on grade shall be keyed or doweled as shown. Concrete columns, walls, or piers shall be in place at least 2 hours, or until the concrete begins to lose its plasticity, before placing concrete for beams, girders, or slabs thereon. In walls having door or window openings, lifts shall terminate at the top and bottom of the opening. Other lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints in walls or columns are required, a strip of 1 inchsquare-edge lumber, bevelled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete.

3.7.2 Contraction Joints in Slabs on Grade

Contraction joints shall be located and detailed as shown on the drawings. Contraction Joints shall be produced by forming a weakened plane in the concrete slab by sawing a continuous slot with a concrete saw. The weakened plane shall be 1/4 the depth of the slab thickness and between 1/8 and 3/16 inch wide. For saw-cut joints, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent ravelling of the edges of the saw cut. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking. Reservoir for joint sealant shall be formed as previously specified.

3.7.3 Dowels and Tie Bars

Dowels and tie bars shall be installed at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03200 CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in slabs using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.8 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03100 STRUCTURAL CONCRETE FORMWORK. Finishing of formed surfaces shall be as specified herein. Surfaces shall be left with the texture imparted by the

forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, uniform color of the concrete shall be maintained by use of only one mixture without changes in materials or proportions for any structure or portion of structure that requires a Class A or B finish. Except for major defects, as defined hereinafter, surface defects shall be repaired as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any location. Tolerances of formed surfaces shall conform to the requirements of ACI 117/117R. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in paragraph Damp-Pack Mortar Repair. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. The cement used for all repairs shall be a blend of job cement with white cement proportioned so that the final color after curing and aging will be the same as the adjacent concrete. Concrete with excessive honeycomb, or other defects which affect the strength of the member, will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class A and B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.8.1 Class A Finish and Class B Finish

Class A finish is required in the following areas, substructure units, deck slab and sidewalk. Class B finish is required on the counterweights. Fins, ravelings, and loose material shall be removed, all surface defects over 1/2 inch in diameter or more than 1/2 inch deep, shall be repaired and, except as otherwise indicated or as specified in Section 03100 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Defects more than 1/2 inch in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep.

3.8.2 Special Finishes

3.8.2.1 Smooth Finish

After other concrete construction is complete in each overall separate contiguous area of the structure, smooth finish shall be applied to the parapets. A mortar mix consisting of one part portland cement and two parts well-graded sand passing a No. 30 sieve, with water added to give the consistency of thick paint, shall be used. Where the finished surface will not receive other applied surface, cement shall be used to replace part of the job cement to produce an approved color, which shall be uniform throughout the surfaces of the structure. After the surface has been thoroughly wetted and allowed to approach surface dryness, the mortar shall be vigorously applied to the area by clean burlap pads or by cork or wood-floating, to completely fill all surface voids. Excess grout shall be scraped off with a trowel. As soon as it can be accomplished without pulling the mortar from the voids, the area shall be rubbed with burlap pads having on their surface the same sand-cement mix specified above but without any mixing water, until all of the visible grout film is removed. The burlap pads used for this operation shall be stretched tightly around a board to prevent dishing the mortar in the voids. The finish of any area shall be completed in the same day, and the limits of a finished area shall be made at natural breaks in the surface. The surface shall be

continuously moist cured for 48 hours commencing immediately after finishing operations in each area. The temperature of the air adjacent to the surface shall be not less than 50 degrees F for 24 hours prior to, and 48 hours after, the application. In hot, dry weather the smooth finish shall be applied in shaded areas or at night, and shall never be applied when there is significant hot, dry wind.

3.9 REPAIRS

3.9.1 Repair of Major Defects

Major defects will be considered to be those more than 1/2 inch deep or, for Class A and B finishes, more than 1/2 inch in diameter and, Also included are any defects of any kind whose depth is over 4 inches or whose surface diameter is greater than their depth. Major defects shall be repaired as specified below.

3.9.1.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Approved equipment and procedures which will not cause cracking or microcracking of the sound concrete shall be used. If reinforcement is encountered, concrete shall be removed so as to expose the reinforcement for at least 2 inches on all sides. All such defective areas greater than 12 square inchesshall be outlined by saw cuts at least 1 inch deep. Defective areas less than 12 square inches shall be outlined by a 1 inch deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels. After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Surfaces shall be kept continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, at his option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes and then remixed, thoroughly tamped into place in thin layers. If hand-placed mortar is used, the Contractor shall test each repair area for drumminess by firm tapping with a hammer and shall inspect for cracks, both in the presence of the Contracting Officer's representative, immediately before completion of the contract, and shall replace any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Burlap shall be kept continually wet.

3.9.1.2 Repair of Deep and Large Defects

Deep and large defects will be those that are more than 6 inches deep and also have an average diameter at the surface more than 18 inches or that are otherwise so identified by the Project Office. Such defects shall be repaired as specified herein or directed, except that defects which affect the strength of the structure shall not be repaired and that portion of the structure shall be completely removed and replaced. Deep and large defects shall be repaired by procedures approved in advance including forming and placing special concrete using applied pressure during hardening. Preparation of the repair area shall be as specified for surface application of mortar. In addition, the top edge (surface) of the repair area shall be sloped at approximately 20 degrees from the horizontal, upward toward the side from which concrete will be placed. The special concrete shall be a concrete mixture with low water content and low slump, and shall be allowed to age 30 to 60 minutes before use. Concrete containing a specified expanding admixture may be used in lieu of the above mixture; the paste portion of such concrete mixture shall be designed to have an expansion between 2.0 and 4.0 percent when tested in accordance with ASTM C 940. A full width "chimney" shall be provided at the top of the form on the placing side to ensure filling to the top of the opening. A pressure cap shall be used on the concrete in the chimney with simultaneous tightening and revibrating the form during hardening to ensure a tight fit for the repair. The form shall be removed after 24 hours and immediately the chimney shall be carefully chipped away to avoid breaking concrete out of the repair; the surface of the repair concrete shall be dressed as required.

3.10 FINISHING UNFORMED SURFACES

The finish of all unformed surfaces shall meet the requirements of paragraph Tolerances in PART 1, when tested as specified herein.

3.10.1 General

The ambient temperature of spaces adjacent to unformed surfaces being finished and of the base on which concrete will be placed shall be not less than 50 degrees F. In hot weather all requirements of paragraphs Hot Weather Requirements and Prevention of Plastic Shrinkage Cracking shall be met. Unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, with additional finishing as specified below, and shall be true to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings, properly consolidated, and left true and regular. Unless otherwise shown on the drawings, exterior surfaces shall be sloped for drainage, as directed. Where drains are provided, interior floors shall be evenly sloped to the drains. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions. Grate tampers or "jitterbugs" shall not be used for any surfaces. The dusting of surfaces with dry cement or other materials or the addition of any water during finishing shall not be permitted. If bleedwater is present prior to finishing, the excess water shall be carefully dragged off or removed by absorption with porous materials such as burlap. During finishing operations, extreme care shall be taken to prevent over finishing or working water into the surface; this can cause "crazing" (surface shrinkage cracks which appear after hardening) of the surface. Any slabs with surfaces which exhibit significant crazing shall be removed and replaced. During finishing operations, surfaces shall be checked with a 10 foot straightedge, applied in both directions at regular intervals while the concrete is still plastic, to detect high or

low areas.

3.10.2 Floated Finish

Slabs to receive more than a rough slab finish shall next be given a wood float finish. Areas as indicated on the drawings shall be given only a float finish. The screeding shall be followed immediately by darbying or bull floating before bleeding water is present, to bring the surface to a true, even plane. Then, after the concrete has stiffened so that it will withstand a man's weight without imprint of more than 1/4 inch and the water sheen has disappeared, it shall be floated to a true and even plane free of ridges. Floating shall be performed by use of suitable hand floats or power driven equipment. Sufficient pressure shall be used on the floats to bring a film of moisture to the surface. Hand floats shall be made of wood, magnesium, or aluminum. Care shall be taken to prevent over-finishing or incorporating water into the surface.

3.10.3 Troweled Finish

Areas as indicated on the drawings shall be given a trowel finish. After floating is complete and after the surface moisture has disappeared, unformed surfaces shall be steel-troweled to a smooth, even, dense finish, free from blemishes including trowel marks. In lieu of hand finishing, an approved power finishing machine may be used in accordance with the directions of the machine manufacturer. Additional trowelings shall be performed, either by hand or machine until the surface has been troweled 2 times, with waiting period between each. Care shall be taken to prevent blistering and if such occurs, troweling shall immediately be stopped and operations and surfaces corrected. A final hard steel troweling shall be done by hand, with the trowel tipped, and using hard pressure, when the surface is at a point that the trowel will produce a ringing sound. The finished surface shall be thoroughly consolidated and shall be essentially free of trowel marks and be uniform in texture and appearance. The concrete mixture used for troweled finished areas shall be adjusted, if necessary, in order to provide sufficient fines (cementitious material and fine sand) to finish properly.

3.10.4 Non-Slip Finish

Non-slip floors shall be constructed in accordance with the following subparagraphs.

3.10.4.1 Broomed

Areas as indicated on the drawings shall be given a broomed finish. After floating, the surface shall be lightly steel troweled, and then carefully scored by pulling a coarse fiber push-type broom across the surface. Brooming shall be transverse to traffic or at right angles to the slope of the slab. After the end of the curing period, the surface shall be vigorously broomed with a coarse fiber broom to remove all loose or semi-detached particles.

3.11 EXTERIOR SLAB AND RELATED ITEMS

3.11.1 Pavements

Pavements shall be constructed where shown on the drawings. After forms are set and underlying material prepared as specified, the concrete shall be placed uniformly throughout the area and thoroughly vibrated. As soon

as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. The entire surface shall be tamped with the strike off, or consolidated with a vibrating screed, and this operation continued until the required compaction and reduction of internal and surface voids are accomplished. Care shall be taken to prevent bringing excess paste to the surface. Immediately following the final consolidation of the surface, the pavement shall be floated longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, additional concrete shall be placed and screeded, and the float operated until a satisfactory surface has been produced. The floating operation shall be advanced not more than half the length of the float and then continued over the new and previously floated surfaces. After finishing is completed but while the concrete is still plastic, minor irregularities and score marks in the pavement surface shall be eliminated by means of long-handled cutting straightedges. Straightedges shall be 12 feet in length and shall be operated from the sides of the pavement and from bridges. A straightedge operated from the side of the pavement shall be equipped with a handle 3 feet longer than one-half the width of the pavement. The surface shall then be tested for trueness with a 12 foot straightedge held in successive positions parallel and at right angles to the center line of the pavement, and the whole area covered as necessary to detect variations. The straightedge shall be advanced along the pavement in successive stages of not more than one-half the length of the straightedge. Depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. The straightedge testing and finishing shall continue until the entire surface of the concrete is true. Before the surface sheen has disappeared and well before the concrete becomes nonplastic, the surface of the pavement shall be given a nonslip sandy surface texture by use of a burlap drag. A strip of clean, wet burlap from 3 to 5 feet wide and 2 feet longer than the pavement width shall be carefully pulled across the surface. Edges and joints shall be rounded with an edger having a radius of 1/8 inch. Curing shall be as specified.

3.11.2 Sidewalks

Concrete shall be 4 inches minimum thickness. Contraction joints shall be provided at 5 feet spaces unless otherwise indicated. Contraction joints shall be cut 1 inch deep with a jointing tool after the surface has been finished. Transverse expansion joints 1/2 inch thick shall be provided at changes in direction and where sidewalk abuts curbs, steps, rigid pavement, or other similar structures. Sidewalks shall be given a lightly broomed finish. A transverse slope of 1/4 inch per foot shall be provided, unless otherwise indicated. Variations in cross section shall be limited to 1/4 inch in 5 feet.

3.11.3 Curbs

Concrete shall be formed, placed, and finished by hand using a properly shaped "mule" or constructed using a slipform machine specially designed for this work. Contraction joints shall be cut 3 inches deep with a jointing tool after the surface has been finished. Expansion joints (1/2 inch wide) shall be provided at 100 feetmaximum spacing unless otherwise indicated. Exposed surfaces shall be finished using a stiff bristled brush.

3.12 CURING AND PROTECTION

3.12.1 General

Concrete shall be cured by an approved method for the period of time given below:

Concrete with Type III cement	3 days
All other concrete	7 days

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and damage from rain and flowing water for the duration of the curing period. Air and forms in contact with concrete shall be maintained at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except as otherwise permitted by paragraph Membrane Forming Curing Compounds, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Concrete containing silica fume shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.12.2 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. The Contractor shall have an approved work system to ensure that moist curing is continuous 24 hours per day.

3.12.3 Membrane Forming Curing Compounds

Membrane forming curing compounds shall be used only on surfaces in the following areas, Lift Span and Tower Spans sidewalks. Membrane curing shall not be used on surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete, including surfaces to which a smooth finish is to be applied or other concrete to be bonded. However, a styrene acrylate or chlorinated rubber compound meeting ASTM C 309, Class B requirements, may be used for surfaces which are to be painted or are to receive bituminous roofing or waterproofing, or floors that are

to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing or flooring specified. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam. Curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. All surfaces shall be thoroughly moistened with water. Curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 75 psi, at a uniform coverage of not more than 400 square feet per gallon for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. Surfaces on which clear compound is used shall be shaded from direct rays of the sun for the first 3 days. Surfaces coated with curing compound shall be kept free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

3.12.4 Impervious Sheeting

The following concrete surfaces may be cured using impervious sheets: Tower Span roadway deck. However, except for plastic coated burlap, impervious sheeting alone shall not be used for curing. Impervious-sheet curing shall only be used on horizontal or nearly horizontal surfaces. Surfaces shall be thoroughly wetted and be completely covered with the sheeting. Sheeting shall be at least 18 inches wider than the concrete surface to be covered. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 4 inches and taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

3.12.5 Cold Weather Curing and Protection

When the daily ambient low temperature is less than 32 degrees F the temperature of the concrete shall be maintained above 40 degrees F for the first seven days after placing. During the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by suitable temperature measuring devices furnished by the Contractor, as required, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor as directed.

3.13 SETTING BASE PLATES AND BEARING PLATES

After being properly positioned, column base plates, bearing plates for beams and similar structural members, and machinery and equipment base plates shall be set to the proper line and elevation with damp-pack bedding mortar, except where nonshrink grout is indicated. The thickness of the

mortar or grout shall be approximately 1/24 the width of the plate, but not less than 3/4 inch. Concrete and metal surfaces in contact with grout shall be clean and free of oil and grease, and concrete surfaces in contact with grout shall be damp and free of laitance when grout is placed. Nonshrink grout shall be used for placing bearings and anchor bolts.

3.13.1 Nonshrink Grout

Nonshrink grout shall be a ready-mixed material requiring only the addition of water. Water content shall be the minimum that will provide a flowable mixture and completely fill the space to be grouted without segregation, bleeding, or reduction of strength.

3.13.1.1 Mixing and Placing of Nonshrink Grout

Mixing and placing shall be in conformance with the material manufacturer's instructions and as specified therein. Ingredients shall be thoroughly dry-mixed before adding water. After adding water, the batch shall be mixed for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Grout not used within 30 minutes after mixing shall be discarded. The space between the top of the concrete or machinery-bearing surface and the plate shall be filled solid with the grout. Forms shall be of wood or other equally suitable material for completely retaining the grout on all sides and on top and shall be removed after the grout has set. The placed grout shall be carefully worked by rodding or other means to eliminate voids; however, overworking and breakdown of the initial set shall be avoided. Grout shall not be retempered or subjected to vibration from any source. Where clearances are unusually small, placement shall be under pressure with a grout pump. Temperature of the grout, and of surfaces receiving the grout, shall be maintained at 65 to 85 degrees F until after setting.

3.13.1.2 Treatment of Exposed Surfaces

For metal-oxidizing nonshrink grout, exposed surfaces shall be cut back 1 inch and immediately covered with a parge coat of mortar consisting of 1 part portland cement and 2-1/2 parts fine aggregate by weight, with sufficient water to make a plastic mixture. The parge coat shall have a smooth finish. For other mortars or grouts, exposed surfaces shall have a smooth-dense finish and be left untreated. Curing shall comply with paragraph CURING AND PROTECTION.

3.14 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL

The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and shall submit specified reports. When, in the opinion of the Contracting Officer, the concreting operation is out of control, concrete placement shall cease and the operation shall be corrected. The laboratory performing the tests shall be onsite and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per month thereafter for conformance with ASTM C 1077.

3.14.1 Grading and Corrective Action

3.14.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.14.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and shall be reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.14.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, the Contractor shall perform all tests for aggregate quality required by ASTM C 33. In addition, after the start of concrete placement, the Contractor shall perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

3.14.3 Scales, Batching and Recording

The accuracy of the scales shall be checked by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, the Contractor shall test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected

immediately.

3.14.4 Batch-Plant Control

The measurement of concrete materials including cementitious materials, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during each day's plant operation.

3.14.5 Concrete Mixture

a. Air Content Testing. Air content tests shall be made when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C 231 for normal weight concrete. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment. An upper warning limit and a lower warning limit line shall be set 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the air content at the mixer controlled as directed.

b. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment,

another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.

c. Slump Testing. In addition to slump tests which shall be made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143 for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Limits shall be set on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Samples for slump shall be taken at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.

d. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, an adjustment shall immediately be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, the concreting operation shall immediately be halted, and the Contractor shall

take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.

e. Temperature. The temperature of the concrete shall be measured when compressive strength specimens are fabricated. Measurement shall be in accordance with ASTM C 1064/C 1064M. The temperature shall be reported along with the compressive strength data.

f. Strength Specimens. At least one set of test specimens shall be made, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 cubic yards or portion thereof of that concrete mixture placed each day. Additional sets of test specimens shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. A truly random (not haphazard) sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to the start of construction. The plan shall assure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength per paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. A set of test specimens for concrete with a 90-day strength per the same paragraph shall consist of six specimens, two tested at 7 days, two at 28 days, and two at 90 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39 for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214.3R.

3.14.6 Inspection Before Placing

Foundations, construction joints, forms, and embedded items shall be inspected by the Contractor in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

3.14.7 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.14.8 Vibrators

The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing. Any vibrator not meeting the requirements of paragraph Consolidation, shall be immediately removed from service and repaired or replaced.

3.14.9 Curing Inspection

a. Moist Curing Inspections. At least once each shift, and not less than twice per day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.

c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, the Contractor shall estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, shall compute the rate of coverage in square feet per gallon, and shall note whether or not coverage is uniform.

d. Membrane Curing Corrective Action. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

3.14.10 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.14.11 Mixer Uniformity

a. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94.

b. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C 94. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

c. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.14.12 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all contractor quality control records.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 03415

PRECAST-PRESTRESSED CONCRETE

PART 1 GENERAL

1.1 SUMMARY

This work is the fabrication, storage, transportation, and erection of prestressed concrete bridge beams.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214	(1977; R 1989) Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 315	(1992) ACI Detailing Manual: Section Details and Detailing of Concrete Reinforcement
ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary

AMERICAN RAILWAY ENGINEEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997ae1) Carbon Structural Steel
ASTM A 108	(1999) Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A 416/A 416M	(1996) Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
ASTM C 31/C 31M	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999ae1) Concrete Aggregates
ASTM C 39	(1996) Compressive Strength of Cylindrical Concrete Specimens

ASTM C 109/C 109M	(1995) Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
ASTM C 150	(1999a) Portland Cement
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 231	(1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete
ASTM C 494	(1999a) Chemical Admixtures for Concrete
ASTM C 578	(2000) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 939	(1994a) Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
ASTM C 940	(1998a) Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory

PRECAST PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI Mnl-116S	(1985) Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products
PCI Mnl-120	(1992) PCI Design Handbook - Precast and Prestressed Concrete

1.3 SYSTEM DESCRIPTION

1.3.1 Design Requirements

1.3.1.1 Precast-Prestressed Members and Connections

Design of members and connections shall be in accordance with ACI 318/318R and PCI Mnl-120.

Precast-prestressed units shall be produced under plant-controlled conditions conforming to PCI Mnl-116S by a firm certified under the PCI Plant Certification Program and specializing in providing precast-prestressed concrete beams for bridges.

1.3.1.2 Loads

Loadings for members and connections shall include all dead load, live load, applicable lateral loads such as wind and earthquake, applicable construction loads such as handling, erection loads, and other applicable loads.

1.3.1.3 Calculations

Design calculations for members and connections not shown in the contract drawings shall be made by a registered professional engineer experienced in the design of precast-prestressed concrete.

1.3.2 Performance Requirements

Perform the following testing to ensure the materials and method used meet the requirements of these specifications and will produce precast-prestressed concrete members which are suitable for their intended use.

1.3.2.1 High-Strength Steel Tendons

Testing shall be as specified in paragraph TESTS, INSPECTIONS, AND VERIFICATIONS.

1.3.2.2 Concrete

Concrete shall be sampled and cylinders made in accordance with ASTM C 172 and ASTM C 31/C 31M.

a. Concrete Test Cylinders. A minimum of two concrete test cylinders per bed shall be made to verify the strength of concrete at the time of stress transfer and a minimum of two test cylinders per day or 50 cubic yards of concrete or fraction thereof, whichever results in the most cylinders, shall be made for each mix design to verify the attainment of the specified strength.

b. Cylinder Making. Cylinders shall be made as near as possible to the location where they will be cured and shall not be disturbed in any way from 1/2 hour after casting until they are either 24 hours old or ready to be tested. Concrete in cylinders may be consolidated by rodding or by vibration as specified in ASTM C 31/C 31M.

c. Cylinder Curing

(1) Test cylinders shall be cured with similar methods as the members they represent. In lieu of actual curing with the members, cylinders may be cured in curing chambers correlated in temperature and humidity with the beds. In such a case, the correlation shall be constantly verified by use of recording thermometers in the curing chambers and comparison with the temperature records of beds and by use of the same methods of moisture retention for curing chambers and casting beds.

(2) For beds cured by steam or radiant heat, cylinders shall be placed at random points along the bed. If there is any indication of variable heat, cylinders shall be placed in the coolest area.

(3) Test cylinders to indicate compliance with specified 28-day or earlier strength shall remain in the bed with the member until the member is removed. At that time, the cylinders shall be removed from their molds and placed in storage in a moist condition at 73.4 degrees plus or minus 3 degrees F.

d. Testing of Cylinders

(1) Testing of cylinders to determine compressive strength shall be performed in accordance with ASTM C 39. The strength of concrete at any given age shall be determined as the average of

two cylinders, except a single cylinder test can be used to determine stress transfer strength or predictive strengths at less than 28 days.

(2) Testing machines shall be calibrated in accordance with ASTM C 39.

1.3.2.3 Air Content

The air content tests shall be conducted in accordance with ASTM C 231. At least one air content test shall be conducted on the concrete from which each member is cast.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Design Calculations; FIO.

Design calculations shall be submitted prior to the initiation of manufacture of members to be used under this contract.

Concrete Mixture Proportions; GA.

Concrete mixture proportions shall be submitted for approval.

Prestressing Method and Equipment; GA.

Descriptions of proposed prestressing method and equipment shall be submitted and approved prior to the start of prestressing operations.

SD-04 Drawings

Erection; GA.

The Contractor shall prepare and submit for approval complete shop drawings that show the precast unit manufacturer's recommended details and materials for the work required by paragraphs DELIVERY, STORAGE, AND HANDLING and ERECTION. The shop drawings shall include: design computations; marking of the units for the placing drawings; anchorages for work of other trades; anchorages to support construction; size and location of steel tendons; methods of stressing; location and sizes of all openings 12 in. wide or larger to be cast into members; formwork; joints between units and other construction; reinforcing steel details; method of curing; and, pickup points and lifting devices.

Installation Drawings for Stressing Tendons and Accessories; GA.

Installation drawings for tendons and accessories shall be submitted and approved prior to commencing the work.

SD-08 Statements

Erection Plan; GA.

The Contractor shall prepare a detailed erection plan which shall be submitted at least 15 days prior to the date that erection of members is to begin.

Certification for Prestressing Technicians; FIO.

Certificates for prestressing technicians shall be submitted prior to start of prestressing operations.

SD-09 Reports

Materials; FIO.

Certified test reports of required material tests shall be submitted prior to the use of the materials in the work. Reports shall be furnished for each shipment and shall be identified with specific lots.

Concrete; FIO.

The results of concrete strength testing by the contractor shall be submitted not more than 5 days after the tests are completed.

Stressing Tendons and Accessories; FIO.

Certified materials test reports shall be submitted for all required materials tests, note the specific standards followed in the performance of tests, show that materials comply with the applicable specifications, be submitted for each material shipment and be identified with specific lots prior to use of materials in the work.

SD-13 Certificates

Cement; FIO, Air-Entraining Admixture; FIO, Water- Reducing Admixture; FIO, Accelerating Admixture; FIO, Aggregates; FIO,

Cement, Air-Entraining Admixture, Water-Reducing Admixture, Accelerating Admixture, and Aggregates shall be certified for compliance with all specifications requirements.

Air Content; FIO,

Each precast member delivered to the jobsite shall be accompanied by a certificate certifying that the air content in the concrete in that member is in compliance with the specifications. The certification must be based on an air content test conducted in conformance with ASTM C 231 on at least one of the batches of concrete from which the member was cast.

SD-14 Samples

Precast Concrete Panel; FIO

One sample panel for each concrete finish specified shall be submitted for approval.

SD-18 Records

Construction Records; FIO

Construction records of the manufacturing, handling, and erection of the precast prestressed concrete members shall be submitted.

Materials Disposition Records; FIO

Records which identify the incorporation of approved materials into the work shall be submitted before completion of the contract.

Prestressing Operations Records; FIO

Complete records of the prestressing operations shall be submitted before completion of the contract.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Transportation

1.5.1.1 Transporting Members

In transporting members by truck, railroad car, or barge, provision shall be made for supporting the members as described above, except battens can be continuous over more than one stack of units, with adequate bracing to ensure their maintaining the vertical position and damping of dangerous vibrations. Trucks with double bolsters are satisfactory provided the members are fully seated on the outer bolsters at not more than 3 feet or the depth of the member from the end and the inner bolster is not more than 8 feet from the end of the member or the designated pickup point. Adequate padding material shall be provided between tie chains or cables to preclude chipping of concrete.

1.5.1.2 Lateral Deflection or Vibration

Any noticeable indication of lateral deflection or vibration during transportation shall be corrected by rigid bracing between members or by means of lateral trussing.

1.5.2 Storage

1.5.2.1 Storage Areas

Storage areas for prestressed members shall be stabilized, and suitable foundations shall be provided, so differential settlement or twisting of members will not occur.

1.5.2.2 Stacked members

Stacked members shall be separated and supported by battens placed across the full width of each bearing point. Battens shall be arranged in vertical planes at a distance not greater than the depth of the member from designated pickup points. Battens shall not be continuous over more than one stack of precast units. Stacking of members shall be such that lifting devices will be accessible and undamaged. The upper members of a stacked tier shall not be used as storage areas for shorter members or equipment.

1.5.3 Handling of Members

The location of pickup points for handling of the members and details of the pickup devices shall be shown in shop drawings. Members shall be

handled only by means of approved devices at designated locations. Members shall be maintained in an upright position at all times and picked up and supported as shown in approved shop drawings.

1.6 CERTIFICATION FOR PRESTRESSING TECHNICIANS

Submitted certificates for prestressing technicians who will use the proposed system in the work shall certify by name that these technicians are thoroughly trained and skilled in the use of the system.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall comply with the following:

2.1.1 Cement

Cement shall comply with the following:

2.1.1.1 Portland Cement

Portland cement shall conform to ASTM C 150, Type I, II or III. The tricalcium aluminate content of the Type III cement shall be limited to 5 or 8 percent.

2.1.2 Aggregates

Aggregates shall meet the requirements of ASTM C 33.

2.1.3 Admixtures

In no event shall admixtures containing chlorides or nitrates be used in the concrete.

a. Air-entraining admixture shall be certified to comply with ASTM C 260.

b. Water-reducing admixture shall be certified to comply with ASTM C 494 Type A.

c. Accelerating admixture shall be certified to comply with ASTM C 494 Type C.

2.1.4 Waterproofing

Waterproofing shall be asphalt cement liquid material that is suitable for painting on concrete for use below grade as a waterproofing material. The material shall conform to AREMA Manual, Chapter 29.

2.1.5 Stressing Tendons

Stressing tendons shall be clean and free of loose rust, scale and pitting. Unbonded tendons shall be permanently protected from corrosion with an approved applied coating.

2.1.5.1 Stress-Relieved Wire and Wire Assemblies

Stress-relieved wire and wire assemblies shall conform to ASTM A 416/A 416M, Grade 270, wire diameter as shown. Wire assemblies shall be shop assembled

with anchor fittings positively attached to wires.

2.1.5.2 Ducts

Transverse bars shall be of ferrous metal, capable of transmitting forces from grout to the surrounding concrete, flexible enough to conform to the bar profile and strong enough to maintain their shape without deforming, sagging, or collapsing during concrete placement and vibration. The inside diameter of the ducts shall be large enough to provide an internal area at least twice the gross area of bar assemblies and shall be at least 1/4-inch larger than the diameter of a bar coupler placed in the ducts. Ducts shall be designed for watertight connections with all fittings. Galvanized ducts will not be permitted

2.1.5.3 Couplers

Couplers shall be metal of proven corrosion resistance and compatible with the bars. Couplers shall be provided with housings long enough to permit the necessary movements and fittings which allow complete grouting of all components.

2.1.5.4 Grout

Grout for grouting transverse bars shall consist of a mixture of Portland cement, shrinkage compensating admixture and potable water of which final proportions shall be based on test results of sample mixtures. Cement shall conform to ASTM C 150, Type I or II. The shrinkage compensating admixture shall produce a 2 percent minimum and a 10 percent maximum unconfined expansion when tested in accordance with ASTM C 940, shall not contain aluminum powder, chlorides, fluorides or nitrates, may be dispensed in solid or liquid form and shall be approved by the Contracting Officer prior to its use. The water content shall be the minimum necessary for proper placement but the water-cement ratio shall not exceed 0.50 by weight. The pumpability of grout shall be determined in accordance with ASTM C 939. The efflux time of a grout sample immediately after mixing shall not be less than 11 seconds. The minimum 7-day compressive strength of 2-inch grout cubes, molded, cured and tested in accordance with ASTM C 109/C 109M shall be 2500 psi. The use of a proprietary non-shrink grout may be submitted to the Contracting Officer for approval as a substitute.

2.1.6 Steel Reinforcement

Steel reinforcement shall be in accordance with Section 03200 CONCRETE REINFORCEMENT.

2.1.7 Box Beam Void Forms

Box beam void forms shall be constructed using preformed cellular polystyrene, ASTM C 578, Type 1; or another material acceptable to the Contracting Officer.

Box beam void forms shall be constructed watertight and resistant to breakage and deformation during concrete placement. The outside of the forms shall be waterproofed, if not constructed or approved preformed cellular polystyrene or an acceptable hot-melt wax coated, polymer coated, or asphalt-penetrated material.

2.1.8 Beveled Sole Plate

Beveled sole plate shall conform to ASTM A 36/A 36M.

2.1.9 Stud Shear Connector

Stud shear connector shall be a proprietary steel rod with larger diameter head that is manufactured as a concrete anchor from steel conforming to ASTM A 108.

2.1.10 Elastomeric Bridge Bearing

Elastomeric bridge bearing shall be a neoprene block with laminated sheet steel plates, as indicated. The bearing block shall be manufactured as a bridge bearing. The manufacturer shall certify that the bearing conforms to the requirements of the AREMA Manual, Chapter 19.

2.2 CONCRETE MIXTURE PROPORTIONS

2.2.1 Concrete

Concrete shall be composed of cementitious material, water, fine and coarse aggregate, and admixtures. The cementitious material shall be portland. The admixtures shall be an air-entraining agent and may include a water-reducing admixture when its formulation and use are approved.

2.2.2 Proportions

The concrete mixture proportions shall meet the following requirements:

Maximum Water-cement ratio (w/c) = 0.43.
Specified Strength = 6500 psi at 28 days.

Air Content = 5 to 7 percent as determined in accordance with ASTM C 231. Proportions shall be selected so that the maximum permitted w/c ratio is not exceeded and so as to produce an average strength exceeding the design strength f'c by the amount indicated below. Where the production facility has a standard deviation record determined in accordance with ACI 214, based on 30 consecutive strength tests of similar mixture proportions to that proposed, obtained within 1 year of the time when concrete placing is expected, it shall be used in selecting average strength. The average strength used as the basis for selecting proportions shall exceed the specified strength f'c by at least.

400 psi if standard deviation is less than 300 psi
550 psi if standard deviation is 300 to 400 psi
700 psi if standard deviation is 400 to 500 psi
900 psi if standard deviation is 500 to 600 psi

If the standard deviation exceeds 600 psi or if a standard deviation record is not available, proportions shall be selected to produce an average strength at least 1,200 psi greater than the specified strength.

Mixtures shall be proportioned in accordance with ACI 211.1. The trial mixtures shall be formulated using the same materials as those to be used in the units supplied under this specification, and the selected proportions shall be submitted for approval with the results of cylinder strengths at 28 days.

2.3 EVALUATION AND ACCEPTANCE

2.3.1 Concrete

A test result shall be the average of the strengths of the two test cylinders made in accordance with paragraph SYSTEM DESCRIPTION, subparagraph PERFORMANCE REQUIREMENTS, subparagraph CONCRETE, subparagraph "a", CONCRETE TEST CYLINDERS. The strength level of the concrete will be considered satisfactory if the average of all sets of three consecutive strength tests equal or exceed the specified strength f'(c) and no individual test falls below the specified value by more than 500 psi. Members manufactured with concrete that does not meet the strength requirements shall be rejected.

2.3.1.1 Air Content

All members cast with concrete having a measured air content less than 5 percent shall be rejected. Members cast with concrete having an air content up to 9 percent may be incorporated into the work if the strength requirements are met.

2.3.2 Tolerances

The precast-prestressed members shall be manufactured within the following tolerances. Members failing to meet the dimensional tolerances shall be rejected.

2.3.2.1 Length of Member

The length of the member shall not deviate from the length shown in the contract drawings by more than plus or minus 3/4 inch or plus or minus 1/8 inch per 10 feet of length, whichever is greater.

2.3.2.2 Cross-sectional Dimensions

The cross-sectional dimensions of a member, if less than 36 inches, shall not vary by more than plus or minus 1/4 inch and, if over 36 inches, they shall not vary by more than plus or minus 3/8 inch.

2.3.2.3 Horizontal Alignment (Sweep)

The horizontal alignment of the members shall not deviate from a straight line parallel to the theoretical centerline by more than 1/2 inch or 1/8 inch per 10 feet of length, whichever is greater. The maximum gap between two adjacent members due to sweep shall not exceed 1 inch.

2.3.2.4 Camber

The actual camber of beams shall not deviate from the computed camber by more than plus or minus 1/8 inch per 10 feet but not more than plus or minus 1/2 inch maximum total deviation.

2.3.2.5 Camber Differential

The differential in camber at midspan between adjacent members shall not exceed 1/8 inch per 10 feet of length or 3/4 inch maximum.

2.3.2.6 Position of Tendons

The position of the tendons shall not deviate from the design position by more than plus or minus 1/4 inch.

2.3.2.7 Handling Devices

The actual position of handling devices shall not deviate from the designed position by more than plus or minus 6 inches.

2.3.2.8 Anchors and Inserts

The actual position of anchors and inserts shall not vary by more than plus or minus 1 inch from positions shown in the contract drawings.

2.3.2.9 Flange Thickness

The thickness of a flange or slab shall not vary from the dimensions in the drawings by more than plus 1/4 inch or minus 1/8 inch.

2.3.2.10 Depth of Member at Support

At the supports, the depth of a member shall not deviate from the dimensions shown in the contract drawings by more than plus or minus 1/4 inch.

2.3.2.11 Squareness of Ends

The ends of members shall not deviate from being square by more than plus or minus 1/4 inch. Squareness shall be checked in both the vertical and horizontal planes.

2.3.3 Defects

2.3.3.1 Minor Defects

Minor defects are those which involve less than 36 square inches of concrete and do not expose stressing tendons or reinforcing steel. These defects will be repaired as specified hereinafter. Cracks which are visible but are 0.01 inch wide or less will be accepted.

2.3.3.2 Major Defects

Major defects are those which involve more than 36 square inches of concrete or expose stressing tendons or reinforcing steel. If one or more major defects appear in a member, it shall be rejected. Cracks of a width of more than 0.01 inch shall be cause for rejection of the member.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

The Contractor shall have required material tests performed on stressing tendons and accessories by an approved laboratory to demonstrate that the materials are in conformance with the specifications. These tests shall be at the Contractor's expense.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication of precast-prestressed members shall follow the applicable provisions of the PCI Mnl-116S, except as specified herein.

3.2 BEDS AND FORMS

3.2.1 Casting Beds

All casting beds shall have concrete support on unyielding foundations.

3.2.2 Forms

Forms, both fixed and movable, shall be of steel. All forms and beds shall be thoroughly cleaned after each use.

3.2.3 Bulkheads

Bulkheads, spacers, templates, and similar equipment having influence on the accuracy of dimensions and alignment shall be regularly inspected and maintained after each casting.

3.2.4 Alignment

Accurate alignment of forms shall be maintained during the casting operation to assure compliances with tolerances specified in paragraph EVALUATION AND ACCEPTANCE. Leakage of the paste in form joints is not acceptable, and measures shall be taken to prevent such leakage. Measures shall also be taken to provide corner chamfers.

3.2.5 Form Ties

For exposed members, form ties, if used, shall be of the threaded or snap-off type so no parts will be left at the surface of the finished concrete.

3.3 TENDONS

Stressing tendons and accessories shall be installed or placed as specified and as shown on contract and approved installation drawings. Installation details of stressing tendons and accessories not specified or shown shall be in accordance with ACI 315 or ACI 318/318R. Welding shall not be performed near or adjacent to stressing tendons. Stressing tendons shall not be installed until all welding has been completed on supports or any part which might be in contact with the tendons.

3.3.1 Prestressing Method and Equipment

Descriptions of the proposed prestressing methods and equipment indicating the manufacturer of all prestressing equipment, including tensioning jacks, stress measurement gages, dynamometers and load cells or other devices for measuring stressing loads, shall be provided by the contractor. Descriptions shall include certified calibration records for each set of jacking equipment and testing curves for stress measurement gages which show that the gages have been calibrated for the jacks for which they are to be used.

3.3.2 Installation Drawings

Detailed installation drawings for stressing tendons and accessories showing the type and size of stressing tendons and anchorages, erection methods, sequence of stressing and stressing calculations shall be provided by the Contractor.

3.3.3 Anchorages

Anchorages shall be set in a plane normal to the axis of the tendons such that uniform bearing on the concrete is assured. Positive connecting anchorages rather than gripping types shall be used for anchoring embedded ends of tendons. Anchorages and anchor fittings shall be permanently protected against corrosion. Parallel wire anchorage wedges or cores shall be recessed within the members.

3.3.4 Stressing Tendons and Ducts

Protective coverings and wrappings shall be removed and each stressing tendon shall be closely inspected to see that nicks, scoring, pits or other damage does not exist and high strength steel bars shall be closely inspected to assure that they are not bent and that threaded ends are in satisfactory condition immediately prior to installation. Strand tendons shall be shop or field assembled as required and positively attached to anchorages. Stressing tendons shall be assembled to required shapes and dimensions and placed where indicated on drawings within specified tolerances and adequately supported. Wires of parallel-wire assemblies shall not be spliced.

3.3.5 Tensioning Tendons

Tensioning of stressing tendons shall be as specified and shown. The stress induced in the tendons by any method of tensioning shall be determined independently by both (1) measurement of tendon elongation and (2) direct measurement of force using a pressure gauge or load cell. If the results of these two measurements do not check each other and the theoretical values within 5 percent, the operation shall be carefully checked and the source of error determined and corrected before proceeding further. Concrete cylinder tests shall indicate a breaking strength of at least 5100 psi before transfer of stress to ensure that the concrete strength is adequate for the requirements of the anchorages or for transfer through bond as well as meet camber or deflection requirements. The final prestress load in each unit after seating shall be as shown. Safety measures shall be taken by the Contractor to prevent accidental injury caused by failure of a stressing tendon or tendon component. The exposed ends of stressing tendons and anchorages shall be protected from damage during stressing operations to prevent failure.

3.3.6 Pretensioning

Strand tendons may be tensioned by jacking of groups of strands or may be tensioned individually by means of a single-strand jack. Before final tensioning, all tendons shall be brought to a uniform initial tension of approximately 1,000 pounds per strand per 200 feet of bed, with a minimum of 1,000 pounds and a maximum of 3,000 pounds per strand. The force corresponding to the initial tension shall be measured by a dynamometer or other approved method to aid in determining the final elongation. After this initial tensioning, the tendons shall be stressed to the total tension indicated on the drawings using hydraulic or mechanical equipment with gauges or dynamometers graduated and calibrated to accurately determine the load applied. Draped pretensioned strands shall be tensioned partially by jacking at the end of the bed and partially by uplifting or depressing strands, or they shall be held in their draped positions by means of rollers, pins or other approved methods and tensioned entirely by jacking. Approved low-friction devices shall be used at all points of change in slope of draped strands while tensioning draped strands, regardless of the tensioning method used. Cable stress shall be maintained between

anchorages until the concrete has reached the specified compressive strength.

3.3.7 Detensioning

Forces from pretensioned strands shall be transferred to the concrete by either the multiple-strand release or the single-strand release method. The stress transfer shall not be performed until concrete strength, as indicated by test cylinders, has reached the specified transfer strength. If concrete has been heat-cured, the detensioning shall be done immediately following the curing period while the concrete is still warm and moist. During detensioning, the prestressing forces shall be kept nearly symmetrical about the vertical axis of the member and shall be applied in a manner that will minimize sudden loading. Eccentricity about the vertical axis shall be limited to one strand.

a. Multiple-Strand Release: In this method, all strands shall be detensioned simultaneously and the load transferred gradually to the concrete by hydraulic jacking.

b. Single-Strand Release: In this method, all strands shall be detensioned by slow heat-cutting the strands in accordance with a pattern and schedule as approved. The strands shall be heated using a low-oxygen flame until the metal gradually loses its strength, causing release of the strands to occur gradually. The low-oxygen flame shall be played along the strand for a minimum of five inches. Strands shall be so heated that the failure of the first wire in each strand shall occur after the torch has been applied for a minimum of five seconds.

3.3.8 Accuracy of Stress and Elongation Measurement

3.3.8.1 Stress Measurement

Hydraulic gauges, dynamometers, load cells or other devices for measuring stressing load shall have an accuracy of reading within two percent for stress measurement. Gauges are required to have been calibrated for the jacks for which they are used within a period not exceeding 12 months. Recalibration shall be performed at any time that a gaging system shows indication of erratic results in the opinion of the Contracting Officer. Gauges shall indicate loads directly in pounds or be accompanied by a chart which converts dial readings into pounds.

3.3.8.2 Elongation Measurement

After the initial force has been applied to a tendon, reference points for measuring elongation due to additional tensioning forces shall be established. They shall be located according to the method of tensioning and type of equipment. The system used shall be capable of measuring the true elongation plus or minus 1/16-inch.

3.3.9 Prestressing Operations Records

The Contractor shall compile and submit complete prestressing operations records to the Contracting Officer. These records shall show the manufacturer, identification and description of materials and equipment including prestressing tendons and jacking and load measuring equipment; location of prestressing tendons; initial design tensioning loads, final design tensioning loads and actual tensioning loads for tendons; dates tensioning loads applied; and theoretical and actual elongations for

tendons.

3.4 STEEL REINFORCEMENT

Steel bars and welded wire fabric shall be placed in accordance with Section 03200 CONCRETE REINFORCEMENT.

3.5 CONCRETE PLACEMENT

Concrete placement shall be in accordance with Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE, except that once placement is started in a member it shall be carried on in a continuous operation until the member is completed. Members shall be cast in a horizontal position and casting in tiers will not be permitted. Adequate vibration shall be provided with internal and form vibrators so the cast members shall be free of rock pockets or surface blemishes resulting from inadequate vibration. Cold joints shall not be permitted in prestressed concrete members. If delays occur that result in hardening of the concrete so it will not receive a vibrator and again become plastic, the concrete shall be removed and the forms shall be washed out and refilled, otherwise partially cast members will be rejected.

3.6 CURING AND PROTECTION

Concrete for the manufacturing of the precast-prestressed concrete members shall be cured and protected in accordance with Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE or by other methods further specified here.

3.6.1 Curing with Steam at Atmospheric Pressure

Steam curing shall be under a suitable enclosure to retain the live steam to minimize moisture and heat losses. The enclosure shall allow free circulation of the steam around the sides and top of the beams. Steam jets shall be so positioned so they do not discharge directly on the concrete, forms, or test cylinders. The cycle of steam application shall conform to the following:

3.6.1.1 Curing After Placing and Vibrating

After placing and vibrating, the concrete shall be allowed to attain its initial set before the steam is applied. During the period between placement of the concrete and application of steam, provisions shall be made to prevent surface drying by means of a coating of membrane curing compound, moist covers, or equally effective methods. Application of the steam shall be delayed not less than 2 hours and not more than 10 hours after the time of concrete placement. If the ambient temperature is below 50 degrees F, enough heat shall be applied to maintain the concrete at its placing temperature.

3.6.1.2 Temperature Increase

The ambient temperature within the casting enclosure shall be increased at a rate not to exceed 40 degrees F per hour. Temperature increase shall be as uniform as possible.

3.6.1.3 Temperature Range

The temperature shall be increased until the ambient temperature in the casting enclosure is between 140 and 160 degrees F. Once this temperature

range is reached, it shall be maintained until the concrete has reached the compressive strength necessary for stressing or destressing the tendons.

3.6.1.4 Temperature Decrease

In discontinuing the steam curing, the ambient air temperature shall decrease at a rate not to exceed 40 degrees F per hour. Temperature decrease shall be as uniform as possible.

3.6.1.5 Recording Thermometers

Recording thermometers showing the time-temperature relationship through the curing period from placing concrete to transfer of prestress shall be provided. At least one recording thermometer per casting enclosure shall be used. The desired curing time-temperature relationship shall be placed on the recording chart of the recording thermometer to aid the personnel controlling the temperature during curing. Recording charts shall be made available upon request and shall be clearly visible during the curing process.

3.6.2 Curing with Radiant Heat and Moisture

3.6.2.1 Radiant Heat

Radiant heat may be applied to beds by means of pipe circulating steam, hot oil, or hot water or by electric blankets or heating elements on forms. Pipes, blankets, or elements shall not be in contact with concrete, form surface, or test cylinders.

3.6.2.2 Moisture Loss

During the cycle of radiant heat curing, effective means shall be provided to prevent rapid loss of moisture in any part of the member. Moisture may be applied by a covering of moist burlap or cotton matting. Moisture may be retained by covering the member with a plastic sheet in combination with an insulating cover or by applying a liquid seal coat or membrane curing compound.

3.6.2.3 Temperature Limits

Temperature limits and use of recording thermometer shall be as specified for curing with steam at atmospheric pressure.

3.6.2.4 Termination of Curing

Termination of curing shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE unless the concrete has been cured by one of the two methods stated above. Termination of curing for concrete cured by either the steam at atmospheric pressure method or the radiant heat with moisture shall be determined based on the compressive strength of the concrete necessary for stressing or destressing the tendons.

3.7 REPAIRS

All honeycombed areas, chipped corners, air pockets over 1/4 inch in diameter, and other minor defects shall be repaired. Form offsets of fins over 1/8 inch shall be ground smooth. All unsound concrete shall be removed from defective areas prior to repairing. All surfaces permanently exposed to view shall be repaired by a blend of portland cement and white

cement properly proportioned so that the final color when cured will be the same as adjacent concrete.

3.8 FINISHING

3.8.1 Unformed surfaces

Unformed surfaces shall receive a wood float finish.

3.9 ERECTION

Erection shall comply with the following.

3.9.1 Storage Provisions

All provisions for storage and handling given in paragraph DELIVERY, STORAGE, AND HANDLING shall be observed at the erection site.

3.9.2 Seating of Precast Prestressed Concrete Members

The precast prestressed concrete members shall be set into place in a manner which assures full bearing. If the bearing called for in the contract drawing is not obtained, then the members shall be removed and the situation corrected.

3.9.3 Erection Plan

The erection plan shall be in sufficient detail so that adequacy of equipment, techniques, and accessories can be determined and comments offered. Acceptance of the Contractor's erection plan shall not relieve the Contractor of his responsibility for erecting precast prestressed members into position as required by the plans and specifications.

3.10 CONSTRUCTION RECORDS

Complete construction records shall be kept of the manufacturing, handling, and erection of the precast-prestressed concrete members. Records shall be kept for, but not limited to, the following items:

a. Specifications of material used in the manufacture of the members.

b. Time-temperature history of the concrete members from casting to the transfer of the prestress force.

c. Records of the tendon stressing operation including initial prestress force, measured elongation, how it was measured, and how the tendons were stressed and destressed.

d. Records of inspection of the members before and after the prestress force is transferred to the members.

e. Records of the inspection of the members each time they are moved.

f. Records of any defects in the member and any corrective measures taken.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 05055

METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The materials used for metalwork fabrication and erection are indicated in SECTION 05120, STRUCTURAL STEEL.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123	(1997ae1) Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip
ASTM A 325	(1997) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM E 165	(1995) Liquid Penetrant Examination Inspection Method
ASTM E 709	(1995) Magnetic Particle Examination

ASME INTERNATIONAL (ASME)

ASME B4.1	(1967; R 1994) Preferred Limits and Fits for Cylindrical Parts
ASME B46.1	(1995) Surface Texture (Surface Roughness, Waviness, and Lay)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.5	(1996) Bridge Welding Code

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Detail Drawings; GA

Detail drawings for metalwork shall be submitted and approved prior to fabrication.

SD-07 Schedules

Materials Orders; FIO

Copies of purchase orders, mill orders, shop orders and work orders for materials shall be submitted prior to the use of the materials in the work.

Materials List; FIO

Materials list for fabricated items shall be submitted at the time of submittal of detail drawings.

Shipping Bill; FIO

Shipping bill shall be submitted with the delivery of finished pieces to the site.

SD-08 Statements

Welding Procedures for Structural Steel; GA

Schedules of welding procedures for steel structures shall be submitted and approved prior to commencing fabrication.

Welding Procedures for Fracture Control Plan; GA

Schedules of welding procedures for fracture critical members shall be submitted and approved prior to commencing fabrication.

Structural Steel Welding Repairs; GA

Welding repair plans for steel shall be submitted and approved prior to making repairs.

SD-09 Reports

Tests, Inspections, and Verifications; FIO

Certified test reports for materials shall be submitted with all materials delivered to the site.

SD-13 Certificates

Qualification of Welders and Welding Operators; FIO

Certifications for welders and welding operators shall be submitted prior to commencing fabrication.

Application Qualification for Steel Studs; GA

Certified reports for the application qualification for steel studs shall be submitted and approved prior to commencing fabrication.

SD-18 Records

Materials Disposition Records; FIO

Materials disposition records shall be submitted before completion of contract.

1.3 METALWORK DETAIL DRAWINGS

Detail drawings for metalwork shall include catalog cuts, templates, fabrication and assembly details and type, grade and class of material as appropriate. Elements of fabricated items inadvertently omitted on contract drawings shall be detailed by the fabricator and indicated on the detail drawings.

1.4 QUALIFICATION OF WELDERS AND WELDING OPERATORS

The Contractor shall certify that the qualification of welders and welding operators and tack welders who will perform structural steel welding have been qualified for the particular type of work to be done in accordance with the requirements of AWS D1.5, Section 5, prior to commencing fabrication. The certificate shall list the qualified welders by name and shall specify the code and procedures under which qualified and the date of qualification. Prior qualification will be accepted if welders have performed satisfactory work under the code for which qualified within the preceding three months. The Contractor shall require welders to repeat the qualifying tests when their work indicates a reasonable doubt as to proficiency. Those passing the requalification tests will be recertified. Those not passing will be disqualified until passing. All expenses in connection with qualification and requalification shall be borne by the Contractor.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Materials Orders

The Contractor shall furnish 6 copies of purchase orders, mill orders, shop orders and work orders for all materials orders and items used in the work. Where mill tests are required purchase orders shall contain the test site address and the name of the testing agency.

2.1.2 Materials List

The Contractor shall furnish a materials list of the materials to be used in the fabrication of each item.

2.1.3 Shipping Bill

The Contractor shall furnish a shipping bill or memorandum of each shipment of finished pieces or members to the project site giving the designation mark and weight of each item, the number of items, the total weight, and the car initial and number if shipped by rail in carload lots. Duplicate copies of shipping bills shall be mailed promptly to Contracting Officer.

2.2 FABRICATION

2.2.1 Structural Fabrication

Material shall be straight before being laid off or worked. If straightening is necessary it shall be done by methods that will not impair the metal. Sharp kinks or bends shall be cause for rejection of the

material. Material with welds will not be accepted except where welding is definitely specified, indicated or otherwise approved. Bends shall be made by approved dies, press brakes or bending rolls. Where heating is required, precautions shall be taken to avoid overheating the metal and it shall be allowed to cool in a manner that will not impair the original properties of the metal. Proposed flame cutting of material other than structural steel shall be subject to approval and shall be indicated on detail drawings. Shearing shall be accurate and all portions of the work shall be neatly finished. Corners shall be square and true unless otherwise shown. Re-entrant cuts shall be filleted to a minimum radius of 2 inches unless otherwise approved. Finished members shall be free of twists, bends and open joints. Bolts, nuts and screws shall be tight.

2.2.1.1 Dimensional Tolerances for Structural Work

Dimensions shall be measured by an approved calibrated steel tape of approximately the same temperature as the material being measured. The overall dimensions of an assembled structural unit shall be within the tolerances indicated on the drawings or as specified in the particular section of these specifications for the item of work. Where tolerances are not specified in other sections of these specifications or shown, an allowable variation of 1/32 inch is permissible in the overall length of component members with both ends milled and component members without milled ends shall not deviate from the dimensions shown by more than 1/16 inch for members 30 feet or less in length and by more than 1/8 inch for members over 30 feet in length.

2.2.1.2 Structural Steel Fabrication

Structural steel may be cut by mechanically guided or hand-guided torches, provided an accurate profile with a surface that is smooth and free from cracks and notches is obtained. Surfaces and edges to be welded shall be prepared in accordance with AWS D1.5, Subsection 3.2. Where structural steel is not to be welded, chipping or grinding will not be required except as necessary to remove slag and sharp edges of mechanically guided or hand-guided cuts not exposed to view. Hand-guided cuts which are to be exposed or visible shall be chipped, ground or machined to sound metal.

2.2.2 Specific Fabrication Requirements

2.2.2.1 Facing of Tower Column Sections

The ends of all bolted tower column sections shall be faced to exact lengths and brought to even bearing after they are boxed and bolted up complete, before attaching the projecting splice plates. The column sections shall be provided with suitable spacing blocks and clamps to hold the plates firmly in their position while the ends are faced. Where the abutting faces of other column sections are not faced, the opening shall not be more than one-quarter inch, except where a close fit is required on the plans, in which case, the opening shall not be greater than one-eighth inch.

2.2.2.2 End Connection Angles

Floorbeams and stringers having end connection angles shall be milled and planed to exact length. If the end connection angles are bolted before milling, they shall then be faced, provided such facing does not remove more than one-eighth inch from the face angles. The angles shall be so accurately set before facing that the entire face of the connection angles

shall be true and flat after facing. If the end connection angles are bolted to the truss or floorbeam after the facing operations,the angles shall be set flush with the faced ends. If angles protrude after bolting, the angles shall be faced so the web will bear.

2.2.2.3 Holes for Field Bolts

All holes for field bolts shall be subpunched or subdrilled one-quarter of an inch less in diameter than that of the finished holes and shall be reamed to size through steel templates, with the following exceptions.

a. Holes in materials thicker than 3/4-inch for high-strength steel shall not be subpunched, but shall be subdrilled to the diameter specified for subpunching and then reamed with the parts assembled, or may be drilled full size with the parts assembled, or may be reamed to template when shop assembly is not required.

b. Holes in field connections of members or portions of the structure required to be shop assembled shall be reamed or drilled to size after assembly.

2.2.2.4 Field Connections

Chord splices of truss members shall, in all cases ,be drilled, or subpunched or subdrilled and reamed in the shop, with at least three abutting sections assembled with milled ends in bearing or close fit, as designated on the drawings. Angular layout of truss members at the truss joints shall be fabricated based on angles that are compatible with the true geometric position (nominal geometry) of the truss. Column splices of towers similarly shall be shop-assembled for reaming and drilling with milled ends in full bearing. Holes for field connections of web members of trusses shall be either drilled or reamed in the shop with the connecting parts assembled. Web members of trusses assembled in place with the chords for ream- and drill-assembled shall be accurately located in their true geometric position (nominal geometry) shown on the contract plans and approved shop detail plans before drilling or reaming. All portals and tower top girders shall be drill- or ream-assembled with their truss or tower members. Diagonal bracing members and struts of the tower trusses shall be either drill-assembled or ream-assembled in the shop with their column members. Floorbeam connections to trusses and towers and stringer connections to floorbeams shall be drilled or reamed to a metal template.

2.2.2.4 Shop Assembly

Parts of shop-bolted members shall be adequately pinned, firmly drawn together and in close contact before drilling is begun. The drifting during assembly shall be only such as to bring the parts into position and not to enlarge the holes or distort the metal.

a. Reaming or drilling full-size of assembled parts or assembled members shall be done after the parts or members are cleaned and so firmly bolted together that the surfaces are in close contact. In case the condition is not complied with in a manner satisfactory to the Contracting Officer, the Contractor shall, at the request of the Inspector, take various pieces apart after reaming, and remove the burrs on the contact surfaces. Reamers shall not be directed by hand where mechanically-guided tools can be used.

b. Connecting parts assembled in the shop for the purpose of reaming

or drilling holes in field connections shall be matchmarked with steel stencils and paint so they may be reassembled in the same position. The parts shall not be interchanged. Diagrams showing such matchmarks shall be furnished to the Contracting Officer.

2.2.2.5 Template Reaming

All metal templates shall have milled ends with holes accurately dimensioned from milled edges. Centerlines of the connection shall be inscribed on the template. The milled edges and the centerline shall be used in accurately locating the template from the milled ends of the members. Reaming or drilling of field connections through templates shall be done after the templates have been located with the utmost care as to position and angle, and firmly bolted. All metal templates shall be fitted with hardened steel bushings. The same template shall be used for reaming of both sets of holes in any connecting member, the bushings being reversed to secure accuracy.

2.2.2.6 Numerically-Controlled Drilling

Numerically-controlled drilling may be used in lieu of drilling and reaming assembled, except for the tower column splices which shall be ream-assembled with the milled ends in bearing. The Contractor will not be relieved of the responsibility to provide accurately drilled holes in properly aligned pieces when assembled.

a. A minimum of two complete intermediate panels of one truss of the towers shall be shop-assembled to verify the quality of the holes, the accuracy of alignment and fit of the mating pieces. Numerically-controlled drilling shall not create a need for fills to produce accurate fit between milled to bear surfaces. If satisfactory work is verified by accurately checking these panels, shop assembly for verification may be reduced to a minimum of 10 percent selected at random to represent all connections that were required to be ream-assembled, or drilled from the solid. If unsatisfactory work is found, the Contractor shall shop-assemble another intermediate panel on the same truss to verify the quality of the holes, the accuracy of alignment, and fit of mating pieces.

b. All other connections which are drilled with numerically-controlled equipment and are not shop assembled shall be checked for centering and fit of pieces by careful shop measurements made by the Contractor. The Contractor shall be responsible for the dimension and fit of all pieces, whether shop-assembled or not.

2.2.3 Welding

2.2.3.1 Welding of Structural Steel

a. Welding Procedures for Structural Steel - Welding procedures for structural steel shall be prequalified as described in AWS D1.5, Subsection 5.7 and Subsection 5.11 or shall be qualified by tests as prescribed in AWS D1.5, Section 5. Properly documented evidence of compliance with all requirements of these specifications for previous qualification tests shall establish a welding procedure as prequalified. For welding procedures qualified by tests, the test welding and specimen testing must be witnessed and the test report document signed by the Contracting Officer. Approval of any welding procedure will not relieve the Contractor of the responsibility for

producing a finished structure meeting all requirements of these specifications. The Contractor will be directed or authorized to make any changes in previously approved welding procedures that are deemed necessary or desirable by the Contractor Officer. The Contractor shall submit a complete schedule of welding procedures for each steel structure to be welded. The schedule shall conform to the requirements specified in the provisions AWS D1.5, Sections 2, 3, 4, 7 and 9. The schedule shall provide detailed procedure specifications and tables or diagrams showing the procedures to be used for each required joint. Welding procedures shall include filler metal, preheat, interpass temperature and stress-relief heat treatment requirements. Each welding procedure shall be clearly identified as being prequalified or required to be qualified by tests. Welding procedures must show types and locations of welds designated or in the specifications to receive nondestructive examination.

b. Welding Process - Welding of structural steel shall be by an electric arc welding process using a method which excludes the atmosphere from the molten metal and shall conform to the applicable provisions of AWS D1.5, Sections 1 thru 7. Welding shall be such as to minimize residual stresses, distortion and shrinkage.

c. Welding Technique

(1) Filler Metal - The electrode, electrode-flux combination and grade of weld metal shall conform to the appropriate AWS specification for the base metal and welding process being used or shall be as shown where a specific choice of AWS specification allowables is required. The AWS designation of the electrodes to be used shall be included in the schedule of welding procedures. Only low hydrogen electrodes shall be used for manual shielded metal-arc welding regardless of the thickness of the steel. A controlled temperature storage oven shall be used at the job site as prescribed by AWS D1.5, Subsection 4.5 to maintain low moisture of low hydrogen electrodes.

(2) Preheat and Interpass Temperature - Preheating shall be performed as required by AWS D1.5, Subsection 4.2 and 4.3 or as otherwise specified except that the temperature of the base metal shall be at least 70 degrees F. The weldments to be preheated shall be slowly and uniformly heated by approved means to the prescribed temperature, held at that temperature until the welding is completed and then permitted to cool slowly in still air.

(3) Stress-Relief Heat Treatment - Where stress relief heat treatment is specified or shown, it shall be in accordance with the requirements of AWS D1.5, Subsection 4.4 unless otherwise authorized or directed.

d. Fracture Critical Members - These indicated members shall be welded in accordance with the Fracture Control Plan of AWS D1.5, Section12. Temporary welds and tack welds are not permitted on Fracture Critical Members.

e. Workmanship - Workmanship for welding shall be in accordance with AWS D1.5, Section 3 and other applicable requirements of these specifications.

(1) Preparation of Base Metal - Prior to welding the Contractor

shall inspect surfaces to be welded to assure compliance with AWS D1.5, Subsection 3.2.

(2) Temporary Welds - Temporary welds required for fabrication and erection shall be made under the controlled conditions prescribed for permanent work. Temporary welds shall be made using low-hydrogen welding electrodes and by welders qualified for permanent work as specified in these specifications. Preheating for temporary welds shall be as required by AWS D1.5 for permanent welds except that the minimum temperature shall be 120 degrees F in any case. In making temporary welds arcs shall not be struck in other than weld locations. Each temporary weld shall be removed and ground flush with adjacent surfaces after serving its purpose.

(3) Tack Welds - Tacks welds shall not be used.

2.2.3.2 Welding of Steel Studs

The procedures for welding steel studs to structural steel, including mechanical, workmanship, technique, stud application qualification, production quality control and fabrication and verification inspection procedures shall conform to the requirements of AWS D1.5, Section 7, except as otherwise specified.

a. Application Qualification for Steel Studs - As a condition of approval of the stud application process, the Contractor shall furnish certified test reports and certification that the studs conform to the requirements of AWS D1.5, Subsections 7.2 and 7.3, certified results of the stud manufacturer's stud base qualification test, and certified results of the stud application qualification test as required by AWS D1.5, Subsection 7.6, except as otherwise specified.

b. Production Quality Control - Quality control for production welding of studs shall conform to the requirements of AWS D1.5, Subsection 7.7, except as otherwise specified. Studs on which pre-production testing is to be performed shall be welded in the same general position as required on production studs (flat, vertical, overhead or sloping). If the reduction of the length of studs becomes less than normal as they are welded, welding shall be stopped immediately and not resumed until the cause has been corrected.

2.2.4 Bolted Connections

2.2.4.1 Bolted Structural Steel Connections

Bolts, nuts and washers shall be of the type specified or indicated. All nuts shall be equipped with washers except for high strength bolts. Beveled washers shall be used where bearing faces have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the use of high strength bolts is specified or indicated the materials, workmanship and installation shall conform to the applicable provisions of ASTM A 325.

a. Bolt Holes - Bolt holes shall be accurately located, smooth, perpendicular to the member and cylindrical.

(1) Holes for regular bolts shall be drilled or subdrilled and reamed in the shop and shall not be more than 1/16 inch larger than the diameter of the bolt.

(2) Holes for fitted bolts shall be match-reamed or drilled in the shop. Burrs resulting from reaming shall be removed. The threads of bolts shall be entirely outside of the holes. The body diameter of bolts shall have tolerances as recommended by ASME B4.1 for the class of fit specified. Fitted bolts shall be fitted in reamed holes by selective assembly to provide an LN-2 fit.

(3) Holes for high strength bolts shall have diameters of not more than 1/16 inch larger than bolt diameters. If the thickness of the material is not greater than the diameter of the bolts the holes may be punched. If the thickness of the material is greater than the diameter of the bolts the holes may be drilled full size or subpunched or subdrilled at least 1/8 inch smaller than the diameter of the bolts and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting occurring during assembly shall not distort the metal or enlarge the holes. Reaming to a larger diameter of the next standard size bolt will be allowed for slight mismatching.

2.2.5 Finished Surfaces

Surface finishes indicated or specified shall be in accordance with ASME B46.1. Values of required roughness heights are arithmetical average deviations expressed in microinches. These values are maximum. Lesser degrees will be satisfactory unless otherwise indicated. Compliance with surface requirements shall be determined by sense of feel and visual inspection of the work compared to Roughness Comparison Specimens in accordance with the provisions of ASME B46.1. Values of roughness width and waviness height shall be consistent with the general type of finish specified by roughness height. Where the finish is not indicated or specified it shall be that which is most suitable for the particular surface, provide the class of fit required and be indicated on the detail drawings by a symbol which conforms to ASME B46.1 when machine finishing is provided. Flaws such as scratches, ridges, holes, peaks, cracks or checks which will make the part unsuitable for the intended use will be cause for rejection.

2.2.6 Unfinished Surfaces

All work shall be laid out to secure proper matching of adjoining unfinished surfaces unless otherwise directed. Where there is a large discrepancy between adjoining unfinished surfaces they shall be chipped and ground smooth or machined to secure proper alignment. Unfinished surfaces shall be true to the lines and dimensions shown and shall be chipped or ground free of all projections and rough spots. Depressions or holes not affecting the strength or usefulness of the parts shall be filled in an approved manner.

2.2.7 Pin Holes

Pin holes shall be bored true to gauges, smooth, straight and at right angles to the axis of the member. The boring shall be done after the member is securely fastened in position.

2.2.8 Bearings

Bearings may be lined with bronze unless otherwise specified or shown. Where the bearing pressure is in excess of 200 psi, bearings shall be lined

with bronze. Pressures on lined bearings shall not exceed 2000 psi of projected area unless otherwise required or authorized. Anti-friction bearings of approved types and of sizes not less than those recommended by the bearing manufacturer for the duty intended will be permitted subject to approval. All bearings shall be properly aligned and provided with a suitable means of lubrication. Anti-friction bearings shall be so installed as to provide for retention of the lubricant and to exclude dirt and grit.

2.2.9 Miscellaneous Provisions

2.2.9.1 Metallic Coatings

a. Zinc Coatings - Zinc coatings shall be applied in a manner and of a thickness and quality conforming to ASTM A 123. Where zinc coatings are destroyed by cutting, welding or other causes the affected areas shall be regalvanized. Coatings 2 ounces or heavier shall be regalvanized with a suitable low-melting zinc base alloy similar to the recommendations of the American Hot-Dip Galvanizers Association to the thickness and quality specified for the original zinc coating. Coatings less than 2 ounces shall be repaired in accordance with ASTM A 780.

2.2.10 Existing Expansion Joint

The existing bridge deck tooth-type expansion joint at the north end of the lift span shall be removed from the bridge, and be brought to the fabrication shop for rehabilitation. The tooth plates shall be reused except that the tooth plates shall be modified to allow for the new railroad miter joints. New support steel shall be added to support the tooth plates when they are reinstalled on the new tower and existing lift span.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

The Contractor shall have required material tests and analyses performed and certified by an approved laboratory to demonstrate that materials are in conformity with the specifications. These tests and analyses shall be performed and certified at the Contractor's expense. Tests, inspections, and verifications shall conform to the requirements of the particular sections of these specifications for the respective items of work unless otherwise specified or authorized. Tests shall be conducted in the presence of the Contracting Officer if so required. The Contractor shall furnish specimens and samples for additional independent tests and analyses upon request by the Contracting Officer. Specimens and samples shall be properly labeled and prepared for shipment.

2.3.1 Nondestructive Testing

When doubt exists as to the soundness of any material part such part may be subjected to any form of nondestructive testing determined by the Contracting Officer. This may include ultrasonic, magnaflux, dye penetrant, x-ray, gamma ray or any other test that will thoroughly investigate the part in question. The cost of such investigation will be borne by the Government. Any defects will be cause for rejection and rejected parts shall be replaced and retested at the Contractor's expense.

2.3.2 Tests of Structural Units

The details for tests of structural units shall conform to the requirements of the particular sections of these specifications covering these items. Each complete structural unit shall be assembled and tested in the shop in the presence of the Contracting Officer unless otherwise directed. Waiving of tests will not relieve the Contractor of responsibility for any fault in operation, workmanship or material that occurs before the completion of the contract or guarantee. After being installed at the site each complete machinery or structural unit shall be operated through a sufficient number of complete cycles to demonstrate to the satisfaction of the Contracting Officer that it meets the specified operational requirements in all respects.

2.3.3 Inspection of Structural Steel Welding

The Contractor shall maintain an approved inspection system and perform required inspections in accordance with Contract Clause CONTRACTOR INSPECTION SYSTEM. Welding shall be subject to inspection to determine conformance with the requirements of AWS D1.5, the approved welding procedures and provisions stated in other sections of these specifications. Nondestructive examination of designated welds will be required. Supplemental examination of any joint or coupon cut from any location in any joint may be required.

2.3.3.1 Visual Examination

All visual examination of completed welds shall be cleaned and carefully examined for insufficient throat or leg sizes, cracks, undercutting, overlap, excessive convexity or reinforcement and other surface defects to ensure compliance with the requirements of AWS D1.5, Section 3 and Section 9, Part D.

2.3.3.2 Nondestructive Examination

The nondestructive examination of shop and field welds shall be performed as designated or described in the sections of these specifications covering the particular items of work.

a. Testing Agency - The nondestructive examination of welds and the evaluation of examination tests as to the acceptability of the welds shall be performed by a testing agency adequately equipped and competent to perform such services or by the Contractor using suitable equipment and qualified personnel. In either case written approval of the examination procedures is required and the examination tests shall be made in the presence of the Contracting Officer. The evaluation of examination tests shall be subject to the approval and all records shall become the property of the Government.

b. Examination Procedures - Examination procedures shall conform to the following requirements.

(1) Ultrasonic Testing - Making, evaluating and reporting ultrasonic testing of welds shall conform to the requirements of AWS D1.5, Section 6, Part C. The ultrasonic equipment shall be capable of making a permanent record of the test indications. A record shall be made of each weld tested.

(2) Radiographic Testing - Making, evaluating and reporting radiographic testing of welds shall conform to the requirements of AWS D1.5, Section 6, Part B.

(3) Magnetic Particle Inspection - Magnetic particle inspection of welds shall conform to the applicable provisions of ASTM E 709.

(4) Dye Penetrant Inspection - Dye penetrant inspection of welds shall conform to the applicable provisions of ASTM E 165.

c. Acceptability of Welds - Welds shall be unacceptable if shown to have defects prohibited by AWS D1.5, Subsection 9.25 or possess any degree of incomplete fusion, inadequate penetration or undercutting.

d. Welds to be Subject to Nondestructive Examination

(1) Ultrasonic and radiographic testing shall be performed on all butt welds of tower front and rear column legs, tower span bottom chords, tower span and tower diagonals, tower horizontal main members, tower span hangers, and main counterweight lifting girders.

(2) Magnetic particle or dye penetrant inspection shall be performed on all fillet welds of the front and rear tower column legs, tower horizontal members, tower span bottom chords, diagonals, vertical, floorbeams, and railroad stringers.

2.3.3.3 Test Coupons

The Government reserves the right to require the Contractor to remove coupons from completed work when doubt as to soundness cannot be resolved by nondestructive examination. Should tests of any two coupons cut from the work of any welder show strengths less than that specified for the base metal it will be considered evidence of negligence or incompetence and such welder shall be removed from the work. When coupons are removed from any part of a structure the members cut shall be repaired in a neat manner with joints of the proper type to develop the full strength of the members. Repaired joints shall be peened as approved or directed to relieve residual stress. The expense for removing and testing coupons, repairing cut members and the nondestructive examination of repairs shall be borne by the Government or the Contractor in accordance with the Contract Clauses INSPECTION AND ACCEPTANCE.

2.3.3.4 Supplemental Examination

When the soundness of any weld is suspected of being deficient due to faulty welding or stresses that might occur during shipment or erection the Government reserves the right to perform nondestructive supplemental examinations before final acceptance. The cost of such inspection will be borne by the Government.

2.3.4 Structural Steel Welding Repairs

Defective welds in the structural steel welding repairs shall be repaired in accordance with AWS D1.5, Subsection 3.7. Defective weld metal shall be removed to sound metal by use of air carbon-arc or oxygen gouging. Welds that have been repaired shall be retested by the same methods used in the original inspection. Except for the repair of members cut to remove test coupons and found to have acceptable welds costs of repairs and retesting shall be borne by the Contractor.

2.3.5 Inspection and Testing of Steel Stud Welding

Fabrication and verification inspection and testing of steel stud welding shall conform to the requirements of AWS D1.5, Subsection 7.8 except as otherwise specified. The Contracting Officer will serve as the verification inspector. One stud in every 100 and studs that do not show a full 360 degree weld flash, have been repaired by welding or whose reduction in length due to welding is less than normal shall be bent or torque tested as required by AWS D1.5, Subsection 7.8. If any of these studs fail two additional studs shall be bent or torque tested. If either of the two additional studs fail all of the studs represented by the tests shall be rejected. Studs that crack under testing in either the weld, base metal or shank shall be rejected and replaced by the Contractor at no additional cost.

PART 3 EXECUTION

3.1 INSTALLATION

All parts to be installed shall be thoroughly cleaned. Packing compounds, rust, dirt, grit and other foreign matter shall be removed. Holes and grooves for lubrication shall be cleaned. Enclosed chambers or passages shall be examined to make sure that they are free from damaging materials. Where units or items are shipped as assemblies they will be inspected prior to installation. Disassembly, cleaning and lubrication will not be required except where necessary to place the assembly in a clean and properly lubricated condition. Pipe wrenches, cold chisels or other tools likely to cause damage to the surfaces of rods, nuts or other parts shall not be used for assembling and tightening parts. Bolts and screws shall be tightened firmly and uniformly but care shall be taken not to overstress the threads. When a half nut is used for locking a full nut the half nut shall be placed first and followed by the full nut. Threads of all bolts except high strength bolts, nuts and screws shall be lubricated with an approved lubricant before assembly. Threads of corrosion-resisting steel bolts and nuts shall be coated with an approved antigalling compound. Driving and drifting bolts or keys will not be permitted.

3.1.1 Alignment and Setting

Each machinery or structural unit shall be accurately aligned by the use of steel shims or other approved methods so that no binding in any moving parts or distortion of any member occurs before it is fastened in place. The alignment of all parts with respect to each other shall be true within the respective tolerances required.

3.1.2 Blocking and Wedges

All blocking and wedges used during installation for the support of parts to be grouted in foundations shall be removed before final grouting unless otherwise directed. Blocking and wedges left in the foundations with approval shall be of steel or iron.

3.1.3 Foundations and Grouting

Concreting of subbases and frames and the anchor bolt grouting under parts of towers shall be in accordance with the procedures as specified in Section 03300 CAST-IN-PLACE-STRUCTURAL CONCRETE.

3.2 PROTECTION OF FINISHED WORK

3.2.1 Machined Surfaces

Machined surfaces shall be thoroughly cleaned of foreign matter. All finished surfaces shall be protected by suitable means. Unassembled pins and bolts shall be oiled and wrapped with moisture resistant paper or protected by other approved means. Finished surfaces of ferrous metals to be in bolted contact shall be washed with an approved rust inhibitor and coated with an approved rust resisting compound for temporary protection during fabrication, shipping and storage periods. Finished surfaces of metals which shall be exposed after installation except corrosion resisting steel or nonferrous metals shall be painted as specified in Section 09900 PAINTING, GENERAL.

3.2.2 Lubrication After Assembly

After assembly all lubricating systems shall be filled with the lubricant specified and additional lubricant shall be applied at intervals as required to maintain the equipment in satisfactory condition until acceptance of the work.

3.3 TESTS

3.3.1 Workmanship

Workmanship shall be of the highest grade and in accordance with the best modern practices to conform with the specifications for the item of work being furnished.

3.3.2 Production Welding

Production welding shall conform to the requirements of AWS D1.5, as applicable. Studs on which pre-production testing is to be performed shall be welded in the same general position as required on production items (flat, vertical, overhead or sloping). Test and production stud welding will be subjected to visual examination or inspection. If the reduction of the length of studs becomes less than normal as they are welded, welding shall be stopped immediately and not resumed until the cause has been corrected.

-- End of Section --

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The fabrication and erection of the structural steel shall be as indicated in SECTION 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)Org

AASHTO HB-16	(1996) Standard Specifications for Highway Bridges, 16th Edition, including 1997, 1998, 1999 and 2000 Interim Revisions

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program Description
AISC ASD Manual	(1989) Manual of Steel Construction Allowable Stress Design

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION (AREMA)Org

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 6/A 6M	(1998a) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 36/A 36M	(1997ae1) Carbon Structural Steel
ASTM A 123	(1997ae1) Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip
ASTM A 307	(1997) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(1997) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile

	Strength
ASTM A 370	(1997)Mechanical Testing of Steel Products
ASTM A 563	(1997) Carbon and Alloy Steel Nuts
ASTM A 572/A 572M	(1999a) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 588/A 588M	(1997) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 709/A 709M	(1997be1) Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges
ASTM A 992/A 992M	(1998e1) Steel for Structural Shapes For Use in Building Framing
ASTM B 695	(1991)(1997) Coatings of Zinc Mechanically Deposited on Iron and steel
ASTM F 436	(1993) Hardened Steel Washers
ASTM F 844	(1998) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 959	(1999) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
ASTM F 1554	Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B46.1	(1995) Surface Texture (Surface Roughness, Waviness, and Lay)

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.5	(1996) Bridge Welding Code

1.2 GENERAL REQUIREMENTS

Structural steel fabrication and erection shall be performed by an organization experienced in structural steel work of equivalent magnitude. The Contractor shall be responsible for correctness of detailing, fabrication, and for the correct fitting of structural members. Connections, for any part of the structure not shown on the contract drawings, shall be considered simple shear connections and shall be designed and detailed in accordance with pertinent provisions of AISC ASD Manual. Substitution of sections or modification of connection details will not be accepted unless approved by the Contracting Officer. Welding shall be in accordance with AWS D1.5. High-strength bolting shall be in accordance with AISC ASD Manual.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Anchor Bolts; GA.

Shop drawings of anchor bolts and anchorage.

Structural Steel Fabrication; GA. Structural Connections; GA.

Shop and erection details including members with their connections not shown on the contract drawings. Welds shall be indicated by standard welding symbols in accordance with AWS A2.4.

Lift Span Temporary System ; GA.

Erection details, including marine support vehicle(s) of the Temporary Support System that is proposed to remove the lift span from the towers. The temporary storage of the lift span at an off-site work area shall be detailed to include relative location from the bridge site, marine route to the temporary storage area, means of ground access, security, office, parking, utility sources, and temporary improvements to this remote site.

SD-08 Statements

Erection Procedure; GA.

Prior to erection, erection narrative and plan of the structural steel framing describing all necessary temporary supports, including the sequence of installation and removal.

Lift Span Float-out and Float-in; GA.

Prior to removal of the towers, a detailed plan of the temporary float out system proposed to support and move the lift span to a temporary location for lift span rehabilitation. The plan for temporary storage location, support system at the storage location, procedure sequence for the rehabilitation of the lift span, and the work to be performed. After the lift span rehabilitation, the method of returning the lift span to the bridge site to place the rehabilitated lift span in service.

Welding; GA.

WPS not prequalified.

Prequalified Welding; FIO.

WPS prequalified.

SD-13 Certificates

Mill Test Reports; GA

Certified copies of mill test reports for structural steel, structural bolts, nuts, washers and other related structural steel items, including attesting that the structural steel furnished contains no less than 25 percent recycled scrap steel, is "Made in America", and meets the requirements specified, for tensile strength, yield strength, elongation, reduction in area, and Charpy V-Notch toughness testing at the indicated testing temperatures prior to the fabrication and installation.

Welder Qualifications; GA

Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.5.

Welding Inspector; GA.

Welding Inspector qualifications.

Fabrication; GA.

A copy of the AISC certificate indicating that the fabrication plant meets the specified structural steelwork category. The category of AISC certification for the tower and tower span fabrication is Major Steel Bridges (Cbr) with the Fracture Critical Member Endorsement (F)

SD-14 Samples

High Strength Bolts and Nuts; GA. Carbon Steel Bolts and Nuts; GA. Nuts Dimensional Style; GA. Washers; GA. Anchor Bolts; GA.

Random samples of bolts, nuts, washers, and anchor bolts as delivered to the job site if requested, taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

1.4 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

1.5 WELDING INSPECTOR

Welding Inspector qualifications shall be in accordance with AWS D1.5

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

2.1.1 Carbon Grade Steel

Carbon grade steel shall conform to ASTM A 36/A 36M.

2.1.2 High-Strength Low-Alloy Steel

High-strength low-alloy steel shall conform to ASTM A 572/A 572M, Grade 50.

2.1.3 Corrosion-Resistant High-Strength Low-Alloy Steel

Corrosion-resistant steel shall conform to ASTM A 588/A 588M. Each clearance gauge sign shall be manufactured from one plate. This steel may be substituted for High Strength Low-Alloy at no additional cost to the Government.

2.1.4 Carbon and High-Strength Low-Alloy Steel

Carbon and high-strength low-alloy steel for main load carrying members for bridges shall conform to ASTM A 709/A 709M, of the various grades indicated on the drawings, and members requiring CVN testing, as indicated.

2.1.5 Structural Shapes for Use in Building Framing

Wide flange shapes in accordance with ASTM A 992/A 992M shall be used where indicated on the drawings. Other shapes of structural steel shall be in accordance with ASTM A 36/A 36M, which includes other ASTM Standards that are included with the general reference to ASTM A 36/A 36M.

2.2 HIGH STRENGTH BOLTS AND NUTS

High strength bolts shall conform to ASTM A 325, Type 1 with carbon steel nuts conforming to ASTM A 563, Grade DH. All high strength bolts, nuts and washers shall be galvanized by the mechanical method, in accordance with ASTM B 695.

2.3 CARBON STEEL BOLTS AND NUTS

Carbon steel bolts shall conform to ASTM A 307, Grade A with carbon steel nuts conforming to ASTM A 563, Grade A.

2.4 ANCHOR BOLTS

Anchor bolts shall conform to ASTM F 1554 of the grade indicated on the drawings. All anchor bolts, nuts, and washers shall be hot-dip galvanized in accordance with ASTM A 123.

2.5 NUTS DIMENSIONAL STYLE

Carbon steel nuts shall be Heavy Hex style when used with ASTM A 307 bolts, ASTM A 325 bolts, or ASTM F 1554 anchor bolts. Exterior nut surfaces shall be free of factory-applied lubricant before field painting. Galvanized fasteners need not be prime painted. However, a "wash-coat" shall be applied if required by the paint manufacturer.

2.6 WASHERS

Plain washers shall conform to ASTM F 844. Hardened washers shall be used with all high strength bolts and shall conform to ASTM F 436. Load indicator washers conforming to ASTM F 959 may be used in addition to

hardened washers at no additional cost to the Government.

2.7 Charpy V-Notch Testing

The structural steel for main load carrying members and components of members shall be Charpy V-Notch (CVN) tested in accordance with ASTM A 370 and AREMA Manual, Chapter 15. The CVN shall be performed on members that are subject to tension and flexural tension and that are considered to be Fractural Critical members or Non-Fractural Critical Members. The testing temperature and required minimum average energy resulting from the testing are indicated on the drawings for the various required tower-span members. All CVN testing shall be performed in the longitudinal direction, except for truss gusset plates that shall be tested in both the longitudinal and transverse direction.

2.8 PAINT

Paint shall conform to Section 09900 PAINTING, GENERAL.

2.8.1 New Structural Steel

All new structural steel shall be painted in the shop on all surfaces prior to any bolted assembly. The steel faying surfaces and steel surfaces to be in contact with concrete shall be painted with the primer coat. Steel surface to have stud shear connector welded to it shall receive only a light coat of the primer that may be easily removed in a localized area to permit stud welding to a clean surface. The remaining surfaces of new structural steel may be shop painted with the intermediate coat and finish coat of paint except for locations of fasteners.

2.8.2 Existing Structural Steel

The lift span structural steel shall be cleaned of existing paint to bare steel at a remote location. The cleaned steel shall be painted with a three coat paint system shall be applied to the entire lift span prior to its return to the new towers.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC ASD Manual, AASHTO HB-16, and AREMA Manual. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC FCD for Category Cbr (Major Bridges) with Endorsement F (Fracture Critical Members) structural steelwork. Compression joints depending on contact bearing shall have a surface roughness not in excess of 500 micro inches as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M.

3.2 ERECTION PROCEDURE

Erection of structural steel shall be in accordance with the applicable provisions of AASHTO HB-16 and AREMA Manual. Erection plan shall be reviewed, stamped and sealed by a structural engineer licensed by the state in Pennsylvania.

3.2.1 Erection Stresses

The Contractor shall submit to the Contracting Officer the proposed method and procedure of erection and any strengthening required due to erection stresses. If the erection stresses in any member exceed the allowed unit stresses by more than 25%, the Contractor shall, at his own expense, increase the section of such member as may be necessary to bring the stresses within permissible values. The examination by the Contracting Officer of the Contractor's erection methods, erection devices, and erection stresses shall not relieve the Contractor of the responsibility for the safe erection of the work.

3.2.2 Jacking Devices

The Contractor shall be solely responsible for the strength and successful operation of all jacking or adjusting devices used. All jacks used shall be of the hydraulic type with a load capacity of at least 50% in excess of the load to be lifted. Any jacking or adjusting procedure shall be designed and detailed, so that the load in the members being jacked can be transmitted to safety shims or blocking which shall closely follow any adjusting or lifting movement required, thus providing for carrying the loads independent of the jacks or adjusting devices in case of failure, and to permit the removal of the jacks or devices at any stage of the operations for their renewal, repair, or maintenance. All jacks or adjusting devices shall be removed and the full dead load of the structure shall be on supports.

3.2.3 Alignment of Towers

a. Special note is hereby made of the need for accuracy and special care in the tower erection in order to assure that proper running clearances are provided for all parts as the span is guided along its lift travel by the fixed tower guide tracks. Accordingly, the Contractor shall exercise such special care and provide all expertise and equipment as is necessary to assure that the geometry of the finish structure, under full dead load at normal temperature of 68 Deg F, is within the following tolerances of deviation from the geometrical dimensions shown on the plans, deviations beyond which will not be accepted (pre-approved correction will be required by and at the Contractor's expense).

Transverse Distance In-to-In of Front Column Transverse Wheel Guide Tracks	-1/8 inch
Longitudinal Distance C-to-C of Front Columns (Across Channel)	+1/2, -1/8 inch
Tower Column Verticality - Maximum Deviation From Plumb	1:2,000

b. The Contractor shall accurately install and adjust all span guide rollers, so as to provide the clearances indicated on the drawings.

c. The foregoing specific requirements shall not relieve or in any way alter the requirement that all other portions of the structure be erected to the highest standards of erection accuracy specified or implied by the contract.

3.2.4 Structural Connections

3.2.4.1 Structural Bolting

Unless noted, all connections between two pieces of structural steel shall be made with high strength bolts.

3.2.4.2 Welding

Welding shall be performed in the shop only, unless noted. The welding shall be performed in accordance with the fracture control plan of AWS D1.5, when welding fracture critical members as indicated on the drawings. Repairs to welds shall conform to the requirements of the Fracture Control Plan. All welds to fracture critical members shall be tested in accordance to the Fracture Control Plan. No tack weld will be permitted.

3.2.4.3 Anchor Bolts

Anchor bolts and other connections between the structural steel and foundations shall be provided and shall be properly located and built into connecting work.

3.2.5 Base Plates and Bearing Plates

Column base plates for columns and bearing plates for beams, girders, and similar members shall be provided. Base plates and bearing plates shall be provided with full bearing after the supported members have been plumbed and properly positioned, but prior to placing superimposed loads. Separate setting plates under column base plates will not be permitted. The area under the plate shall be damp-packed solidly with bedding mortar, except where nonshrink grout is indicated on the drawings. Bedding mortar and anchor bolt grout shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.2.6 Field Priming

After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat, unless galvanized. If total shop painting is selected, the fastener and the surrounding area shall spot painted with the intermediate and top coat of paint.

3.3 WELDING

The contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Prequalified welding procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

3.4 LIFT SPAN REHABILITATION

The Lift Span shall be reused in the rehabilitated bridge. The following is a listing of some of the work that is necessary to rehabilitate the Lift Span.

3.4.1 Lift Span Float-out and Float-in

The Lift Span shall be removed from the existing bridge and "floated-out" to a remote location that does not interfere with any marine navigation except during the "float-out" and eventual "float-in".

3.4.2 Rivet Removal Procedure

The indicated existing rivets shall be removed by the following method:

a. The rivet head shall be flame-cut 1/16-inch above the base metal using a scarfing tip, and the rivet shank shall be driven out using a pneumatic punch. Do not flame any material without written approval from the Contracting Officer.

b. Material to remain shall not be damaged.

c. If it appears that the rivet shanks cannot be driven out by punching, the rivet shank shall be removed by drilling. Repair or replace, in a manner acceptable to the Contracting Officer at no additional cost to the Government, any structural steel that is damaged by construction operations.

d. If a new bolt cannot be placed in the hole originally occupied by the rivet, ream the hole to the proper size.

e. If the reaming procedure produces an oblong hole in any material, the largest diameter of bolt, which is more than 1/8-inch larger than the diameter of the removed rivet, or where holes exceed fastener diameter of the new hole by one size and ream the hole to fit the larger bolt with the approval of the Contracting Officer.

3.4.3 Rivet Removal Categories

There are two categories of rivet removal on the lift span:

a. The majority of rivets that shall be removed are removed when existing structural steel is being removed. This rivet removal is included in the steel demolition work. These rivets shall be replaced with high-strength bolts when new structural steel is erected.

b. Certain other indicated rivets shall be removed from truss joints and shall immediately be replaced with a high-strength bolt. This is category of rivet removal is for strength purposes.

c. Some rivets that are removed during structural steel removal operations will not receive a new high-strength bolt because the new structural steel will be erected at a new location. However, to avoid having open holes, a new high-strength bolt with nut and washer shall be erected in each open hole.

3.4.4 Strengthening Structural Steel

Portions of the lift span shall be strengthened as indicated.

3.4.5 Cleaning and Painting

Containment, cleaning, collection, storage, and disposal of paint waste plus complete painting of the entire lift span shall occur at the remote site, see Section 13281, LEAD HAZARD CONTROL ACTIVITIES.

3.4.6 Inspection

The Lift Span individual members shall be inspected by the Contractor's

cleaning crew during paint removal operations to ensure that all cleaned structural steel remains in serviceable condition. Any deteriorated structural steel that needs to be repaired shall be brought to the attention of the Contracting Officer.

3.4.7 Rehabilitation

The portions of the Lift Span that shall be rehabilitated are indicated on the drawings.

-- End of Section --

SECTION 05500

MISCELLANEOUS METAL

PART 1 GENERAL

1.1 SUMMARY

This work shall consist of furnishing and installing galvanized steel grid bridge flooring of the open-welded-type and partially-filled-type, new bridge access metalwork, and other incidental metalwork items.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A14.3	(1992) Ladders - Fixed - Safety Requirements

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997ae1) Carbon Structural Steel
ASTM A 53	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	(1997ae1) Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip
ASTM A 153	(1998) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 467	(1998) Machine and Coil Chain
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 653	(1996) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 924	(1996a) Steel Sheet, Metallic-Coated by the Hot-Dip Process

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 (2000) Structural Welding Code - Steel

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531 (1993) Metal Bar Grating Manual

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Miscellaneous Metal Items; GA.

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items: deck grating, stairways, and framing for machine rooms and operator house.

SD-14 Samples

Miscellaneous Metal Items; GA.

Samples of the following items: grid deck, metal platform grating, and metal stair grating. Samples shall be full size, taken from manufacturer's stock, and shall be complete as required for installation in the structure. Samples may be installed in the work, provided each sample is clearly identified and its location recorded.

1.4 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123, ASTM A 653, or ASTM A 924, as applicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.5 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

1.6 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.7 ANCHORAGE

Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

1.8 SHOP PAINTING

Surfaces of ferrous metal except galvanized surfaces, shall be cleaned and shop coated with the manufacturer's standard protective coating unless otherwise specified. Surfaces of items to be embedded in concrete shall be prime painted. Items to be finish painted shall be prepared according to manufacturer's recommendations or as specified.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS

Doors and panels shall be flush type unless otherwise indicated. Frames for access doors shall be fabricated of not lighter than 16 gauge steel with welded joints and finished with anchorage for securing into construction. Access doors shall be a minimum of 14 by 20 inches and of not lighter than 14 gauge steel, with stiffened edges, complete with attachments. Access doors shall be hinged to frame and provided with a flush face, screw driver operated latch. Exposed metal surfaces shall have a shop applied prime coat.

2.2 CORNER GUARDS AND SHIELDS

Corner guards and shields for jambs and sills of openings and edges of platforms shall be steel shapes and plates anchored in masonry or concrete with welded steel straps or end weld stud anchors. Corner guards for use with glazed or ceramic tile finish on walls shall be formed of 0.0625 inch thick corrosion-resisting steel with polished or satin finish, shall extend 5 feet above the top of cove base or to the top of the wainscot, whichever is less, and shall be securely anchored to the supporting wall. Corner guards on exterior shall be galvanized.

2.3 METAL STAIRS

Metal stairs shall be fabricated of steel channel stringers, steel plate treads and risers, grating treads, landings, columns, handrails, and

necessary bolts and other fastenings as indicated. Structural steel shall conform to ASTM A 36/A 36M. Stairs and accessories shall be galvanized. Gratings for treads and landings shall conform to NAAMM MBG 531. Grating treads shall have slip-resistant nosings.

2.4 FLOOR GRATINGS AND FRAMES

Carbon steel grating shall be designed in accordance with NAAMM MBG 531 to meet the indicated load requirements. Edges shall be banded with bars 1/4 inch less in height than bearing bars for grating sizes above 3/4 inch. Banding bars shall be flush with the top of bearing grating. Frames shall be of welded steel construction finished to match the grating. Floor gratings and frames shall be galvanized after fabrication.

2.5 FLOOR PLATES

Floor plates shall be 1/4 inch thick, raised thread steel,galvanized. Wearing surface shall be aluminum oxide or silicon carbide bonded to the surface in the shop.

2.6 BRIDGE GRID FLOORING

2.6.1 Materials

The steel grid bridge flooring shall meet the requirements for the construction of steel grid floors, as contained in the 16th edition of the AASHTO Standard Specifications for Highway Bridges, Division II, Chapter 12 and all subsequent Interim Specifications, except as modified herein.

All materials shall meet the requirements referred to below:

Steel Grid Bearing Bars, Supplemental Bars, Diagonal Bars, Cross Bars and Trim Bars (for the roadway grid flooring)	ASTM A 36/A 36M
Galvanizing	ASTM A 123 and ASTM A 153
Galvanizing Repair	ASTM A 780

2.6.2 Fabrication

The steel grid shall be fabricated in units that are the width of the various portions of the bridge deck, as indicated on the drawings. The length of the grid unit in the longitudinal direction of the bridge shall be as shown on the drawings or at the convenience of the grid manufacturer, as approved by the Contracting Officer. The grid units shall be fabricated to conform to the roadway surface indicated on the contract drawings.

The entire assembly for each welded grid section for the various widths of the bridge deck shall be securely welded at all intersections of steel grid bearing bars, supplemental bars, diagonal bars and cross bars. A puddle-type of weld shall be used to deposit weld filler metal at each intersection of grid bards. The weld metal shall fasten the bars to the adjacent bars. The grid will be visually inspected and any loose bars shall be rewelded at the Contractor's expense.

All shop welding and assembly shall be completed prior to galvanizing.

The bearing bars and supplemental bars shall be intersected at right angles

by cross bars. The top of the supplemental bars, diagonal bars and cross bars shall be at the same elevation as the top of the bearing bars.

The top surface of the bearing bars, supplemental bars, diagonal bars and cross bars shall have serrations, as recommended by the grid manufacturer.

The bearing bars shall be continuous without splices for each grid panel.

Bearing bars, supplemental bars, diagonal bars and cross bars shall be normal to the roadway surface and shall not be slanted, twisted or bent.

2.6.3 Galvanizing

The grid panels shall be hot-dipped galvanized according to ASTM A 123 with thickness Grade 100. Care shall be used to prevent warping during the galvanizing operations.

Fabricated grid panel which are to be shop welded to the top flange of transverse cross beams shall be galvanized after the grid panel is welded to the beams.

The grid panels may be heated to a maximum of 750 Degrees F to achieve the longitudinal flatness and transverse camber as required.

The following Fabrication Tolerances for Grid Deck panels shall be as follows and shall be measured after galvanizing and just prior to shipment:

a. panel length (in direction of bearing bars) = +/- 1/4 inch

b. panel width (in direction of cross bar) = +0 / -1/8 inch

c. squareness diagonal measurement is +/- 1/2 inch of opposite diagonal

d. longitudinal camber (in direction of bearing bars) = 0.003 x length

e. transverse camber (in direction of cross bar) = 0.002 x width

f. side bow (sweep) = +/- 1/16 inch x length of panel, in feet, divided by five or consistent with allowable clearances shown in the plans.

The conformance to the transverse roadway surface within the tolerances indicated herein shall be checked using a template.

The fabricated grid panels not conforming to the above fabrication requirements will be considered defective and shall be rejected.

Fabricate new steel grid flooring deck panels such that when installed, the longitudinal main bars of adjoining new panels will be in continuous alignment, with an offset tolerance of +/- 1/8 inch, and will be parallel to the longitudinal centerline of the bridge.

2.7 HANDRAILS

Handrails shall be designed to resist a concentrated load of 200 pounds in any direction at any point of the top of the rail or 20 pounds per foot applied horizontally to top of the rail, whichever is more severe.

2.7.1 Steel Handrails, Including Carbon Steel Inserts

Steel handrails, including inserts in concrete, shall be steel pipe conforming to ASTM A 53 or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Steel railings shall be 1-1/2 inch nominal size. Railings shall be hot-dip galvanized. Pipe collars shall be hot-dip galvanized steel.

a. Joint posts, rail, and corners shall be fabricated by one of the following methods:

(1) Flush type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8 inch hexagonal recessed-head setscrews.

(2) Mitered and welded joints by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Railing splices shall be butted and reinforced by a tight fitting interior sleeve not less than 6 inches long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

b. Removable sections, toe-boards, and brackets shall be provided as indicated.

2.7.2 Fascia Railing

The fascia railing shall be from bar stock and shall be welded in the shop to the fascia girder.

2.8 LADDERS

Ladders shall be galvanized steel, fixed rail type in accordance with ANSI A14.3.

2.9 MISCELLANEOUS

Miscellaneous plates and shapes for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings, and frames, shall be provided to complete the work.

2.10 ROOF SCUTTLES

Roof scuttles shall be of galvanized steel not less than 14 gauge, with 3 inch beaded flange welded and ground at corners. Scuttle shall be sized to provide minimum clear opening of 72 by 60 inches. Cover and curb shall be water tight. The curb shall be equipped with an integral metal cap flashing of the same gauge and metal as the curb, full welded and ground at corners for weathertightness. Scuttle shall be completely assembled with heavy hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles on outside and neoprene draft seal. The cover shall be equipped with an automatic hold-open arm complete with handle to permit one hand release.

2.11 SAFETY CHAINS

Safety chains shall be galvanized welded steel, proof coil chain tested in

accordance with ASTM A 467, Class CS. Safety chains shall be straight link style, 3/16 inch diameter, minimum 12 links per foot and with bolt type snap hooks on each end. Eye bolts for attachment of chains shall be galvanized 3/8 inch bolt with 3/4 inch eye, anchored as indicated. Two chains shall be furnished for each guarded opening.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

All items shall be installed at the locations shown and according to the manufacturer's recommendations. Items listed below require additional procedures as specified.

3.2 INSTALLATION OF BRIDGE GRID FLOORING

3.2.1 Storage and Handling

Steel grid flooring panels shall be stored at the bridge site, above ground, upon platforms, skids, or other supports. It shall be kept free from dirt, grease, and other foreign matter and shall be protected as far as possible from corrosion. It shall be properly drained so as not to pond water.

Careless handling and lifting of the grid flooring units with improper devices which causes the units to become out of the above fabrication tolerances shall be corrected to the satisfaction of the Contracting Officer at the Contractor's expense. If the unit cannot be corrected, it shall be rejected.

3.2.2 Positioning

Though within the required fabrication tolerances above, sweep or horizontal bow shall be removed from units before splicing sufficiently to result in the proper alignment of cross bars and to preserve overall dimensions and geometry of completed floor. The Contractor shall repair any damage to the flooring to the satisfaction of the Contracting Officer at the Contractor's expense.

3.2.3 Field Assembly

The grid flooring panels shall be connected together along their edges, as detailed. The connections shall meet with the approval of the Engineer.

The sides of the bottom flanges of the bearing bars shall have a strip of galvanizing power tool cleaned so that the bearing bars of the grid panels can be field welded to the new transverse joists or grid connection plate.

3.2.4 Connection to Supports

The grid panels shall be placed on the supporting transverse joists so that there is contact with each bearing bar and transverse joist. The grid panels shall be held in place until the grid panel is welded to the cross beams.

The galvanized surfaces that are cleaned and welded or otherwise damaged shall be repaired according to ASTM A780, using either zinc-based solders or zinc-rich paints type of materials. The proposed method and material of repairing damaged galvanizing shall be approved by the Contracting Officer

prior to use.

Construction vehicles and equipment shall not be permitted on the grid flooring that is not connected to all supports.

3.3 ATTACHMENT OF HANDRAILS

Toeboards and brackets shall be installed where indicated. Splices, where required, shall be made at expansion joints. Removable sections shall be installed as indicated.

3.3.1 Installation of Steel Handrails

Installation shall be by means of base plates bolted to stringers or structural steel framework. Rail ends shall be secured by steel pipe flanges bolted to a back plate or by 1/4 inch bolts to studs or solid backing.

3.4 MOUNTING OF SAFETY CHAINS

Safety chains shall be mounted 3 feet 6 inches and 2 feet above the floor.

-- End of Section --

SECTION 05650

RAILROADS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN RAILWAY ENGINEEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/ASNT CP-189	(1995) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 536	(1984; R 1999e1) Specification for Ductile Iron Castings
ASTM D 395	(1998) Test Methods for Rubber Property - Compression Set
ASTM D 402	(1997) Distillation of Cut-Back Asphaltic (Bituminous) Products
ASTM D 412	(1998a) Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 429	(1999) Test Methods for Rubber Property - Adhesion to Rigid Substrates
ASTM D 471	(1998e1) Test Method for Rubber Property - Effect of Liquids
ASTM D 518	(1999) Test Method for Rubber Deterioration - Surface Cracking
ASTM D 573	(1999) Test Method for Rubber - Deterioration in an Air Oven
ASTM D 1149	(1999) Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber

ASTM D 1229	(1987; R 1997e1) Test Method for Rubber Property - Compression Set at Low Temperatures
ASTM D 1310	(1986; R 1997el) Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
ASTM D 2171	(1994) Viscosity of Asphalts by Vacuum Capillary Viscometer
ASTM D 3740	(1999c) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM F 512	(1995) Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C2	(1999) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA C6	(1997) Cross Ties and Switch Ties Preservative Treatment by Pressure Processes
AWPA M2	(1997) Standard for Inspection of Treated Timber Products
AWPA M6	(1997) Brands Used on Forest Products
AWPA P2	(1995) Standard for Creosote Solutions

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Wood Ties; GA

Name of the tie manufacturer, Rail Tie Association membership, the wood species proposed, the quantities of ties for each species proposed, and product data for the ties to be furnished, including the type of seasoning to be utilized, prior to ordering the ties

New Jointed Rail; GA, Joint Bars; FIO, Compromise Joint Bars; FIO

Manufacturer's data on new rail including: rail weight, rail section, drilling, rail length, date rolled, and the name of the mill where the rail was rolled. The maximum allowable vertical wear on the rail head and the maximum allowable horizontal wear on the side of the rail shall be provided. The design of the joint bars and compromise joint bars proposed to be furnished with each rail section shall also be provided.

Miscellaneous Track Materials; FIO

Manufacturer's data for all track materials to be furnished.

Crossing Material or Surface; GA

Within 30 days of the Notice to Proceed, the brand name of the premanufactured crossing material or crossing surface material proposed for use along with manufacturer's literature concerning the product; and for built-in-place crossings, the type of materials to be used along with manufacturer's literature.

Components or Products; GA.

Performance data for components or products proposed as an equivalent to those specified. The Contracting Officer's written approval is required for any such equivalent type component or product proposed to be used.

SD-04 Drawings

Bridge Repair; GA.

Shop drawings necessary for the construction and erection of the railroad bridge work. Shop drawings shall be made from measurements taken at the site wherever possible or from established measurements, when actual measurements are not available. The Contractor shall be responsible for the accuracy of the established measurements, the information furnished to the subcontractors for the preparation of their Shop Drawings, and the checking of all Shop Drawings. Drawings shall bear the stamp of a Professional Engineer, registered in Pennsylvania.

As-Built; GA.

One set of reproducible originals of the final as-built drawings for each automatic crossing protection installation prior to final acceptance by the Contracting Officer. The materials and methods used to produce these drawings shall meet the requirements of this specification and shall result in drawings which are easy to revise without damage to the drawing.

SD-07 Schedules

Materials and Equipment; GA.

A complete schedule of the materials proposed for installation within 60 days of receipt of notice to proceed, and before installation of the materials; the schedule shall include a list of equipment proposed for the work.

SD-08 Statements

Crossing Material or Surface;FIO

Detailed installation procedure for the premanufactured crossing material or crossing surface material proposed for use within 30 days of the notice to proceed.

Thermite Welding Procedures; GA.

A detailed statement covering the step-by-step procedures to be employed in making the welds, including a complete description of each of the following items, as applicable, and any other essential characteristics included in the welding procedures:

a. The manufacturer's trade name for the welding process.

b. The method used for cutting and cleaning the rail ends. Flame cutting of rail ends will not be allowed.

c. The minimum and maximum spacing between rail ends.

d. The method used for maintaining the rails in alignment during welding.

e. The method used for preheating, including time and temperature.

f. The tapping procedure, including the minimum time required to cool the weld under the mold insulation.

g. The method used, including a description of special tools and equipment, for removing the upset metal and finishing the weld to the final contour.

h. Quality control procedures to be followed.

i. The contractual agreements with any subcontractor employed by the Contractor in doing the work.

SD-09 Reports

Sampling and Testing; GA.

One certified copy of Test Reports for each test performed on the ballast and subballast within 2 working days of the test completion.

Wood Ties; FIO

Certified test and inspection reports for bridge ties subsequent to treatment, a minimum of seven calendar days prior to any ties being installed in track. Test and inspection reports shall contain the information required by Part 7 of AWPA M2.

Direct Fixation Rail Attachments; GA

Results and loading system for the pullout tests.

Results only of the torque tests.

Should the contractor choose to install the fasteners after the deck has been poured, he shall submit his plan for installation prior to construction.

Ultrasonic Test; FIO

Results of the ultrasonic rail testing. Results shall list defects and rail stationing.

SD-13 Certificates

Wood Ties; FIO

Certificates of compliance prior to any ties being installed in track.

Materials and Equipment; FIO.

Manufacturer's certificates of conformance for the following materials:

a. Rail.
b. Tie plates.
c. Track bolts, nuts, and spring washers.
d. Joint bars.
e. Rail anchors.
f. Track spikes.
g. Miter rails.
h. Rail welding process.
j. Premanufactured road crossings and/or crossing surfaces.

SD-18 Records

Record of Field Weld; FIO

A welding record of each field weld on the form attached at the end of this section. The original copies of the form bearing the signatures and initials of personnel involved shall be submitted as part of the Project Record Documents.

Table VII;FIO

A record of the items repaired or rebuilt by the electric arc welding method and grinding as shown on Table VII at the end of this section.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Materials

The Contracting Officer will notify the Contractor of the materials approved or disapproved. Disapproved materials that have already been delivered to the project site, shall be promptly segregated from the approved materials and removed from the premises. If materials are disapproved, acceptable replacement materials shall be provided at no additional cost to the Government. Initial approval by the Contracting Officer will not prevent the removal and replacement of materials that are materially defective or materials not meeting this specification that are discovered during construction and/or routine quality control/quality assurance operations.

1.4 QUALIFICATIONS

1.4.1 Track Construction

Track construction shall be performed under the direction of qualified and competent supervisory personnel experienced in railroad construction.

1.4.2 Welding

Welding shall be performed under the direct supervision of an experienced welding supervisor or foreman.

PART 2 PRODUCTS

2.1 JOINT BARS

Joint bars shall be of the size, shape, and punching pattern to fit the rail being joined.

2.1.1 New Joint Bars

New joint bars shall be used with new rail, and shall be of the "toeless" and "head free design" to match rail section. New joint bars shall conform to the requirements of "Specifications For High-Carbon Steel Joint Bars" or "Specifications For Quenched Carbon-Steel Joint Bars and Forged Compromise Joint Bars" found in Chapter 4, Part 2 of AREMA Manual for the joint bar and assemblies recommended in Chapter 4, Part 1 of AREMA Manual.

2.1.2 Used Joint Bars

Used joint bars in good condition shall not be used.

2.1.3 Compromise Joint Bars

Compromise joint bars shall be of the size, shape, and punching pattern to fit the rail sizes and sections being joined. Only factory designed and constructed (forged or cast) compromise joint bars shall be used to join rails of different sizes.

2.1.3.1 New Compromise Joint Bars

Compromise joint bars shall conform to the requirements of "Specifications For Quenched Carbon-Steel Joint Bars and Forged Compromise Joint Bars" found in Chapter 4, Part 2 of AREMA Manual.

2.2 OIL FOR CORROSION PROTECTION

Oil for protecting rail and other track materials from corrosion, except joints, shall conform to the following general specification:

Asphalt, 100 penetration minimum 45 percent	ASTM D 402
Flash point, minimum 130 degrees F	ASTM D 1310
Viscosity, kinematic, 140 degrees F 480 to 700 centistokes	ASTM D 2171

2.3 RAIL

2.3.1 New Jointed Rail

New jointed rail shall comply with the following:

a. Rail Lengths: New rail shall be a 115 lbs/yd section and shall conform to the specifications in Chapter 4, Parts 1 and 2 of AREMA Manual that were in effect at the time of its manufacture. New rail shall be provided in 39 ft lengths.

b. Rail Drilling: New rail shall be provided with the rail ends drilled. Drilling shall be uniform and to the patterns specified.

2.3.2 Welded Rail

New rail shall be 115lbs section and shall conform to Chapter 4, Part 2 of AREMA Manual.

2.4 TIE PLATES

2.4.1 General

Tie plates shall be of the dimensions and punching pattern (A or B) to fit the rail. New tie plates conforming to Chapter 5, Part 1 of AREMA Manual shall be used with new rail. Canted tie plates shall be used in all new rail.

2.5 WOOD TIES

Species shall be Ash, Beech, Red and White Oak, Gum, Spruces Pine, Douglas Fir, and other Fir. Conditioning and seasoning shall conform to the requirements of AWPA C6 for the individual wood species. Ties shall be well seasoned. Prior to preservative treatment, wood ties shall be dried to the oven dry moisture content, or less, as specified in paragraph 3.14 of AWPA C6. The wood may be air dried, vapor dried, or boultonized. Ties which are to be dried by artificial means shall be conditioned and treated as soon as possible after sawing, but no more than 30 days later. The temperature used for boultonizing shall be as high as possible but in no case less than 200 degrees F. Vapor dried ties shall be transferred from drying cylinders to treatment cylinders as quickly as possible to avoid loss of heat from the seasoned ties. Ties shall be pressure treated in accordance with Chapter 3, Part 6 of AREMA Manual by the empty cell process with a 60/40 creosote/coal tar solution (Grade C) in accordance with AWPA P2 to a minimum retention of 8 lbs/cu ft of wood. Bridge ties shall be treated in accordance with paragraph Bridge Ties. The Contractor shall record treatment as specified in AWPA M2. Treated ties shall be permanently marked or branded by the producer in accordance with AWPA M6. Ties shall be produced by a member of the Railway Tie Association. All ties, except Southern, Red, and Ponderosa Pine, shall be incised on all four sides in the pattern specified in AREMA Manual, Chapter 3, Part 6, prior to treatment. Splits shall not be longer than 4 in. and not wider than 1/4 in at either end. Splits longer than 4 in but not longer than the width of the face in which the split appears, will be acceptable if specified anti-splitting devices are installed with the splits compressed. Any required adzing and drilling for spikes shall be performed prior to treatment. The Contractor shall notify the Contracting Officer at least 15 days prior to the shipment of any treated ties or timbers from the manufacturer's plant, to provide the Government the opportunity to inspect the materials before shipment. When inspections of onsite materials result in product rejection, the Contractor shall promptly segregate and remove rejected material from the premises. The Government may also charge the Contractor any additional cost of inspection or test when prior rejection makes reinspection or retesting necessary.

2.5.1 Bridge Ties

Wood bridge ties shall be not less than 12 in thick and 10 in wide. The length shall be 11.0 ft. The method for treatment of bridge ties shall be in accordance with AWPA C2. The treatment standards shall be based on the type of deck on the bridge. Any drilling of bolt holes shall be performed prior to treatment. The ties shall be sawed to dimensions and furnished in the quantities indicated on the contract drawings. The Contractor shall field verify all dimensions and quantities prior to furnishing timber bridge ties.

2.5.2 Tie Plugs

Tie plugs shall fit holes from which spikes are drawn. The plugs shall comply with Chapter 3, Part 1 of AREMA Manual and shall be treated in accordance with Chapter 3, Part 6 of AREMA Manual.

2.6 ANTI-SPLITTING DEVICES

Bridge ties shall be equipped on each end with gang nail end plates anti-splitting devices of the type specified, regardless of whether or not the wood has shown any tendency to split. Products used shall conform to AREMA Manual, Chapter 3, Part 1, Section 10.

2.7 GRADE CROSSINGS

2.7.1 Crossing Material or Surface

Roadway width shall be as indicated in the contract drawings. Crossing material or surface shall be RailGuard Gauge Panel and Field Panel as manufactured by Omni Products, or approved equal.

2.7.2 Rail

Rail within the road crossing and for at least 20 ft on either side of the crossing shall be 115RE as specified in paragraph Rail and Joint Bars.

2.7.3 Track Materials

For premanufactured crossing surfaces or systems, tie plates, spikes or other rail fasteners, rail anchors, and other track materials shall conform to the manufacturer's recommendations. Unless specified by the crossing manufacturer, track materials shall be as specified in paragraph MISCELLANEOUS TRACK MATERIALS.

2.7.4 Threaded Fasteners and Screw Spikes

Threaded fasteners for use in grade crossings shall be of the sizes and lengths specified by the grade crossing manufacturer or as indicated for built-in-place crossings. Screw spikes shall have a minimum ultimate tensile strength of 60,000 psi and shall be galvanized for corrosion protection.

2.7.5 Cable Conduit

Cable conduit under grade crossings shall be 4 in diameter PVC pipe conforming to ASTM F 512, and shall be a minimum of Schedule 80.

2.8 DIRECT FIXATION RAIL ATTACHMENTS

The contractor shall use an L.B. Foster Direct Fixation Fastener or approved equal. The approved equal shall meet all testing requirements for anchorage, elastomer, spring clip, longitudinal loads, and electrical resistance.

The dimensions of the fasteners shall be as shown on the plans. The spacing of the fasteners shall be 15 inches center to center maximum. The fasteners shall be set to ensure a rail gauge of 56 1/2" as shown on the plans. The required horizontal geometry is as shown on the plans.

The plate material shall be Grade 65-45-12 Ductile Iron in accordance with ASTM A 536 and the housing for the spring clip shall be an integral part of the plate.

The fastener body shall provide for adjustment features of +/- 1/2 inch from the nominal bolt location. Adjustment for fastener body shall be at anchor bolt locations and shall not be at clip locations.

The total thickness of the fastener at the centerline of the rail shall be as shown on the plans. There shall be a minimum of 3/8" total thickness of elastomer. The elastomer shall be of neoprene, natural rubber, or a combination of neoprene and natural rubber.

2.9 SALVAGED MATERIALS

2.9.1 Dunnage

Pallets, sills, and other material used for packaging and stacking salvaged track items shall be clean, free of decay or other defect, and sufficiently sturdy for the service intended.

2.9.2 Marking Paint

Marking paint shall be a good quality oil-based spray marking paint or a good quality oil-based paint marker.

2.9.3 Salvaging Rail

All rail removed from the existing bridge and approaches shall become the property of the Contractor and shall be removed from the site.

2.9.4 Joint Bars

Joint bars shall not be used and shall become the property of the Contractor and shall be removed from the site.

2.9.5 Tie Plates

Tie plates salvaged from existing track shall become the property of the Contractor and shall be removed from the site.

2.10 RAIL BONDING AND GROUNDING

2.10.1 Rail Bonds

Rail bonds shall be exothermic type ("Cadweld") bonds applied to the field side of the rail head, or 46 in bonds welded to the rail web. The bond

cables shall be flexible bare copper stranded 1/0 AWG cables with preformed ends. Bond cables shall be flexible bare copper stranded cables with preformed ends and shall conform to applicable requirements of AREMA Manual Vol. 3.

2.10.2 Grounding Rods

Grounding rods shall be 1 in diameter zinc-coated steel rods. The minimum length of ground rods shall be 8 ft.

2.10.3 Ground Connection Cables

Connections between the grounding system or ground rods and rails shall be made with a bare flexible copper stranded 2/0 AWG cable.

2.10.4 Electrical Connecting Hardware

Electrical connecting hardware shall be bronze pressure bar type materials having no rotating parts coming in direct contact with conductors.

2.10.5 Insulated Joints

Insulated joints shall conform to the applicable portions of Chapter 4, Part 2 of AREMA Manual. Conventional continuous insulated joints with fiber insulation shall not be used.

2.11 WELDING

2.11.1 Rail Welding Kits

Kits for thermite type rail welds shall be approved by the Contracting Officer before use.

2.12 Miter Rail Joints

Miter Rail Joints shall be provided for the connection of the rail at each end of the lift span to connect to the rail on the tower spansb as shown on the drawings.

PART 3 EXECUTION

3.1 REMOVAL, SALVAGE, AND DISPOSITION OF MATERIALS

Tracks and segments of track shall not be dismantled until approved to do by the Contracting Officer, after the bridge is closed to all traffic. No track materials shall be salvaged by the Contractor for later use by the Government.

3.1.1 Methods and Procedures

The Contractor may use any methods to dismantle the track, provided proper measures are taken to ensure the safety of the laborers and the general public.

3.1.2 Material to be Scrapped

All removed track material shall be scrapped and shall become the property of the Contractor.

3.3 TRACK CONSTRUCTION

Track construction not covered specifically herein shall be in accordance with AREMA recommendations and recommended practices.

3.2 Roadbed Preparation

Excavation, embankment preparation, and subgrade preparation shall be performed in accordance with Section 02300 EARTHWORK Roadbed surface, grade, and drainage shall be approved prior to any distribution of construction material. Where the subgrade or roadbed is damaged during distribution of materials, ruts and depressions shall be filled and compacted and the roadbed surface reapproved prior to track construction.

3.3 Unloading the Materials

The use of picks in the handling of ties will not be permitted. Rails shall be unloaded from cars with an approved derrick or crane and placed with the head up without dropping and with sufficient support under the base. Rails of proper length shall be distributed as necessary for road crossings, switches, joint spacing, and other special conditions.

3.4 Ties

Standard center-to-center spacing of bridge ties shall be as shown on the drawings. Ties shall be laid perpendicular to the center line of the track with the grain up (heartwood side down). The best ties shall be used at the rail joints. The ends of ties on one side of the track shall be parallel to the rail and the center of the tie shall be on the approximate center line of the track. The top surface of ties shall provide full bearing for the tie plate. Adzing shall be restricted to that necessary to provide a sound true bearing for the tie plate. Adzing in excess of 0.2 in will not be permitted. Where adzing is necessary, the cut surface shall be completely saturated with creosote or other approved preservatives.

3.5 Tie Plates

Tracks shall be fully tie-plated. Tie plates shall be free of dirt and other foreign material when installed. Tie plates shall be placed so that the rails will have full bearing on the plate, and the plate will have full bearing on the tie. Tie plates shall be set at right angles to the rail with the outside shoulder against the base of the rail, and centered on the tie. Canted tie plates shall be installed to cant the rail inward.

3.6 Rail

The base of the rail and the surface of the tie and tie plate shall be free of dirt and other foreign materials prior to laying rail.

3.6.1 Laying Rail

Rail shall be laid without bumping or striking, to standard gauge (4 ft 8-1/2 in between points 5/8 in below the top of the rail) on tangents

a. Jointed rails shall be laid, one at a time, with space allowance for expansion being provided between rail ends in accordance with TABLE VI.

b. Gaps between rail ends in insulated joints shall only be sufficient to permit insertion of standard end posts.

c. A standard rail thermometer shall be used to determine the rail temperature. The thermometer shall be laid close to the web on the side of the rail base which is shaded from the sun's rays in advance of the laying operation and left there long enough to accurately record the temperature. The contractor quality control representative shall see that rail temperature is checked frequently and that proper rail expansion shims are used. All thermometers shall be calibrated against the Contracting Officer's rail thermometer which will have been accurately calibrated and will be considered as the standard.

d. Except at insulated joints, the staggering of the joints on one side shall not vary more than 18 in. in either direction from the center of the opposite rail.

e. Rails not less than 13 ft long may be used for final connections to existing rails to prevent joints from occurring at prohibited locations or to provide the specified joint stagger in curves.

f. Rail joints shall not occur in or within 20 ft of a road crossing,.

3.6.2 Joints

The joints in opposite rails shall be staggered one-half the rail length but not less than 12 ft apart, except closer joints may be required at insulated joints. Rail less than 13 ft in length shall not be installed in track.

3.6.3 Expansion Allowance

Allowance for expansion shall be provided at rail joints by using rail-expansion metal shims. Shims shall be removed to within 12 rails of the laying. Shims shall be of the thickness shown in TABLE VI. The temperature of the rail shall be determined by use of a thermometer placed on the rail base on the side away from the sun. Typical rail gap gauges are as shown.

TABLE VI. SHIM THICKNESS

33-Ft Rail 160 Joints per Mi		39-Ft Rail 135 Joints per Mi		78-Ft Rail 68 Joints per Mi	
Rail Temperature (degrees F)	Shim Thickness (in.)	Rail Temperature (degrees F)	Shim Thickness (in.)	Rail Temperature (degrees F)	Shim Thickness (in.)
Below -10	5/16	Below 6	5/16	Below 35	5/16
-10 to 14	1/4	6 to 25	1/4	35 to 47	1/4
15 to 34	3/16	26 to 45	3/16	48 to 60	3/16
35 to 59	1/8	46 to 65	1/8	61 to 73	1/8
over 60	1/16	over 66	1/16	over 74	1/16

3.6.4 Cutting Rail

Only rail saws or track chisels shall be used to cut rail. New holes shall be drilled using a standard template. Holes shall not be burned in rail. Holes cut with a torch will not be accepted. When drilling of rail is necessary, all chips and burrs shall be removed before applying joints.

3.7 Joint Bars

Joint bars shall be clean, and the contact surfaces coated with petrolatum or petrolatum base compound with a corrosion inhibitor. Rail joints shall be installed so that bars are not cocked between the base and head of the rail. Bars shall be properly seated in the rail and the full number of correct-size bolts, nuts, and spring washers installed. Bolts shall be placed with nuts alternately on inside and outside of rail. A corrosion resistant lubricant shall be applied to the bolt threads prior to application of nuts. Bolts shall be tightened to torque of approximately 500 ft-lbs beginning at the center of the joint and working both ways to the ends of the joint. After the track has been in service , but before acceptance of the work, all bolts shall be checked and retightened to a torque of approximately 550 ft-lbs. Defective joint bars designated on the contract drawings, discovered by the Contractor during track repair operations, or as identified by the Contracting Officer shall be replaced with acceptable joint bars.

3.8 Spiking

3.8.1 Spiking Procedures

Rail shall be spiked promptly after being laid. Spikes shall be started and driven vertically and square with the rail. Spikes shall be driven to allow approximately 1/8 to 3/16 in space between the underside of the spike and the top of the rail base. Spikes shall not be overdriven, or straightened while being driven. Spikes shall not be installed through the slots in skirted-type, slotted joint bars (angle bars). Spikes shall not be driven against the ends of joint bars.

3.8.2 Number of Spikes

Four rail-holding spikes shall be used on each tie on tangents and curves less than 4 degrees. Spikes on the gauge side of the running rail shall be placed directly across from each other and the spikes on the field side of the running rail shall be placed directly across from each other. This pattern shall be held consistent. Eight rail-holding spikes shall be used on each tie through road crossings.

3.9 Tie Plugs

If spikes are withdrawn, the holes shall be swabbed with creosote and plugged with creosoted tie plugs of proper size to fit the hole. If spikes are withdrawn and spikes are to be reinserted in existing spike holes, the holes shall be swabbed with creosote and plugged with creosoted tie plugs prior to redriving the spike. Tie plugs shall not be installed in prebored holes unless spikes have been driven and withdrawn.

3.10 Cleanup

Upon completion of the work, the Contractor shall remove all rubbish, waste, and discarded materials generated by the work from the project area. Areas where the Contractor has worked, including but not limited to, project areas, material storage sites, and borrow or disposal areas shall

be left in a clean, well-graded, and well-drained condition.

3.10.1 Spoil Materials

Spoil materials removed from the track shall be disposed of off site at the Contractor's expense. Spoil materials shall not be placed on the shoulders, in ditches, in drains, or in other areas where they would impede the flow of water away from the track.

3.11 Final Adjustments

Sixty calendar days after the track has been accepted and put into operation, the Contractor shall perform, at no cost to the Government, necessary resurfacing adjustments to leave the track in alignment and on grade.

3.12 Tolerances for Finished Track

Completed track shall meet the following tolerances. Track not meeting the tolerances specified below shall be repaired to meet these requirements, at no additional cost to the Government.

3.12.1 Gauge

Track gauge shall be within plus 1/4 in or minus 1/8 inch of standard gauge.

3.12.2 Track Surface

Track surface shall meet the following requirements:

a. The runoff at the end of a raise shall not exceed 1/2 in in any 31 ft of rail.

b. The deviation from design profile on either rail at the mid-ordinate of a 62 ft chord shall not exceed 1/2 in

e. The difference in cross level between any two points less than 62 ft apart on tangents.

3.12.3 Guard Check Gauge

Guard check gauge is the distance between the gauge line of a frog and the guard line of its guard rail, or guarding face, measured across the track at right angles to the gauge line. The design value for guard check gauge is 54-5/8 in. Guard check gauge shall be within plus or minus 1/8 in of the design value.

3.13 HIGHWAY CROSSINGS

Highway and other crossings within the project shall be constructed as indicated on the contract drawings.

3.13.1 Rail

Rail within the crossing area and for 20 ft beyond each end of the crossing shall be, at a minimum, 115 lbs/yd. Bolted joints will be eliminated by either field welding the joints to form continuous rail throughout this area or by using 78 ft rail lengths.

3.13.2 Crossing Surface

The surface of the highway shall be in the same plane as the top of the rails for a distance of 2 ft outside of the rails for either single or multiple-track crossings. A smooth transition shall be made between the crossing surface and the adjoining pavement.

3.13.3 Crossing Flangeways

Upon completion of the grade crossing installation, the flangeways through the crossing shall be a minimum of 2 in deep and between 2-1/2 and 3 in wide. The Contractor shall ensure that adequate flangeways are provided prior to installation of the final crossing surface.

3.13.3.1 Clean Grade Crossing Flangeways

Where grade crossing flangeways are obstructed (filled in), the Contractor shall remove foreign material to provide a minimum 2 in depth and 2-1/2 in width flangeways on the gauge side of the rails.

3.14 BONDING AND GROUNDING TRACK

Track shall be bonded and grounded as indicated. Where track is designated for bonding and grounding, the rails shall be bonded electrically continuous and effectively grounded. Connections shall be made by exothermite welds in accordance with the manufacturer's instructions.

3.14.1 Rail Joint Bond

Rail joints on both rails of designated track shall be bonded using an exothermic type bond. The bond shall be applied to the field side of the rail head or web unless otherwise approved by the Contracting Officer. Track to be bonded and grounded shall be electrically insulated from the remaining track using one of the specified insulated joints.

3.14.2 Rail Cross-Bond and Ground

Rail cross-bond and ground shall be installed using an exothermic type bond. The cross-bond shall be applied to the rail web. One cross-bond and ground shall be provided for each section of bonded and grounded track. Connections between grounding system or ground rods and rails shall be made with bare stranded copper cable, installed at least 12 in below the bottom of the ties. Ground rods shall be driven vertically full-length. The top of the ground rod shall be located at the toe of the ballast slope and shall be a minimum of 12 in below the top of the subgrade. Maximum resistance to ground from any grounded rail or structure shall not exceed 25 ohms. The Contractor shall make any corrections needed to reduce the resistance to below 25 ohms at no cost to the Government.

3.14.3 Inspection of Rail Bond and Ground

Loose, damaged, or missing rail bond wires, cross bond wires, ground connections, and ground rods shall be visually inspected. If there is a signal failure, bonding can be tested for current loss in the joints using a volt meter. Defective items shall be marked for repair.

3.14.4 Rail Bonds At Signalized Grade Crossings

Bolted rail joints within the approach circuits to signalized highway grade

crossings shall be double-bonded using both a rail head bond and a web bond. Rail head and web bonds shall be installed in the locations indicated where the existing rail bonds are missing, broken, or otherwise ineffective.

3.14.5 Existing Bonds

The Contractor shall protect existing rail bonds, cross-bonds, ground connections, and grounding rods from damage. Except for bonds attached to rails which are designated to be replaced in this contract, replacement of bonds damaged or destroyed by the Contractor's operation shall be replaced at no cost to the Government.

3.14.6 Removal of Defective Bonds

Rail head pin-type and welded-type bonds shall be removed by shear cutting old cables immediately adjacent to the weld or pin. Rail web type pin bonds shall be removed by knocking the old pin out with a drift. Flames or torches shall not be used to remove defective bonds.

3.15 DIRECTION FIXATION RAIL ATTACHMENTS

The contractor has the option of installing the fasteners prior to or after the concrete is poured for the deck slab.

The anchor bolts shall not be in contact with any reinforcing bar and shall penetrate into the concrete deck at least 5 inches. The proposed anchorage system must meet the testing provided below. The contractor shall also check the placement of reinforcing steel in the deck prior to the pouring of any section of the deck to ensure that contact between reinforcing and anchorage does not occur.

The contractor shall fabricate 6 production examples of anchorage assemblies complete with anchor bolts and inserts. The inserts shall be set with its axis at right angles to plane and flush with the surface of the concrete test block. Each anchorage insert shall be numbered one through six. The following tests shall be performed by the contractor.

3.15.1 Torque Test (Anchorage Assemblies Nos. 1 and 2)

3.15.1.1 Application

Torque test load of 500 foot-pounds on installed anchor insert.

3.15.1.2 Procedure

Screw anchor bolt into female insert tight against lock nut set two inches from end of bolt. Apply torque test load to anchor bolt head.

3.15.1.3 Acceptance Criteria

Test shall show no evidence of circular movement by female insert. Should any of the torque tests fail to meet the specified acceptance criteria, the fastener anchorage will be unacceptable.

3.15.2 Pullout Tests (Anchorage Assemblies Nos. 3, 4, 5, and 6)

3.15.2.1 Application

Upward test load of 20,000 pounds on installed anchor insert.

3.15.2.2 Equipment

The reaction plate shall be a steel plate 3-1/2 inches square by 1/2 inch thick with a 0.9687 inch diameter hole drilled in the center.

3.15.2.3 Procedure

The Restrained Test shall be performed on Anchorage Assemblies Nos. 3 and 4. The reaction plate shall be placed over the anchor bolt installation to be tested. The accepted loading system shall be connected to the bolt engaged in the anchor insert. Apply the initial uplift load of 1,000 pounds against the reaction plate and then increase the load at a rate of 1,000 pounds per minute until the load reaches 20,000 pounds.

The Unrestrained Test shall be performed on Anchorage Assemblies Nos. 5 and 6. Remove the reaction plate and apply 10,000 pound uplift load to anchor insert against reaction surface outside of six inch radius area in which the anchor insert is centered.

3.15.2.4 Acceptance Criteria

Test shall show no evidence of upward movement by the insert. Should any of the uplift tests fail to meet the specified acceptance criteria, the fastener anchorage will be unacceptable.

Test shall be performed on each of two specimens that are identical in all respects to elastomer proposed for use in the direct fixation rail fasteners. Specimens used for testing shall be taken from a batch of compound certified by the contractor to be identical to that used for making the elastomer component and having a cure equal to the cure of this elastomer component.

3.15.3 Elastomer

The elastomer shall be tested in accordance with ASTM D 412 to determine the tensile strength and the ultimate elongation. The tensile strength shall be not less than 1,500 psi and the ultimate elongation shall be not less than 350 percent.

The elastomer shall be tested for 22 hours at 100 degrees C in accordance with ASTM D 395, Method B. For neoprene and other synthetic base elastomers, the compression set shall not exceed 35 percent. For natural rubber base elastomers, the test shall be conducted at 70 degrees C and the compression set shall not exceed 25 percent.

The elastomer shall be aged for 70 hours at 100 degrees C for the neoprene based elastomers and 70 degrees C for natural rubber base elastomers, in accordance with ASTM D 573. Measure and record the change in hardness and the percentage change of properties from the original tensile strength and and ultimate elongation. For neoprene and other synthetic base elastomers, the percentage of decrease in tensile strength shall not exceed 15 percent; the percentage of decrease of ultimate elongation shall not exceed 40 percent; and the change in hardness, measured on the Durometer A scale, shall not exceed 10 points. For natural rubber base elastomers, the percentage of decrease of tensile strength shall not exceed 25 percent; the percentage of decrease of ultimate elongation shall not exceed 25 percent; and the change in hardness, measured on the Durometer A scale, shall not

exceed 25 percent; and the change in hardness, measured on the Durometer A scale, shall not exceed 10 points.

Test specimens shall be prepared in accordance with ASTM D 518, Procedure A. The test specimens shall be tested in accordance with ASTM D 1149, at 40 degrees C and at an ozone concentration of 50 pphm. The elastomer shall not exhibit any cracking when examined, in accordance with ASTM D 1149, at the end of a 100-hour exposure.

The elastomer shall be tested at minus 10 degrees C for 70 hours, in accordance with ASTM D 1229, to determine the percent compression set at 30 minutes after release (T30 reading). The compression set shall not exceed 65 percent.

In accordance with ASTM D 471, the test shall be conducted with ASTM No. 1 oil to determine the volume change of elastomer for 70 hours at 100 degrees C for neoprene base elastomers, and for 70 hours at 23 degrees C for natural rubber base elastomers. The volume change for the No. 1 oil shall not exceed minus 10 or plus 35 percent.

This test shall be performed on specimens of elastomer, which are to be bonded in the finished rail fastener, in accordance with ASTM D 429, Method D. For use as bonded elastomer, the failure must be a type R failure (i.e. elastomer tears before bond fails).

The spring clip shall be tested to a maximum of 15,000 pounds in increments of 1,000 pounds at an application downward at centerline of the fastener normal to rail head. Each load increment shall be measured at a vertical deflection of rail head to the nearest 0.0001 inch and each measurement shall be recorded when rail head has stopped moving. After final load increment has been applied and the deflection has been recorded, the test load shall be removed from the rail head and the elevation shall be recorded on a graph vertical deflection of rail head.

Test acceptance criteria, longitudinal testing and electrical requirements for rail fastener components are as follows:

3.15.3.1 Test Acceptance Criteria

Test acceptance criteria are as follows:

1. Allowable envelope of load deflection curve: Deflections recorded for increments neither lighter than 5,000 pounds nor heavier than 12,000 pounds.

2. Slope of the load-deflection curve (spring rate of fasteners): Not less than 150,000 pounds per inch, more than 200,000 pounds per inch, for all loads between 5,000 pounds and 12,000 pounds. Constancy of slope: Within 10 percent over the load range.

3. Recovery of rail fastener to original rail head position: Within 0.005 inch of its pretest position within one minute after test load has been removed.

4. Stability: No movement of fastener components caused by other than deflections, and no visual slippage, yields, and fractures.

5. Ratio of deflection to thickness of elastomer:

a. Basis of determination: Rail head deflection, inches; measured immediately after final load has been applied divided by rail fastener design thickness of elastomer, in inches.

b. Maximum vertical deflection of the elastomer: Not to exceed 25 percent of its uncompressed thickness.

c. Value for repeated test of same fastener: Within 20 percent of initial test values.

3.15.3.2 Longitudinal Testing

Longitudinal testing is as follows:

A. Dry Resistance

1. Remove moisture, if any, from rail fastener assembly, and with one lead of high potential tester connected to rail head and ground lead connected to anchor bolt, apply 500 volts DC for three minutes. Use the current value obtained to calculate resistance.

2. Acceptance resistance to 500 volts DC: not less than 10 megohms.

B. Wet Resistance

1. Release rail fastener from concrete test block and rail; immerse rail fastener in distilled water for 70 hours at 100 degrees C for neoprene based elastomers and for 336 hours at 70 degrees C natural rubber based elastomers.

2. After rail fastener has been removed from water without drying, and with no portion of rail fastener cooler than 35 degrees C, reassemble rail fastener and rail on concrete test block.

3. Connect one lead of high potential tester to rail head and ground lead to anchor bolt, apply 500 volts DC for three minutes, and test for electrical resistance. Use stabilized current value obtained to calculate resistance.

4. Allowable resistance: shall not be less than one megohm.

C. Wet Impedance

1. With rail fastener assembly still wet, and with no portion of assembly cooler than 35 degrees C, apply a potential of 50 volts AC between rail head and grounded anchor bolt until reading has stabilized for 30 seconds of measurement for frequencies 1,000; 2,000; 4,000; 6,000; 8,000 and 10,000 Hz.

2. After reading has stabilized for 30 seconds, measure impedance of each frequency within an accuracy of plus or minus two percent, and record for each frequency.

3. Impedance for frequencies between 1,000 Hz through 6,000 Hz shall not be less than 9,000 ohms, at 8 kHz shall be not less than 7,000 ohms, and at 10 kHz shall not be less than 6,000 ohms.

3.16 INSTALLATION OF MISCELLANEOUS TRACK MATERIALS

3.16.1 Tie Plates

Tie plates shall be furnished to the work sites as required. Excess tie plates, remaining at the conclusion of the contract, shall be delivered to the military installation storage site and stacked where directed by the Contracting Officer.

3.16.2 Insulated Joints

Insulated joints shall be installed where indicated and in accordance with the manufacturer's installation instructions.

3.16.3 Installation of Joint Bars

Joint bars shall be installed with their full number of bolt assemblies unless otherwise noted. Bars shall be properly seated on the rail and the bolts tightened beginning at the center of the joint and working toward the ends of the bars, alternating between rails. Bolts used shall be of the proper diameter and length for the rail and joint bars at the joint. The use of extra washers to shim out track bolt nuts is prohibited. Bolts with nuts shall be placed alternately on inside and outside of rail.

3.17 THERMITE WELDING PROCEDURES

Thermite welding procedures shall be performed by a technician certified to meet ANSI/ASNT CP-189, level II or III qualifications and comply with the following paragraphs:

3.17.1 End Preparation

Rails to be welded shall meet the requirements of Paragraph 1, "Specifications for Fabrication of Continuous Welded Rail" given in Chapter 4, Part 2 of AREMA Manual. The rail ends shall be aligned in accordance with paragraph GAP AND ALIGNMENT. Rail ends shall show no steel defects, dents, or porosity before welding. Bolt holes shall not be made in, or permitted to remain in, the ends of the rail to be welded. One handling hole may be made in each end of welded string. Rail ends containing such holes shall be cut off during track construction. Rail which must be cut for any reason shall be cut square and clean by means of approved rail saws or abrasive cutting wheels in accordance with Chapter 5 of AREMA Manual, article, "Recommended Practice For Use of Abrasive Wheels".

3.17.1.1 Cleaning

The rails to be welded shall be cleaned of grease, oil, dirt, loose scale, and moisture to a minimum of 6 in back from the rail ends, including the railhead surface. Cleaning shall be accomplished by use of a wire brush, to completely remove dirt and loose oxide and by use of oxygen-acetylene torch to remove grease, oil and moisture. A power grinder with an abrasive wheel shall be used to remove scale rust, burrs, lipped metal and mill brands which would interfere with the fit of the mold, for 2 in on each side of the ends.

3.17.1.2 Gap and Alignment

The minimum and maximum spacing between rail ends shall be as specified by the rail welding kit manufacturer and the approved welding procedures.

a. The ends of the rails to be welded shall be properly gapped and aligned to produce a weld which shall conform to the alignment tolerances below. Alignment of rail shall be done on the head of the rail. The rail gap and alignment shall be held without change during the complete welding cycle.

b. Vertical alignment shall provide for a flat running surface. Any difference of height of the rails shall be in the base.

c. Horizontal alignment shall be done so that any difference in the width of heads of rails shall occur on the field side. Horizontal offsets shall not exceed 0.04 in. in the head and/or 0.12 inch in the base.

3.17.2 Surface Misalignment Tolerance

Combined vertical offset and crown camber shall not exceed 0.04 inch/feet at 600 degrees F or less. Combined vertical offset and dip camber shall not exceed 0.01 inch/feet at 600 degrees F or less.

3.17.3 Gauge Misalignment Tolerance

Combined horizontal offset and horizontal kink camber shall not exceed 0.04 inch/feet at 600 degrees F or less.

3.17.4 Thermite Welding

Welding shall be done in accordance with Chapter 4, Part 2 of AREMA Manual, articles "Thermite Welding - Rail Joints" and "Specifications for Fabrication of Continuous Welded Rail", except as modified by these specifications. All welds shall be visually inspected at the time of welding.

3.17.4.1 Thermite Weld Preheating

The rail ends shall be preheated prior to welding to a sufficient temperature and for sufficient time as indicated in the approved welding procedures to ensure full fusion of the weld metal to the rail ends without cracking of the rail or weld.

3.17.4.2 Thermite Weld Cooling

The molds shall be left in place after tapping for sufficient time to permit complete solidification of the molten metal and proper slow cooling to prevent cracking and provide a complete weld with proper hardness and ductility.

3.17.5 Weld Finishing and Tolerances

Welded joints in the finished track shall be brought to a true surface and alignment by means of a proper grinding or planing machine (shear). Finish grinding shall be performed with an approved grinder operated by a skilled workman grinding evenly and leaving the joints in a smooth and satisfactory condition. Finishing shall eliminate all cracks. The completed weld shall be finished by mechanically controlled grinding in conformance with the following requirements:

a. A finishing deviation of not more than plus or minus 0.01 in of

the parent section of the rail head surface will be allowed. The gauge side of the rail head shall be finished to plus or minus 0.01 in of the parent section.

b. Welds produced by welding kits which are specially designed to produce reinforced welds need not be ground in the finishing area except as necessary to remove fins, burrs, cracks, etc.

3.17.6 Weld Quality

Each completed weld shall have full penetration and complete fusion and be entirely free of cracks or fissures. Welds shall meet the acceptance criteria given in AWS D1.1.

3.17.7 Weld Numbering

The Contractor shall semi-permanently mark a sequential weld number on the rail immediately adjacent to the weld, using a quality lead paint marker at the time the weld is made. Welds shall be numbered sequentially in the order in which they are made. The Contracting Officer will provide the Contractor with the initial weld number. Defective welds which are replaced shall be assigned a new sequential number by adding a letter to the defective weld number (e.g., defective weld 347 would be replaced by 347A).

3.18 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory, or by the Contractor, subject to approval. If the Contractor elects to establish testing facilities, approval of such facilities shall be based on compliance with ASTM D 3740. Work requiring testing will not be permitted until the Contractor's facilities have been inspected and approved. The inspection of the facilities will be at the expense of the Contractor.

3.18.1 Tie Inspection

The Contractor shall be responsible for the quality of the treated ties. Each tie shall be permanently marked or branded by the producer in accordance with AWPA M6. Each treated wood tie shall be inspected, in accordance with AWPA M2, for conformance with the specified AWPA standards. The 100 percent inspection shall be performed by an independent inspection agency approved by the Contracting Officer. Inspection shall be made at the wood treatment site. The agency's report of inspection shall accompany delivery of the ties. The Contractor shall core and check preservative treatment once per 1000 ties delivered to the construction site.

3.19 INSPECTION AND FIELD TESTING

Quality control inspection and field testing shall be performed by a technician certified to meet ANSI/ASNT CP-189 level II or III qualifications with a minimum of one year experience in testing rail for defects.

3.19.1 Track

Inspection shall be performed to ensure that all the requirements of these specifications are met. Bolted joints shall be inspected for loose bolts

and for smooth transitions between rails of different sections. Rail, tie plates, and ties shall be checked to ensure that the rail is properly seated and has full bearing on the tie plate and tie. Upon completion of construction, measurements of track gauge, cross level, and alignment shall be taken and recorded at least once every 100 feet of track centerline length. A copy of these measurements shall be provided to the Contracting Officer.

3.19.2 Welded Joints - Visual Inspection

Each welded joint shall be inspected by the Contractor in the presence of the Contracting Officer after removal of the mold and grinding of excess metal. The Contractor shall pay particular attention to surface cracking, slag inclusion, gas pockets, and lack of fusion. The Contractor shall correct or replace, at no extra cost to the Government, any weld found defective. The method of correction shall be as approved by the Contracting Officer.

3.19.3 Thermite Weld Joints Testing

Each thermite weld joint shall be dye tested following the visual inspection. The method of inspection and acceptance shall be in accordance with AWS D1.1. The Contractor shall correct or replace defective welds, at no additional cost to the Government. The method of correction shall be as approved by the Contracting Officer. The testing will determine whether or not each weld meets the criteria of paragraphs Gap and Alignment, Weld Finishing and Tolerances, and Weld Quality. Welds made in the track which the Contracting Officer determines to be unacceptable shall be cut out of the rail and replaced by a section of new rail and two new welds. Saw cuts shall be made at least 6 in from the centerline of the faulty weld. Replacement welds and replacement rails shall be at the sole expense of the Contractor. Replacement welds shall be renumbered as indicated. Replacement welds made in track shall be ultrasonically tested.

RECORD OF FIELD WELD

INSTALLATION_____ WELD NUMBER _____

FINAL INSTALLED
LOCATION _____ TRACK _____
STATION _____ RAIL Left Right (Circle)

DATE _____ TIME _____ AM PM (Circle)

AIR TEMPERATURE _____ F*. WEATHER _____
RAIL TEMPERATURE _____ F*. _____

WELD KIT MANUFACTURER _____
RAIL GAP
NEAREST 1/16 IN _____
RAIL CUT REQUIRED? YES NO (Circle)
BACK RAIL
MANUFACTURER _____ USED RAIL? YES NO (Circle)
YEAR/MONTH ROLLED _____ HEAT NUMBER _____
_____

AHEAD RAIL
MANUFACTURER _____ USED RAIL? YES NO (Circle)
YEAR/MONTH ROLLED _____ HEAT NUMBER _____
_____

REMARKS_____
_____
_____

ULTRASONIC TEST DATE & RESULTS _____

KIT MFG. REPRESENTATIVE
PRESENT _____ WELDING FOREMAN _____
(Initial) (Signed)

CONTRACTING OFFICER'S
REPRESENTATIVE
PRESENT _____ RECORDER _____
(Initial) (Signed)

_____ RECORDER _____
(Initial) (Signed)

FOR GOVERNMENT USE ONLY

ULTRASONIC TEST DATE AND RESULTS _____

---

*NOTE: Determination will be made to the nearest 1/2 degree.
-- End of Section --

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)

AF&PA T01	(1991; Supple 1993; Addenda Apr 1997; Supple T02) National Design Specification for Wood Construction

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC TC Manual	(1994) Timber Construction Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 153	(1998) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 193/A 193M	(2001a) Specification for Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 194/A 194M	(2001) Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
ASTM A 307	(1997) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM F 547	(1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C2	(1999) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA M4	(1999) Standard for the Care of Preservative-Treated Wood Products
AWPA P5	(1999) Waterborne Preservatives

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Structural Wood Members; FIO

Design analysis and calculations of structural laminated members, fabricated wood trusses, and other fabricated structural members showing design criteria used to accomplish the applicable analysis.

SD-04 Drawings

Structural Wood Members; GA. Installation of Framing; GA.

Drawings of structural members, indicating materials, shop fabrication, and field erection details; including methods of fastening.

Nailers and Nailing Strips; GA

Drawings of field erection details, including materials and methods of fastening nailers in conformance with other Sections of these specifications.

SD-13 Certificates

Grading and Marking; GA

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity.

PART 2 PRODUCTS

2.1 LUMBER AND SHEATHING

2.1.1 Grading and Marking

2.1.1.1 Lumber Products

Solid sawn lumber shall bear an authorized gradestamp or grademark recognized by ALSC, or an ALSC recognized certification stamp, mark, or hammerbrand. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

2.1.2 Sizes

Lumber and material sizes shall conform to requirements of the rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Unless otherwise specified, sizes indicated are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

2.1.3 Treatment

Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4. Except as specified for all-heart material of the previously mentioned species, the following items shall be treated:

a. Wood members in contact with or within 18 inches of soil.

b. Wood members in contact with water.

c. Wood members exposed to the weather .

d. Wood members in contact with concrete that is in contact with soil or water or that is exposed to weather.

2.1.3.1 Lumber and Timbers

Lumber and timbers shall be treated in accordance with AWPA C2 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use.

2.1.4 Moisture Content

At the time lumber and other materials are delivered and when installed in the work their moisture content shall be as follows:

a. Treated and untreated Lumber: 4 inches or less, nominal thickness, 19 percent maximum. 5 inches or more, nominal thickness, 23 percent maximum in a 3 inch perimeter of the timber cross section.

b. Materials Other Than Lumber: In accordance with standard under which product is produced.

2.1.5 Structural Wood Members

Species and grades shall be as listed in AF&PA T01. Structural lumber used in fabrication structural members for engineered uses, shall have allowable design values of 1500 psi in bending; 1000 psi in tension parallel to the grain; 350 psi in compression perpendicular to the grain; 900 psi in compression parallel to the grain; 200 psi in horizontal shear; and a modulus of elasticity of 1,500,000 psi. Design of members and fastenings shall conform to AITC TC Manual. Other stress graded or dimensioned items such as blocking, carriages, and studs shall be standard or No. 2 grade.

2.2 ACCESSORIES AND NAILS

Markings shall identify both the strength grade and the manufacturer. Accessories and nails shall conform to the following:

2.2.1 Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

2.2.2 Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws

Type, size, and finish best suited for intended use. Finish options include zinc compounds.

2.2.3 Nails

ASTM F 547, size and type best suited for purpose. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T01. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T01. Reasonable judgement backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

2.2.4 Timber Connectors

Unless otherwise specified, timber connectors shall be in accordance with AITC TC Manual.

2.2.5 Galvanized Hardware

All hardware shall be galvanized in accordance with ASTM A 153.

2.2.6 Stainless Steel Hardware

Stainless steel bolts and nuts shall conform to ASTM A 193/A 193M and ASTM A 194/A 194M (Type 304), respectively.

PART 3 EXECUTION

3.1 INSTALLATION OF FRAMING

3.1.1 General

General framing shall be in accordance with AF&PA T11.Members shall be closely fitted, accurately set to required lines and levels, and rigidly secured in place.

3.1.2 Structural Members

Members shall be adequately braced before erection. Members shall be aligned and all connections completed before removal of bracing. Individually wrapped members shall be unwrapped only after adequate protection by a cover has been provided. Scratches and abrasions of factory-applied sealer shall be treated with two brush coats of the same sealer used at the factory.

3.1.3 Curved Fender Timbers

The end sections of each fender consist of long radius curves. The exterior line of walers shall be factory bent to fit the radius of the curved end sections. The vertical sheeting timbers do not require curvature.

3.2 INSTALLATION OF MISCELLANEOUS WOOD MEMBERS

3.2.1 Bridging

Wood bridging shall have ends accurately bevel-cut to afford firm contact and shall be nailed at each end with two nails. Metal bridging shall be installed as recommended by the manufacturer. The lower ends of bridging shall be driven up tight and secured after subflooring or roof sheathing has been laid and partition framing installed.

3.2.2 Corner Bracing

Corner bracing shall be installed when required by type of sheathing used or when siding, other than panel siding, is applied directly to studs. Corner bracing shall be let into the exterior surfaces of the studs at an angle of approximately 45 degrees, shall extend completely over wall plates, and shall be secured at each bearing with two nails.

3.2.3 Blocking

Blocking shall be provided as necessary for application of sheathing and other materials or building items. Blocking shall be cut to fit between framing members and rigidly nailed thereto.

3.2.4 Nailers and Nailing Strips

Nailers shall be provided as necessary for the attachment of finish materials. Stacked nailers shall be assembled with spikes or nails spaced not more than 18 inches on center and staggered. Beginning and ending nails shall not be more than 6 inches for nailer end. Ends of stacked nailers shall be offset approximately 12 inches in long runs and alternated at corners. Anchors shall extend through the entire thickness of the nailer. Strips shall be run in lengths as long as practicable, butt jointed, cut into wood framing members when necessary, and rigidly secured in place.

3.2.5 Framing for Buildings

The Operator House and Electrical Room and interior of the Machinery Houses shall be framed with standard grade interior framing lumber. No treatment is necessary.

3.3 INSTALLATION OF TIMBER CONNECTORS

Installation of timber connectors shall conform to applicable requirements of AF&PA T01.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 07413

METAL SIDING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Mnl	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 518	(1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 578	(2000) Rigid, Cellular Polystyrene Thermal Insulation
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 610	(1995) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(1987; R 1994e1) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1995) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1997) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1997) Measuring Adhesion by Tape Test
ASTM D 4214	(1998) Evaluating Degree of Chalking of Exterior Paint Films

ASTM D 4587	(1991) Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light - and Water-Exposure Apparatus
ASTM D 5894	(1996) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM E 84	(2000a) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1998) Minimum Design Loads for Buildings and Other Structures

1.2 GENERAL REQUIREMENTS

1.2.1 Design

Criteria, loading combinations, and definitions shall be in accordance with ASCE 7. Maximum calculated fiber stress shall not exceed the allowable value in the AISI; a one third overstress for wind is allowed. Midspan deflection under maximum design loads shall be limited to L/180. Contract drawings show the design wind loads and the extent and general assembly details of the metal siding. Members and connections not shown on the drawings shall be designed by the Contractor. Siding panels and accessories shall be the products of the same manufacturer. Steel siding design shall be in accordance with AISI Cold-Formed Mnl.

1.2.2 Architectural Considerations

Panels profile shall be as shown on the drawings.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Siding; GA.

Drawings consisting of catalog cuts, design and erection drawings, shop coating and finishing specifications, and other data as necessary to clearly describe design, materials, sizes, layouts, construction details, fasteners, and erection. Drawings shall be accompanied by engineering design calculations for the siding panels.

SD-13 Certificates

Siding; GA. Installation; GA. Accessories; GA.

Certificates attesting that the panels and accessories conform to the requirements specified. Certified laboratory test reports showing that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than 5 pieces has been tested and has met the quality standards specified for factory color finish. Mill certification for structural bolts, siding, and wall liner panels.

Insulation; GA.

Certificate attesting that the insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

SD-14 Samples

Accessories; GA.

One sample of each type of flashing, trim, closure, cap and similar items. Size shall be sufficient to show construction and configuration.

Siding; GA.

One piece of each type and finish (exterior and interior) to be used, 9 inches long, full width.

Fasteners; GA.

Two samples of each type to be used with statement regarding intended use. If so requested, random samples of bolts, nuts, and washers as delivered to the jobsite shall be taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

Insulation; GA.

One piece of each type to be used, and descriptive data covering installation.

Gaskets and Insulating Compounds; GA.

Two samples of each type to be used and descriptive data.

Sealant; GA.

One sample, approximately 1 pound, and descriptive data.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials shall be covered with weathertight coverings and kept dry. Storage accommodations for metal siding shall provide good air circulation and protection from surface staining.

1.5 WARRANTIES

The Contractor shall provide a weather tight warranty for the metal siding for a period of 20 years to include siding panel assembly, 10 years against the wear of color finish, and 10 years against the corrosion of fasteners caused by ordinary wear and tear by the elements. The warranties shall start upon final acceptance of the work or the date the Government takes possession, whichever is earlier.

PART 2 PRODUCTS

2.1 SIDING

2.1.1 Wall Siding

Panels shall be steel and shall have a factory color finish. Length of sheets shall be sufficient to cover the entire height of any unbroken wall surface when length of run is 30 feet or less. Width of sheets with overlapping configurations shall provide not less than 24 inches of coverage in place, and those with interlocking ribs shall provide not less than 12 inches of coverage in place. Wall panels shall be fastened to framework using exposed or concealed fasteners.

2.1.2 Floor Siding

Panel for under floor siding shall be steel with a factory applied finish similar to the wall siding. The panel may have a projection of 0.5 inches at a spacing of 6 or 12 inches.

2.2 FACTORY COLOR FINISH

Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Color shall nearly match the exterior steel paint top coat color indicated in Section 09900 PAINTING, GENERAL, subparagraph BUILDING EXTERIOR STEEL PANELS. The exterior coating shall be a nominal 1 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than 0.2 mil thickness. The interior color finish shall consist of a nominal 1 mil thick PVF2 finish otherwise the same as the exterior. The exterior color finish shall meet the test requirements specified below.

2.2.1 Salt Spray Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2016 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by ASTM D 610; and a rating of 6, 1/16 to 1/8 inch failure at scribe, as determined by ASTM D 1654.

2.2.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of fracturing to the naked eye.

2.2.3 Accelerated Weathering, Chalking Resistance and Color Change

A sample of the sheets shall be tested in accordance with ASTM D 4587, test condition B for 1000 total hours. The coating shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.2.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.2.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.500 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no loss of adhesion.

2.2.6 Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.3 ACCESSORIES

Flashing, trim, metal closure strips, caps, and similar metal accessories shall be the manufacturer's standard products. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chlorided premolded to match configuration of the panels and shall not absorb or retain water.

2.4 FASTENERS

Fasteners for steel panels shall be zinc-coated steel, corrosion resisting steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Fasteners for attaching wall panels to supports shall provide both tensile and shear strength of not less than 750 pounds per fastener. Fasteners for accessories shall be the manufacturer's standard. Exposed wall fasteners shall be color finished or provided with plastic color caps to match the panels. Nonpenetrating fastener system for wall panels using concealed clips shall be manufacturer's standard for the system provided.

2.4.1 Screws

Screws shall be as recommended by the manufacturer.

2.4.2 End-Welded Studs

Automatic end-welded studs shall be shouldered type with a shank diameter of not less than 3/16 inch and cap or nut for holding panels against the shoulder.

2.4.3 Bolts

Bolts shall be not less than 1/4 inch diameter, shouldered or plain shank as required, with proper nuts.

2.4.4 Expansion Anchors

Expansion anchors shall be commercially available galvanized steel bolts manufactured to be bolted in concrete

2.5 INSULATION

2.5.1 Wall Insulation

Thermal resistance of insulation shall be not less than the R-values shown on the contract drawings. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518. Insulation shall be a standard product with the insulation manufacturer, factory-marked or identified with insulation manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Blanket insulation shall have a facing as specified in paragraph VAPOR RETARDER. Insulation , including facings, shall have a flame spread not in excess of 10 and a smoke developed rating not in excess of 1 when tested in accordance with ASTM E 84. The stated R-value of the insulation shall be certified by an independent Registered Professional Engineer if tests are conducted in the insulation manufacturer's laboratory.

2.5.2 Floor Insulation

The underfloor insulation shall conform to ASTM C 578, Types II, IV or IX of the thickness indicated. The edges shall be either tongue-and-groove or ship-lap. The exterior edges shall be square. Panel sizes shall be as large as possible.

2.6 VAPOR RETARDER

2.6.1 Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be white reinforced polypropylene kraft laminate (PSK). Facings and finishes shall be factory applied.

2.7 SEALANT

Sealant shall be an elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color and shall cure to a rubberlike consistency.

2.8 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.9 Plywood

Exterior grade, commercial quality plywood may be provided from local building supply stores. The plywood shall be procured in the largest sheet size that is available. The plywood shall be flat with a maximum deflection of 0.5 inches when the entire sheet is placed on a flat surface.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's erection instructions and drawings. Dissimilar materials which are not compatible when contacting each other shall be insulated from each other by means of gaskets or insulating compounds. Improper or mislocated drill holes shall be plugged with an oversize screw fastener and gasketed washer; however, panels with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Stained, discolored, or damaged sheets shall be removed from the site.

3.1.1 Siding and Accessories

Siding shall be applied with the longitudinal configurations in the vertical position. Accessories shall be fastened into framing members, except as otherwise approved. Closure strips shall be provided as indicated and where necessary to provide weathertight construction.

3.1.1.1 Lap Type Panels with Exposed Fasteners

End laps shall be made over framing members with fasteners into framing members approximately 2 inches from the end of the overlapping sheet. Side laps shall be laid away from the prevailing winds. Spacing of fasteners shall present an orderly appearance and shall not exceed: 8 inches on center at end laps of siding, 8 inches on center at connection of siding to intermediate supports, and 18 inches on center at side laps of siding except when otherwise approved. Side and end laps of siding and joints at accessories shall be sealed. Fasteners shall be installed in straight lines within a tolerance of 1/2 inch in the length of a bay. Fasteners shall be driven normal to the surface and to a uniform depth to seat the gasketed washers properly.

3.1.1.2 Concealed Fastener Wall Panels

Panels shall be fastened to framing members with concealed fastening clips or other concealed devices standard with the manufacturer. Spacing of fastening clips and fasteners shall be in accordance with the manufacturer's written instructions. Spacing of fasteners and anchor clips along the panel interlocking ribs shall not exceed 12 inches on center except when otherwise approved. Fasteners shall not puncture metal sheets except as approved for flashing, closures, and trim; exposed fasteners shall be installed in straight lines. Interlocking ribs shall be sealed with factory-applied sealant. Joints at accessories shall be sealed.

3.2 Under Floor Insulation

The under floor insulation shall be applied to the bottom surface of each

concrete floor of the Operator Room and Electrical Room. The insulation shall be under each entire floor except if there would be interference with entry into the rooms through the floor. The insulation shall be connected to the bottom of each floor with an adhesive that is recommended by the insulation manufacturer. Sheet of plywood shall be placed under the insulation as a support and protector. Floor siding shall then be placed below the plywood. Expansion anchor bolts shall then be drilled and bolted to the concrete floor slabs.

-- End of Section --

SECTION 07416

STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD Spec S335	(1989) Specification for Structural Steel Buildings - Allowable Stress Design, Plastic Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Mnl	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 653/A 653M	(1999) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 518	(1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 991	(1998) Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1999) Specular Gloss
ASTM D 610	(1995) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(1987; R 1994e1) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1308	(1987; R 1998) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive

	Environments
ASTM D 2244	(1995) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1997) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1997) Measuring Adhesion by Tape Test
ASTM D 4214	(1998) Evaluating Degree of Chalking of Exterior Paint Films
ASTM D 4587	(1991) Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light - and Water-Exposure Apparatus
ASTM D 5894	(1996) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM E 84	(2000a) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM E 1592	(1998) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1998) Minimum Design Loads for Buildings and Other Structures

1.2 GENERAL REQUIREMENTS

The Contractor shall furnish a commercially available roofing system which satisfies all requirements contained herein and has been verified by load testing and independent design analyses to meet the specified design requirements.

1.2.1 Structural Standing Seam Metal Roof (SSSMR) System

The SSSMR system covered under this specification shall include the entire roofing system; the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with ASTM E 1592. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as exterior gutters and downspouts; eaves, ridge, system flashings installed and any other components specified

within this contract to provide a weathertight roof system.

1.2.2 Manufacturer

The SSSMR system shall be the product of a manufacturer who has been in the practice of manufacturing and designing SSSMR systems for a period of not less than 3 years and has been involved in at least five projects similar in size and complexity to this project.

1.2.3 Installer

The installer shall be certified by the SSSMR system manufacturer to have experience in installing at least three projects that are of comparable size, scope and complexity as this project for the particular roof system furnished. The installer may be either employed by the manufacturer or be an independent installer.

1.3 DESIGN REQUIREMENTS

The design of the SSSMR system shall be provided by the Contractor as a complete system. Members and connections not indicated on the drawings shall be designed by the Contractor. Roof panels, components, transitions, accessories, and assemblies shall be supplied by the same roofing system manufacturer.

1.3.1 Design Criteria

Design criteria shall be in accordance with ASCE 7.

1.3.2 Dead Loads

The dead load shall be the weight of the SSSMR system. Collateral loads such as electrical systems, and ceilings shall not be attached to the panels.

1.3.3 Live Loads

1.3.3.1 Concentrated Loads

The panels and anchor clips shall be capable of supporting a 300 pound concentrated load. The concentrated load shall be applied at the panel midspan and will be resisted by a single standing seam metal roof panel assumed to be acting as a beam. The undeformed shape of the panel shall be used to determine the section properties.

1.3.3.2 Uniform Loads

The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 30 psf.

1.3.4 Roof Snow Loads

The design roof snow loads shall be as shown on the contract drawings.

1.3.5 Wind Loads

The design wind uplift pressure for the roof system shall be as shown on the contract drawings. The design uplift force for each connection assembly shall be that pressure given for the area under consideration,

multiplied by the tributary load area of the connection assembly. The safety factor listed below shall be applied to the design force and compared against the ultimate capacity. Prying shall be considered when figuring fastener design loads.

a. Single fastener in each connection.....3.0

b. Two or more fasteners in each connection...2.25

1.3.6 Thermal Loads

Roof panels shall be free to move in response to the expansion and contraction forces resulting from a total temperature range of 120 degrees F during the life of the structure.

1.3.7 Framing Members Supporting the SSSMR System

Any additions/revisions to framing members supporting the SSSMR system to accommodate the manufacturer/fabricator's design shall be the Contractor's responsibility and shall be submitted for review and approval. New or revised framing members and their connections shall be designed in accordance with AISC ASD Spec S335. Maximum deflection under applied live load, snow, or wind load shall not exceed 1/180 of the span length.

1.3.8 Roof Panels Design

Steel panels shall be designed in accordance with AISI Cold-Formed Mnl. The structural section properties used in the design of the panels shall be determined using the unloaded shape of the roof panels. The calculated panel deflection from concentrated loads shall not exceed 1/180 of the span length. The calculated panel deflection under applied live load, snow, or wind load shall not exceed 1/180 times the span length. Deflections shall be based on panels being continuous across three or more supports. Deflection shall be calculated and measured along the major ribs of the panels.

1.3.9 Accessories and Their Fasteners

Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the roof panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces. There shall be a minimum of two fasteners per clip. Single fasteners with a minimum diameter of 3/8 inch will be allowed when the supporting structural members are prepunched or predrilled.

1.4 PERFORMANCE REQUIREMENTS

The SSSMR shall be tested for wind uplift resistance in accordance with ASTM E 1592; SSSMR systems previously tested and approved by the Corps of Engineers' STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE may be acceptable. Two tests shall be performed. Test 1 shall simulate the edge condition with one end having crosswise restraint and other end free of crosswise restraint. The maximum span length for the edge condition shall be 30 inches. Test 2 shall simulate the interior condition with both ends free of crosswise restraint. The maximum span length for the interior condition shall be 5.0 feet. External reinforcement, such as clamps on the ribs, shall not be installed to improve uplift resistance. Bolts through seams shall not be installed.

1.5 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Design Analysis; GA.

Design analysis signed by a Registered Professional Engineer employed by the SSSMR manufacturer. The design analysis shall include a list of the design loads, and complete calculations for the support system (when provided by the Contractor), roofing system and its components; valley designs, gutter/downspout calculations, screw pullout test results, and shall indicate how expected thermal movements are accommodated.

SD-04 Drawings

Structural Standing Seam Metal Roof System; GA.

Metal roofing drawings and specifications and erection drawings; shop coating and finishing specifications; and other data as necessary to clearly describe design, materials, sizes, layouts, standing seam configuration, construction details, provisions for thermal movement, line of panel fixity, fastener sizes and spacings, sealants and erection procedures. Drawings shall reflect the intent of the architectural detailing using the manufacturer's proprietary products and fabricated items as required. The SSSMR system shop drawings shall be provided by the metal roofing manufacturer.

SD-08 Statements

Qualifications; GA.

Qualifications of the manufacturer and installer.

SD-09 Reports

Test Report for Uplift Resistance of the SSSMR; GA.

The report shall include the following information:

a. Details of the SSSMR system showing the roof panel cross-section with dimensions and thickness.

b. Details of the anchor clip, dimensions, and thickness.

c. Type of fasteners, size, and the number required for each connection.

d. Purlins/subpurlins size and spacing used in the test.

e. Description of the seaming operation including equipment used.

f. Maximum allowable uplift pressures. These pressures are

determined from the ultimate load divided by a factor of safety equal to 1.65.

g. Any additional information required to identify the SSSMR system tested.

h. Signature and seal of an independent registered engineer who witnessed the test.

SD-13 Certificates

Structural Standing Seam Metal Roof System; GA.

a. Certification that the actual thickness of uncoated sheets used in SSSMRS components including roofing panels, subpurlins, and concealed anchor clips complies with specified requirements.

b. Certification that materials used in the installation are mill certified.

c. Previous certification of SSSMR system tested under the Corps of Engineers' Standard Test Method in lieu of ASTM E 1592 testing.

d. Certification that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than three pieces has been tested and has met the quality standards specified for factory color finish.

e. Certification of installer. Installer certification shall be furnished.

f. Warranty certificate. At the completion of the project the Contractor shall furnish signed copies of the 5-year Warranty for Structural Standing Seam Metal Roof (SSSMR) System, a sample copy of which is attached to this section, the 20-year Manufacturer's Material Warranties, and the manufacturer's 20-year system weathertightness warranty.

Insulation; GA

Certificate attesting that the fiberglass,polyurethane, or polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

SD-14 Samples

Accessories; GA.

One sample of each type of flashing, trim, closure, thermal spacer block, cap and similar items. Size shall be sufficient to show construction and configuration.

Roof Panels; GA.

One piece of each type to be used, 9 inches long, full width.

Factory Color Finish; GA.

Three 3 by 5 inches samples of each type and color.

Fasteners; GA.

Two samples of each type to be used, with statement regarding intended use. If so requested, random samples of bolts, nuts, and washers as delivered to the job site shall be taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

Insulation; GA.

One piece, 12 by 12 inches, of each type and thickness to be used, with a label indicating the rated permeance (if faced) and R-values. The flame spread, and smoke developed rating shall be shown on the label or provided in a letter of certification.

Gaskets and Insulating Compounds; GA.

Two samples of each type to be used and descriptive data.

Sealant; GA.

One sample, approximately 1 pound, and descriptive data.

Concealed Anchor Clips; GA.

Two samples of each type used.

Subpurlins; GA.

One piece, 9 inches long.

EPDM Rubber Boots; GA.

One piece of each type.

1.6 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials shall be covered with weathertight coverings and kept dry. Storage conditions shall provide good air circulation and protection from surface staining.

1.7 WARRANTIES

The SSSMR system shall be warranted as outlined below. Any emergency temporary repairs conducted by the owner shall not negate the warranties.

1.7.1 Contractor's Weathertightness Warranty

The SSSMR system shall be warranted by the Contractor on a no penal sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The SSSMR system covered under this warranty shall include the entire roofing system including, but not limited to, the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with ASTM E 1592. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and

trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, and skylights; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weathertight roof system; and items specified in other sections of these specifications that are part of the SSSMR system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified design loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. See the attached Contractor's required warranty for issue resolution of warrantable defects. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and system manufacturer, which shall be submitted along with Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in attached WARRANTY FOR STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM, and shall start upon final acceptance of the facility. It is required that the Contractor provide a separate bond in an amount equal to the installed total roofing system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the five year Contractor's warranty period for the entire SSSMR system as outlined above.

1.7.2 Manufacturer's Material Warranties.

The Contractor shall furnish, in writing, the following manufacturer's material warranties which cover all SSSMR system components such as roof panels, anchor clips and fasteners, flashing, accessories, and trim, fabricated from coil material:

a. A manufacturer's 20 year material warranty warranting that the zinc-coated steel, as specified herein will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.

b. A manufacturer's 20 year exterior material finish warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight, as determined by ASTM D 4214 test procedures; or change color in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to refinishing with an air-drying version of the specified finish or replacing the defective coated material.

c. A roofing system manufacturer's 20 year system weathertightness warranty.

1.8 COORDINATION MEETING

A coordination meeting shall be held 30 days prior to the first submittal, for mutual understanding of the Structural Standing Seam Metal Roof (SSSMR) System contract requirements. This meeting shall take place at the building site and shall include representatives from the Contractor, the roof system manufacturer, the roofing supplier, the erector, the SSSMR design engineer of record, and the Contracting Officer. All items required by paragraph SUBMITTALS shall be discussed, including applicable standard

manufacturer shop drawings, and the approval process. The Contractor shall coordinate time and arrangements for the meeting.

PART 2 PRODUCTS

2.1 ROOF PANELS

Panels shall be steel and shall have a factory color finish. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope for slope lengths. Width of sheets shall provide not more than 24 inches of coverage in place. SSSMR system with roofing panels greater than 12 inches in width shall have standing seams rolled during installation by an electrically driven seaming machine. Height of standing seams shall be not less than 2 inches for rolled seam and 2 inches for seams that are not rolled.

2.1.1 Steel Panels

Steel panels shall be zinc-coated steel conforming to ASTM A 653/A 653M; Uncoated panels shall be 0.0239 inch thick minimum. Panels shall be within 95 percent of nominal thickness.

2.2 CONCEALED ANCHOR CLIPS

Concealed anchor clips shall be the same as the tested roofing system. Clip bases shall have factory punched or drilled holes for attachment. Clips shall be made from multiple pieces with the allowance for the total thermal movement required to take place within the clip. Single piece clips may be acceptable when the manufacturer can substantiate that the system can accommodate the thermal cyclic movement under sustained live or snow loads.

2.3 ACCESSORIES

Flashing, trim, metal closure strips, caps and similar metal accessories shall be the manufacturer's standard products. Exposed metal accessories shall be finished to match the panels furnished. The use of a continuous angle butted to the panel ends to form a closure will not be allowed.

2.4 FASTENERS

Fasteners for steel roof panels shall be zinc-coated steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Fasteners for accessories shall be the manufacturer's standard.

2.4.1 Screws

Screws for attaching anchor devices shall be not less than No. 14. Actual screw pull out test results shall be performed for the actual material gage and yield strength of the structural purlins or subpurlins to which the clip is to be anchored/attached. Other screws shall be as recommended by the manufacturer to meet the strength design requirements of the panels.

2.4.2 Bolts

Bolts shall be not less than 1/4 inch diameter, shouldered or plain shank as required, with locking washers and nuts.

2.4.3 Structural Blind Fasteners

Blind screw-type expandable fasteners shall be not less than 1/4 inch diameter. Blind (pop) rivets shall be not less than 9/32 inch minimum diameter.

2.5 SUBPURLINS

Cold formed supporting structural members/subpurlins shall have a minimum thickness of 0.059 inches and a minimum tensile yield strength of 50000 psi. Hot rolled structural members shall have a minimum thickness of 0.25 inches and a minimum tensile yield strength of 36000 psi. Subpurlins shall be shop painted.

2.6 FACTORY COLOR FINISH

Panels shall have a factory applied polyvinylidene fluoride or other finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Color shall nearly match the exterior steel top coat paint color indicated in Section 09900 PAINTING, GENERAL, subparagraph BUILDING STEEL EXTERIOR PANELS. The exterior coating shall be a nominal 2 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than 1.0 mil thickness. The interior color finish shall consist of a nominal 1 mil thick PVF2 or other finish otherwise the same as the exterior. The exterior color finish shall meet the test requirements specified below.

2.6.1 Salt Spray Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2016 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by ASTM D 610; and a rating of 6, over 2 1/16 to 1/8 inch failure at scribe, as determined by ASTM D 1654.

2.6.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of cracking to the naked eye.

2.6.3 Accelerated Weathering, Chalking Resistance and Color Change

A sample of the sheets shall be tested in accordance with ASTM D 4587, test condition B 1000 total hours. The coating shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.6.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.6.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.500 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no cracking.

2.6.6 Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.6.7 Specular Gloss

Finished roof surfaces shall have a specular gloss value of 10 or less at an angle of 85 degrees when measured in accordance with ASTM D 523.

2.6.8 Pollution Resistance

Coating shall show no visual effects when covered spot tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.7 INSULATION

Thermal resistance of insulation shall be not less than the R-values shown on the contract drawings. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518. Insulation shall be a standard product with the insulation manufacturer, factory marked or identified with insulation manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Blanket insulation shall have a facing as specified in paragraph VAPOR RETARDER. Insulation, including facings, shall have a flame spread not in excess of 10 and a smoke developed rating not in excess of 10 when tested in accordance with ASTM E 84. The stated R-value of the insulation shall be certified by an independent Registered Professional Engineer if tests are conducted in the insulation manufacturer's laboratory.

2.7.1 Blanket Insulation

Blanket insulation shall conform to ASTM C 991.

2.8 INSULATION RETAINERS

Insulation retainers shall be type, size, and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams, shall have a fire resistance classification not less than that permitted for the insulation.

2.9 SEALANT

Sealants shall be elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color and shall cure to a rubberlike consistency. Sealant placed in the roof panel standing seam ribs shall be provided in accordance with the manufacturer's recommendations.

2.10 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.11 VAPOR RETARDER

2.11.1 Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be white reinforced polypropylene kraft laminate (PSK). Facings and finishes shall be factory applied.

2.12 EPDM RUBBER BOOTS

Flashing devices around pipe penetrations shall be flexible, one-piece devices molded from weather-resistant EPDM rubber. Rubber boot material shall be as recommended by the manufacturer. The boots shall have base rings made of aluminum or corrosion resisting steel that conform to the contours of the roof panel to form a weather-tight seal.

2.13 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

Prefabricated curbs and equipment supports shall be of structural quality, hot-dipped galvanized or galvanized sheet steel, factory primed and prepared for painting with mitered and welded joints. Integral base plates and water diverter crickets shall be provided. Minimum height of curb shall be 8 inches above finish roof. Curbs shall be constructed to match roof slope and to provide a level top surface for mounting of equipment. Curb flange shall be constructed to match configuration of roof panels. Curb size shall be coordinated, prior to curb fabrication, with the mechanical equipment to be supported. Strength requirements for equipment supports shall be coordinated to include all anticipated loads. Flashings shall not be rigidly attached to underline structure.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's erection instructions and drawings. Dissimilar materials which are not compatible when contacting each other shall be insulated by means of gaskets or insulating compounds. Molded closure strips shall be installed wherever roofing sheets terminate in open-end configurations, exclusive of flashings. The closure strip installation shall be weather-tight and sealed. Screws shall be installed with a clutching screw gun, to assure screws are not stripped. Field test shall be conducted on each gun prior to starting installation and periodically thereafter to assure it is adjusted properly to install particular type and size of screw as

recommended by manufacturer's literature. Improper or mislocated drill holes shall be plugged with an oversize screw fastener and gasketed washer; however, sheets with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Stained, discolored, or damaged sheets shall be removed from the site.

3.1.1 Field Forming of Panels for Unique Area

When roofing panels are formed from factory-color-finished steel coils at the project site, the same care and quality control measures that are taken in shop forming of roofing panels shall be observed. Rollformer shall be operated by the metal roofing manufacturer's representative. In cold weather conditions, preheating of the steel coils to be field formed shall be performed as necessary just prior to the rolling operations.

3.1.2 Subpurlins

Unless otherwise shown, subpurlins shall be anchored to the purlins or other structural framing members with bolts or screws. Attachment to the substrate (when provided) or to the panels is not permitted. The subpurlin spacing shall not exceed 30 inches on centers at the corner, edge and ridge zones, and 5 foot maximum on centers for the remainder of the roof. Corner, edge, and ridge zones are as defined in ASCE 7.

3.1.3 Roof Panel Installation

Roof panels shall be installed with the standing seams in the direction of the roof slope. The side seam connections for installed panels shall be completed at the end of each day's work. Method of applying joint sealant shall conform to the manufacturer's recommendation to achieve a complete weather-tight installation. End laps of panels shall be provided in accordance with the manufacturer's instructions. Closures, flashings, EPDM rubber boots, roof curbs, and related accessories shall be installed according to the manufacturer's drawings. Fasteners shall not puncture roofing sheets except as provided for in the manufacturer's instructions for erection and installation. Expansion joints for the standing seam roof system shall be installed at locations indicated on the contract drawings and other locations indicated on the manufacturer's drawings.

3.1.4 Concealed Anchor Clips

Concealed anchor clips shall be fastened directly to the structural framing members. Attachment to the substrate (when provided) or to the metal deck is not permitted. The maximum distance, parallel to the seams, between clips shall be 30 inches on center at the corner, edge, and ridge zones, and 5 feet maximum on centers for the remainder of the roof.

3.2 INSULATION INSTALLATION

Insulation shall be continuous over entire roof surface. Where expansion joints, terminations, and other connections are made, the cavity shall be filled with batt insulation with vapor retarder providing equivalent R-value and perm rating as remaining insulation. Insulation shall be installed as indicated and in accordance with manufacturer's instructions.

3.2.1 Blanket Insulation

Blanket insulation shall be installed between and parallel to the purlins with tabs of a facer lapping on the top face of the purlins. Thermal blocks shall be provided over purlins, between clips. A second layer of unfaced insulation shall be added between purlins to provide full R-value. Blanket insulation shall be supported by an integral facing or other commercially available support system.

3.3 PROTECTION OF VAPOR RETARDER FROM ROOF DECK

A cloth industrial duct tape shall be applied over the seams of metal roof decks, at penetration edges, and at surface areas exhibiting sharp burrs or similar protrusions. For other types of roof decks, cloth industrial duct tape shall be applied over irregularities which could potentially puncture polyethylene membrane.

3.4 VAPOR RETARDER INSTALLATION

3.4.1 Integral Facing on Blanket Insulation

Integral facing on blanket insulation shall have the facing lapped and sealed with a compatible tape to provide a vapor tight membrane.

3.4.2 Polyethylene Vapor Retarder

The polyethylene vapor retarder membrane shall be installed over the entire surface. A fully compatible polyethylene tape shall be used to seal the edges of the sheets to provide a vapor tight membrane. Sheet edges shall be lapped not less than 6 inches. Sufficient material shall be provided to avoid inducing stresses in the sheets due to stretching or binding. All tears or punctures that are visible in the finished surface at any time during the construction process shall be sealed with polyethylene tape.

3.5 CLEANING AND TOUCH-UP

Exposed SSSMR systems shall be cleaned at completion of installation. Debris that could cause discoloration and harm to the panels, flashings, closures and other accessories shall be removed. Grease and oil films, excess sealants, and handling marks shall be removed and the work shall be scrubbed clean. Exposed metal surfaces shall be free of dents, creases, waves, scratch marks, and solder or weld marks. Immediately upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with the same material used for the shop coat. Factory color finished surfaces shall be touched up with the manufacturer's recommended touch up paint.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

FACILITY DESCRIPTION_____

BUILDING NUMBER:_____

CORPS OF ENGINEERS CONTRACT NUMBER:_____

CONTRACTOR

CONTRACTOR:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

OWNER

OWNER:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONSTRUCTION AGENT

CONSTRUCTION AGENT:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

THE SSSMR SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY _____ FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE. THE SSSMR SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING: THE ENTIRE ROOFING SYSTEM, MANUFACTURER SUPPLIED FRAMING AND STRUCTURAL MEMBERS, METAL ROOF PANELS, FASTENERS, CONNECTORS, ROOF SECUREMENT COMPONENTS, AND ASSEMBLIES TESTED AND APPROVED IN ACCORDANCE WITH ASTM E 1592. IN ADDITION, THE SYSTEM PANEL FINISHES, SLIP SHEET, INSULATION, VAPOR RETARDER, ALL ACCESSORIES, COMPONENTS, AND TRIM AND ALL CONNECTIONS ARE INCLUDED. THIS INCLUDES ROOF PENETRATION ITEMS SUCH AS VENTS, CURBS, SKYLIGHTS; INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS; EAVES, RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM FLASHINGS INSTALLED AND ANY OTHER COMPONENTS SPECIFIED WITHIN THIS CONTRACT TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATIONS THAT ARE PART OF THE SSSMR SYSTEM.

ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE ASSOCIATED WITH THE SSSMR SYSTEM COVERED UNDER THIS WARRANTY SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON _____ AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Company President) (Date)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

THE CONTRACTOR SHALL SUPPLEMENT THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE SSSMR SYSTEM, WHICH SHALL BE SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR WILL BE ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY EXAMPLE.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).

2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.

3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.

4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.

5. FAILURE OF ANY PART OF THE SSSMR SYSTEM DUE TO ACTIONS BY THE OWNER TO INHIBIT FREE DRAINAGE OF WATER FROM THE ROOF AND GUTTERS AND DOWNSPOUTS OR ALLOW PONDING WATER TO COLLECT ON THE ROOF SURFACE. CONTRACTOR'S DESIGN SHALL INSURE FREE DRAINAGE FROM THE ROOF AND NOT ALLOW PONDING WATER.

6. THIS WARRANTY APPLIES TO THE SSSMR SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.

7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR; AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES.

**

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

**REPORTS OF LEAKS AND SSSMR SYSTEM DEFICIENCIES SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE, BY TELEPHONE OR IN WRITING, FROM EITHER THE OWNER OR CONTRACTING OFFICER. EMERGENCY REPAIRS TO PREVENT FURTHER ROOF LEAKS SHALL BE INITIATED IMMEDIATELY; A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS SSSMR SYSTEM WITHIN SEVEN (7) CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE SSSMR SYSTEM REPAIRED OR REPLACED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR.

IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. THE REQUEST FOR AN ARBITRATOR MUST BE MADE WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED, THE PARTIES SHALL, WITHIN TEN (10) DAYS, JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES SHALL CONFER WITHIN TEN (10) DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE (1) NAME REMAINS. THE REMAINING PERSON SHALL BE THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED, ETC., SHALL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT SHALL PAY FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. A WRITTEN ARBITRATOR'S DECISION WILL BE REQUESTED NOT LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT.

A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

-- End of Section --

SECTION 07900

JOINT SEALING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 920	(1998e1) Elastomeric Joint Sealants
ASTM D 1056	(1991) Flexible Cellular Materials - Sponge or Expanded Rubber

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Backing; GA. Bond-Breaker; GA.

Sealant; GA.

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material.

SD-13 Certificates

Sealant; GA.

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL REQUIREMENTS

The ambient temperature shall be within the limits of 40 to 90 degrees F when the sealants are applied.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall include the following information as applicable: manufacturer, name of

material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be stored at temperatures between 40 and 90 degrees F unless otherwise specified by the manufacturer.

PART 2 PRODUCTS

2.1 BACKING

Backing shall be 25 to 33 percent oversize for closed cell and 40 to 50 percent oversize for open cell material, unless otherwise indicated.

2.1.1 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2 .

2.2 BOND-BREAKER

Bond-breaker shall be as recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.3 PRIMER

Primer shall be non-staining type as recommended by sealant manufacturer for the application.

2.4 SEALANT

2.4.1 ELASTOMERIC

Elastomeric sealants shall conform to ASTM C 920 and the following:

b. Polyurethane sealant: Grade NS, Class 25, Use NT.

c. Silicone sealant: Type S, Grade NS, Class 25, Use NT.

2.5 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all frost, condensation and moisture. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

3.1.3 Steel Surfaces

Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish work, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

3.1.4 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

3.2 APPLICATION

3.2.1 Backing

Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

3.2.2 Bond-Breaker

Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

3.2.3 Primer

Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

3.2.4 Sealant

Sealant shall be used before expiration of shelf life. Multi-component sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Joints shall be sealed as detailed in the drawings. Sealant shall be forced into joints with sufficient pressure to expel air and fill the groove solidly. Sealant shall be installed to the indicated depth without displacing the backing. Unless otherwise indicated, specified, or recommended by the manufacturer, the installed sealant shall be dry tooled to produce a uniformly smooth surface free of wrinkles and to ensure full adhesion to the sides of the joint; the use of solvents, soapy water, etc., will not be allowed. Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

3.3 CLEANING

The surfaces adjoining the sealed joints shall be cleaned of smears and other soiling resulting from the sealant application as work progresses.

-- End of Section --

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.8	(1998) Steel Doors and Frames

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 236	(1989; R 1993) Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
ASTM C 976	(1990; R 1996) Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box
ASTM D 2863	(1997) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

DOOR AND HARDWARE INSTITUTE (DHI)

DHI A115.1G	(1994) Installation Guide for Doors and Hardware

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM HMMA 862	(1987) Hollow Metal Manual; Section: Guide Specifications for Commercial Security Hollow Metal Doors and Frames

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 80A	(1996) Protection of Buildings from Exterior Fire Exposures
NFPA 101	(2000) Life Safety Code
NFPA 252	(1995) Fire Tests of Door Assemblies

STEEL DOOR INSTITUTE (SDOI)

SDOI SDI-106	(1996) Standard Door Type Nomenclature
SDOI SDI-107	(1997) Hardware on Steel Doors (Reinforcement - Application)

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Steel Doors and Frames; GA.

Drawings using standard door type nomenclature in accordance with SDOI SDI-106 indicating the location of each door and frame, elevation of each model of door and frame, details of construction, method of assembling sections, location and extent of hardware reinforcement, hardware locations, type and location of anchors for frames, and thicknesses of metal. Drawings shall include catalog cuts or descriptive data for the doors, frames, and weatherstripping including air infiltration data and manufacturers printed instructions.

SD-09 Reports

Fire Rated Doors; GA.

A letter by a nationally recognized testing laboratory which identifies the product manufacturer, type, and model; certifying that the laboratory has tested a sample assembly in accordance with NFPA 252 and issued a current listing for same.

SD-13 Certificates

Fire Rated Doors; GA. Thermal Insulated Doors; GA. Security Doors; GA.

a. Certification of Oversized Fire Doors: Certificates of compliance in accordance with the requirements of NFPA 252 for fire doors exceeding the sizes for which label service is available.

SD-14 Samples

Steel Doors and Frames; GA.

Manufacturer's standard color samples of factory applied finishes.

1.3 DELIVERY AND STORAGE

During shipment, welded unit type frames shall be strapped together in pairs with heads at opposite ends or shall be provided with temporary steel spreaders at the bottom of each frame; and knockdown type frames shall be securely strapped in bundles. Materials shall be delivered to the site in undamaged condition, and stored out of contact with the ground and under a weathertight covering permitting air circulation. Doors and assembled frames shall be stored in an upright position in accordance with DHI A115.1G.

Abraded, scarred, or rusty areas shall be cleaned and touched up with matching finishes.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 DOORS AND FRAMES

Doors and frames shall be factory fabricated in accordance with ANSI A250.8 and the additional requirements specified herein. Door grade shall be heavy duty (Grade II) unless otherwise indicated on the door and door frame schedules. Exterior doors and frames shall be designation G60 galvanized. Interior doors and frames shall be designation G60 galvanized. Doors and frames shall be prepared to receive hardware conforming to the templates and information provided under Section 08700 BUILDERS' HARDWARE. Doors and frames shall be reinforced, drilled, and tapped to receive mortised hinges, locks, latches, and flush bolts as required. Doors and frames shall be reinforced for surface applied hardware. Frames shall be welded type. Door frames shall be furnished with a minimum of three jamb anchors and one floor anchor per jamb. Anchors shall be not less than 18 gauge steel. For wall conditions that do not allow the use of a floor anchor, an additional jamb anchor shall be provided. Rubber silencers shall be furnished for installation into factory predrilled holes in door frames; adhesively applied silencers are not acceptable. Reinforcing of door assemblies for closers and other required hardware shall be in accordance with ANSI A250.8and the conditions of the fire door assembly listing when applicable. Exterior doors shall have top edges closed flush and sealed against water penetration.

2.2 FIRE RATED DOORS

Fire rated door assemblies shall bear the listing identification label of a nationally recognized testing laboratory qualified to perform tests of fire door assemblies in accordance with NFPA 252 and having a listing for the tested assemblies. The fire resistance rating shall be 1-1/2 hr. Doors exceeding the sizes for which listing label service is offered shall be in accordance with NFPA 252. Listing identification labels shall be constructed and permanently applied by a method which results in their destruction should they be removed.

2.3 THERMAL INSULATED DOORS

The interior of thermal insulated doors shall be completely filled with rigid plastic foam permanently bonded to each face panel. The thermal conductance (U-value) through the door shall not exceed 0.41 btu/hr times sq f times f when tested as an operational assembly in accordance with ASTM C 236 or ASTM C 976. Doors with cellular plastic cores shall have a minimum oxygen index rating of 22 percent when tested in accordance with ASTM D 2863.

2.4 SECURITY DOORS

Security type doors and frames shall be factory fabricated in accordance with NAAMM HMMA 862 and the additional requirements specified herein. Doors and frames shall be galvanized 14 gauge construction. Doors shall

have 14 gauge steel plate on both sides, and be internally reinforced vertically with continuous 20 gauge steel stiffeners spaced 6 inches on center maximum. Doors shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Door thickness shall be 1-3/4 inches. Exterior doors shall be insulated to provide a thermal conductance (U-value) not to exceed 0.41 btu/hr times sq f times f when tested as an operational assembly in accordance with ASTM C 236 or ASTM C 976. Doors with cellular plastic cores shall have a minimum oxygen index rating of 22 percent when tested in accordance with ASTM D 2863. Door frames shall be all welded type, with double rabbet jamb profile. Frame corners shall be machine-mitered, full welded. All exposed welds shall be ground and finished smooth.

2.5 FACTORY FINISH

Doors and frames shall be phosphatized primed, and finished with an electrostatic baked on enamel or polyester base factory finish paint. Color shall be in accordance with SECTION 09900 PAINTING, GENERAL.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with DHI A115.1G. Preparation for surface applied hardware shall be in accordance with SDOI SDI-107. Rubber silencers shall be installed in door frames after finish painting has been completed; adhesively applied silencers are not acceptable. Weatherstripping shall be installed at exterior door openings to provide a weathertight installation. Installation and operational characteristics of fire doors shall be in accordance with NFPA 80, NFPA 80A and NFPA 101. Hollow metal door frames shall be solid grouted in steel stud walls.

3.1.1 Thermal Insulated Doors

Hardware and perimeter seals shall be adjusted for proper operation. Doors shall be sealed weathertight after installation of hardware and shall be in accordance with Section 07900 JOINT SEALING.

3.1.2 Security Doors

Door frames shall be rigidly anchored in place and provided with antispread space filler reinforcements to prevent disengagement of the lock bolt by prying or jacking of the frame. Jambs shall be filled solid with concrete grout.

-- End of Section --

SECTION 08510

STEEL WINDOWS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(1997ael) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 569/A 569M	(1998) Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality
ASTM A 653/A 653M	(1999) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 633	(1985; R 1998) Electrodeposited Coatings of Zinc on Iron and Steel
ASTM B 766	(1998) Electrodeposited Coatings of Cadmium
ASTM D 3656	(1997) Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
ASTM E 283	(1991; R 1999) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 330	(1997el) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
ASTM E 331	(1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1998) Minimum Design Loads for Buildings and Other Structures

ASME INTERNATIONAL (ASME)

ASME B18.6.3	(1972; R 1997) Machine Screws and Machine Screw Nuts
ASME B18.6.4	(1981; R 1997) Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series)

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(1997) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(1997) Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 101	(2000) Life Safety Code

STEEL WINDOW INSTITUTE (SWI)

SWI Specifier's Guide	(1995) The Specifier's Guide to Steel Windows

1.2 WINDOW PERFORMANCE

Steel windows shall be designed to meet the following performance requirements, and shall be of the type and size indicated.

1.2.1 Structural Performance

Windows shall be designed to withstand windloads determined by procedures in ASCE 7 and a wind speed of 100 mph. Structural test pressures on window units shall be for positive load (inward) and negative load (outward) equal to 1-1/2 times the minimum design windload when tested in accordance with ASTM E 330. After testing, there shall be no glass breakage, permanent damage to main frame, sash or ventilator member, fasteners, hardware parts, support arms or actuating mechanisms or any other damage which could cause window to be inoperable. There shall be no permanent deformation in excess of the requirements established by SWI Specifier's Guide for the window types specified in this section.

1.2.2 Air Infiltration

Air infiltration shall not exceed the amount established by SWI Specifier's Guide for weatherstripped window types when tested in accordance with ASTM E 283.

1.2.3 Water Penetration

Water penetration shall not exceed the amount established by SWI Specifier's Guide for weatherstripped window types when tested in accordance with ASTM E 331.

1.2.4 Thermal Performance

Thermal transmittance for steel windows with insulating glass shall not exceed a U-factor of 0.35 Btu/hr-ft^2-F determined according to NFRC 100. Window units shall comply with the U.S. Department of Energy, Energy Star Window Program for the Northern Climate Zone.

1.2.5 Condensation Index Rating

The condensation index rating shall be 85 as determined using National Fenestration Rating Council approved software THERM.

1.2.6 Life Safety Criteria

Windows shall conform to NFPA 101 when rescue and/or second means of escape are indicated.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Steel Windows; GA.

Manufacturer's descriptive data and catalog cut sheets.

SD-04 Drawings

Steel Windows; GA.

Insect Screens; GA.

Drawings indicating elevations of windows, rough-opening dimensions for each type and size of windows, full-size sections, thicknesses of metal, fastenings, methods of installation and anchorage, connections with other work, type of wall construction, size and spacing of anchors, method of glazing, types and locations of operating hardware, mullion details, weatherstripping details, screen details including method of attachment, and window schedules showing locations of each window type .

SD-06 Instructions

Steel Windows; GA.

Manufacturer's preprinted installation instructions and cleaning instructions.

SD-13 Certificates

Steel Windows; GA.

Certificates stating that the steel windows conform to requirements of this section. Product ratings determined using NFRC 100 and NFRC 200 shall be authorized for certification and properly labeled by the manufacturer.

SD-14 Samples

Steel Windows; GA.

Manufacturer's standard color samples of painted finishes.

SD-19 Operation and Maintenance Manuals

Steel Windows; GA.

Manufacturer's preprinted instructions for operating and maintaining hardware for each type of window specified, including finish.

1.4 QUALIFICATION

Window manufacturer shall specialize in designing and manufacturing the type of steel windows specified, and shall have a minimum of 5 years of documented successful experience. Manufacturer shall have the facilities capable of meeting contract requirements, single-source responsibility and warranty.

1.5 DELIVERY AND STORAGE

Steel windows shall be delivered to project site and stored in accordance with manufacturer's recommendations. Damaged windows shall be replaced with new windows.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Steel Bars

Steel bars shall be solid one-piece sections hot-rolled from new billet steel in accordance with SWI Specifier's Guide.

2.1.2 Sheet Steel

Hot-rolled sheet steel shall conform to ASTM A 569/A 569M, commercial quality with a minimum of 0.15 percent carbon. Cold-rolled sheet steel shall conform to ASTM A 653/A 653M. Sheet steel shall be zinc coated (galvanized) by the hot-dip process in accordance with ASTM A 653/A 653M or ASTM A 924/A 924M.

2.1.3 Screws and Bolts

Screws and bolts shall conform to ASTM B 766, ASME B18.6.3 and ASME B18.6.4.

2.2 STEEL WINDOW TYPES

Steel windows shall be designed for shop glazing, and for double pane insulated glass types scheduled on drawings and specified in Section 08810 GLASS AND GLAZING. Units shall be complete with glass and glazing

provisions to meet requirements of paragraph WINDOW PERFORMANCE and SWI Specifier's Guide. Glazing material shall be compatible with steel, and shall not require painting.

2.2.1 Casement Windows

The steel windows shall be casement-type with an outward pivot about the right and left edges of the window. Horizontal and vertical muntin bars shall be sized to have nearly equal size of "clear glass panes" for all metal windows. The muntins shall be plastic and shall be placed between the layers of glass. Each casement leaf shall have one plate of interior and exterior glass.

2.3 WEATHERSTRIPPING

Weatherstripping for steel window ventilating sections shall be manufacturer's standard designed to meet water penetration and air infiltration requirements specified under paragraph WINDOW PERFORMANCE in accordance with SWI Specifier's Guide,
and shall be manufactured of material compatible with steel and shall be resistant to weather. Weatherstrips shall be factory-applied and shall be easily replaced in the field. Neoprene or polyvinylchloride weatherstripping are not acceptable where exposed to direct sunlight.

2.4 INSECT SCREENS

Insect screens shall be provided for all steel windows and shall be steel window manufacturer's standard design. Insect screens shall be fabricated roll-formed corrosion resistant steel frames. Plastic-coated (18 x 16) glass fiber mesh screening shall conform to ASTM D 3656..

2.5 ACCESSORIES

2.5.1 Fasteners

Fastening devices shall be window manufacturer's standard design made from non-magnetic stainless steel, cadmium-plated steel, zinc-plated steel, nickel/chrome-plated steel or magnetic stainless steel in compliance with SWI Specifier's Guide. Self-tapping sheet metal screws are not acceptable for material thicker than 1/16 inch.

2.5.2 Window Anchors

Anchors for installing windows shall be as a minimum, finished steel or hot-dip to match the prime window.

2.6 FINISHES

2.6.1 Prime Coat

Steel windows, fins, mullions, cover plates and associated parts shall be cleaned, treated and factory primed with manufacturer's standard primer coat in a dry film thickness of not less than 1.0 mil. Primer coat shall be free of scratches and other blemishes. Paint finish shall be in accordance with paragraph FIELD PAINTED FINISH.

2.6.2 Baked Enamel

Finish Steel windows shall be coated with a baked-on silicon polyester

enamel in a dry film thickness of not less than 1.0 mil. Finish shall be free of scratches and other blemishes. Color shall be in accordance with COLOR SCHEDULE.

2.6.3 Galvanized Finish

Steel windows, fins, mullions, cover plates and associated parts shall be electrodeposited with zinc in accordance with ASTM B 633 or hot-dip galvanized in accordance with ASTM A 123/A 123M. Ventilators containing dovetail weatherstrip grooves shall be finished with an electrodeposited coating of zinc in accordance with ASTM B 633.

PART 3 EXECUTION

3.1 INSTALLATION

Steel windows shall be installed in accordance with approved shop drawings and manufacturer's approved recommendations. Steel surfaces in close proximity with dissimilar metals other than stainless steel, zinc, or cadmium, shall be protected from direct contact. The completed window installation shall be watertight and shall be in accordance with Section 07900 JOINT SEALING. Glazing shall be installed in accordance with requirements of this section and Section 08810 GLASS AND GLAZING. Fire-rated windows shall be glazed in accordance with NFPA 80.

3.2 ADJUSTMENTS AND CLEANING

3.2.1 Hardware Adjustments

Final operating adjustments shall be made after glazing work is complete. When adjustments are completed, operating sash or ventilators shall operate smoothly, and shall be weathertight when locked in closed position.

3.2.2 Cleaning

Steel window finish and glass shall be cleaned on interior and exterior sides in accordance with window manufacturer's recommendations. Alkaline or abrasive agents shall not be used.

3.3 FIELD PAINTED FINISH

Steel windows shall NOT be field painted in accordance with Section 09900 PAINTING, GENERAL. Weatherstrips shall be protected from paint.XX Finish shall be free of scratches and other blemishes. Color shall be in accordance with the SECTION 09900 PAINTING, GENERAL.

-- End of Section --

SECTION 08550

WOOD WINDOWS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4216	(1998) Rigid Poly(Vinyl Chloride) (PVC) and Related Plastic Building Products Compounds

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(1997) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(1997) Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence

NATIONAL WOOD WINDOW & DOOR ASSOCIATION (NWWDA)

NWWDA I.S. 2	(1997) Wood Windows

1.2 DESCRIPTION

Windows shall be of the type and size indicated. The glass and ventilating areas of the windows furnished shall be not less than such areas of the windows indicated. The next larger standard-stock size shall be furnished where windows larger than the openings indicated are required to meet this requirement. The Contractor shall provide proper size openings where windows vary in size from those indicated.

1.2.1 Thermal Performance

Thermal transmittance for PVC windows with insulating glass shall not exceed a U-factor of 0.40 Btu/hr-ft^2-F determined according to NFRC 100, and a solar heat gain coefficient (SHGC) of 0.55 Btu/hr-ft^2-F determined according to NFRC 200. Window units shall comply with the U.S. Department of Energy, Energy Star Window Program for the Central Climate Zone

1.2.2 Condensation Index Rating

The condensation index rating shall be 85 as determined using National Fenestration Rating Council approved software THERM.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Wood Windows; GA. Insect Screens; GA.

Manufacturer's descriptive data and catalog cuts.

SD-04 Drawings

Wood Windows; GA. Insect Screens; GA.

Drawings indicating elevations of units, half-size sections, fastenings, methods of installation and anchorage, methods of glazing, locations of operating hardware, mullion details, method and material for weatherstripping, screen details, and connections with other work and schedules showing location of each window unit.

SD-06 Instructions

Installation; GA. Cleaning; FIO.

Manufacturer's installation instructions and cleaning instructions.

SD-13 Certificates

Wood Windows; GA.

Certificates stating that the windows conform to the specified requirements. Manufacturer's labels affixed to windows indicating performance in compliance to NWWDA I.S. 2, will be acceptable in lieu of certificates. Product ratings determined using NFRC 100 and NFRC 200 shall be authorized for certification and properly labeled by the manufacturer.

SD-14 Samples

Finish; GA.

Manufacturer's standard color charts.

1.4 STORAGE

Windows shall be under weathertight covering, stored out of contact with the ground and placed in a manner to prevent warpage in accordance with manufacturer's recommendations.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 WOOD WINDOWS

Wood windows shall be Rating ODP 60 in accordance with NWWDA I.S. 2.

2.1.1 Clad Wood Windows

Clad wood windows shall consist of complete units including sash, glass, frames, weatherstripping, insectscreens, and hardware. Wood window sash and frame members shall be clad with vinyl. Windows shall conform to the requirements of NWWDA I.S. 2. Window units shall be designed for glazing and cleaning from inside the building.

2.1.1.1 Vinyl Cladding

Vinyl (PVC) cladding shall conform to the requirements of ASTM D 4216, Class 144434331111. Material thickness shall be minimum 0.020 inch, increased to minimum 0.035 inch at integral flanges used for installation and flashing. Preformed cladding shall conform to the shape of the wood frame. Vinyl cladding corners shall be either sealed lap joint, heat welded, or vacuum formed.

2.1.2 Window Types

2.1.2.1 Double Hung Windows

Wood double hung windows shall consist of basic frame with related parts and shall have sash which operates vertically with the weight of sash offset by a counterbalancing mechanism mounted in window to hold the sash stationary at any open position. Windows shall be complete with locking devices to secure the sash in the closed position and shall have sash lifts as required. Each window sash shall be capable of being removed to clean the entire window.

2.2 GLASS AND GLAZING

Glass and glazing materials shall conform to Section 08810 GLASS AND GLAZING. Windows shall be gray tinted, double-glazed, low-E.

2.3 WEATHERSTRIPPING

Operating sash shall be weatherstripped around the full perimeter with material that has performance and durability qualities adequate for normal and continuous operation.

2.4 HARDWARE

Window hardware shall be provided for the window types as indicated and shall meet the requirements of NWWDA I.S. 2. Hardware materials shall be compatible with the surrounding surfaces. Hardware which is exposed with sash in the open position shall have stainless steel or equivalent material for operators, hinges, and fasteners.

2.5 FINISH

Vinyl clad wood windows shall be furnished with manufacturer's standard white color.

2.6 INSECT SCREENS

Insect screen panels shall be provided for all wood windows and shall be in accordance with manufacturer's standard practice.

2.7 CAULKING AND SEALANTS

Caulking and Sealants shall be in accordance with the manufacturer's recommendation. The color shall be white.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's approved installation instructions. Windows shall be securely anchored in place to a straight, plumb, and level condition without distortion.

3.2 ADJUSTMENTS

Adjustments for proper operation of ventilating unit shall be made after installation. Adjustments shall be made to sash to assure smooth operation and units shall be weathertight when locked closed.

3.3 CLEANING

Windows shall be cleaned on both exterior and interior in accordance with manufacturer's recommendations.

-- End of Section --

SECTION 08700

BUILDERS' HARDWARE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283	(1991; R 1999) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA L & R Directory	(Effective thru Jun 1999) Directory of Certified Locks & Latches
BHMA Closer Directory	(Effective thru Jul (1999) Directory of Certified Door Closers
BHMA Exit Devices Directory	(Effective thru Aug 1998) Directory of Certified Exit Devices
BHMA A156.1	(1997) Butts and Hinges
BHMA A156.2	(1996) Bored and Preassembled Locks and Latches
BHMA A156.3	(1994) Exit Devices
BHMA A156.4	(1992) Door Controls - Closers
BHMA A156.5	(1992) Auxiliary Locks & Associated Products
BHMA A156.6	(1994) Architectural Door Trim
BHMA A156.7	(1997) Template Hinge Dimensions
BHMA A156.8	(1994) Door Controls - Overhead Stops and Holders
BHMA A156.13	(1994) Mortise Locks & Latches
BHMA A156.16	(1989) Auxiliary Hardware

BHMA A156.18	(1993) Materials and Finishes
BHMA A156.21	(1996) Thresholds

DOOR AND HARDWARE INSTITUTE (DHI)

DHI Keying Systems	(1989) Keying Systems and Nomenclature
DHI Locations for CSD	(1997) Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames
DHI Locations for SSD	(1990) Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames
DHI ANSI/DHI A115.1G	(1994) Installation Guide for Doors and Hardware
DHI ANSI/DHI A115-W	(1995) Wood Door Prep Standards

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Hardware and Accessories; GA.

Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Spare parts data for locksets, exit devices, closers, after approval of the detail drawings, and not later than 1 month prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

SD-04 Drawings

Hardware Devices; GA.

Detail drawings for hardware devices for keying systems, and other details required to demonstrate proper function of units.

SD-07 Schedules

Hardware Schedule; GA.

Hardware schedule listing all items to be furnished. The schedule shall

include for each item: the quantities; manufacturer's name and catalog numbers; the ANSI number specified, sizes; detail information or catalog cuts; finishes; door and frame size and materials; location and hardware set identification cross-references to drawings; corresponding reference standard type number or function number from manufacturer's catalog if not covered by ANSI or BHMA; and list of abbreviations and template numbers.

Keying Schedule; GA.

Keying schedule developed in accordance with DHI Keying Systems, after the keying meeting with the user.

SD-13 Certificates

Hardware and Accessories; GA.

The hardware manufacturer's certificates of compliance stating that the supplied material or hardware item meets specified requirements. Each certificate shall be signed by an official authorized to certify in behalf of the product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply. A statement that the proposed hardware items appear in BHMA L & R Directory, BHMA Closer Directory and BHMA Exit Devices Directory directories of certified products may be submitted in lieu of certificates.

1.3 PREDELIVERY CONFERENCE

Upon approval of the Hardware Schedule, the construction Contractor shall arrange a conference with the hardware supplier, Contracting Officer and the using agency to determine keying system requirements. Location of the key control storage system, set-up and key identification labeling will also be determined.

1.4 DELIVERY, STORAGE, AND HANDLING

Hardware shall be delivered to the project site in the manufacturer's original packages. Each article of hardware shall be individually packaged in the manufacturer's standard commercial carton or container, and shall be properly marked or labeled to be readily identifiable with the approved hardware schedule. Each change key shall be tagged or otherwise identified with the door for which its cylinder is intended. Where double cylinder functions are used or where it is not obvious which is the key side of a door, appropriate instructions shall be included with the lock and on the hardware schedule. Manufacturer's printed installation instructions, fasteners, and special tools shall be included in each package.

1.5 SPECIAL TOOLS

Special tools, such as those supplied by the manufacturer, unique wrenches, and dogging keys, shall be provided as required to adjust hardware items.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

1.7 OPERATION AND MAINTENANCE MANUALS

Six complete copies of maintenance instructions listing routine maintenance

procedures, possible breakdowns and repairs, and troubleshooting guides shall be provided.

PART 2 PRODUCTS

2.1 GENERAL HARDWARE REQUIREMENTS

Hardware shall conform to the requirements specified herein and the HARDWARE SETS listing at the end of this section. Hardware set numbers correspond to the set numbers shown on the drawings.

2.2 TEMPLATES

Requirements for hardware to be mounted on metal doors or metal frames shall be coordinated between hardware manufacturer and door or frame manufacturer by use of templates and other information to establish location, reinforcement required, size of holes, and similar details. Templates of hinges shall conform to BHMA A156.7.

2.3 HINGES

Hinges shall conform to BHMA A156.1. Hinges used on metal doors and frames shall also conform to BHMA A156.7. Except as otherwise specified, hinge sizes shall conform to the hinge manufacturer's printed recommendations.

2.3.1 Contractor's Option

Hinges with antifriction bearings may be furnished in lieu of ball bearing hinges, except where prohibited for fire doors by the requirements of NFPA 80.

2.4 LOCKS AND LATCHES

To the maximum extent possible, locksets, latchsets and deadlocks, and all components thereof, including cylinders and removable cores, shall be the products of a single manufacturer. Lock fronts for double-acting doors shall be rounded. Strikes for wood frames and pairs of wood doors shall be furnished with wrought boxes.

2.4.1 Mortise Lock and Latchsets

Mortise lock, latchsets, and strikes shall be series 1000 and shall conform to BHMA A156.13, operational Grade 1. Strikes for security doors shall be rectangular without curved lip. Mortise type locks and latches for doors 1-3/4 inches thick and over shall have adjustable bevel fronts or otherwise conform to the shape of the door. Mortise locks shall have armored fronts.

2.4.2 Lock Cylinders (Mortise, Rim and Bored)

Lock cylinders shall comply with BHMA A156.5. Lock cylinder shall have not less than seven pins. Cylinders shall have key removable type cores. A master keying system shall be provided. Construction interchangeable cores shall be provided. Disassembly of knob or lockset shall not be required to remove core from lockset. All locksets, lockable exit devices, and padlocks shall accept same interchangeable cores.

2.4.3 Lock Trim

Lock trim shall be cast, forged, or heavy wrought construction of

commercial plain design. In addition to meeting the test requirement of BHMA A156.2 or BHMA A156.13, knobs, lever handles, roses, and escutcheons shall be 0.050 inch thick, if unreinforced. If reinforced, the outer shell shall be 0.035 inch thick and the combined thickness shall be 0.070 inch except that knob shanks shall be 0.060 inchthick. Knob diameter shall be 2-1/8 to 2-1/4 inches.Lever handles shall be of plain design with ends returned to no more than 1/2 inch from the door face.

2.5 EXIT DEVICES AND EXIT DEVICE ACCESSORIES

Exit devices and exit device accessories shall conform to BHMA A156.3, Grade 1.

2.5.1 Exit Devices and Auxiliary Items

Trim shall be of wrought construction and commercial plain design with straight, beveled, or smoothly rounded sides, corners, and edges. Adjustable strikes shall be provided for rim type and vertical rod devices. Open back strikes shall be provided for pairs of doors with mortise and vertical rod devices; except open back strikes shall be used on labeled doors only where specifically provided for in the published listings. Escutcheons shall be provided not less than 7 by 2-1/4 inches. Escutcheons shall be cut to suit cylinders and operating trim.

2.5.2 Removable Mullions

Removable mullions shall be Type 22 of the box type and shall be used only with those exit devices for which the mullions were manufactured. Mullions shall be furnished with mullion stabilizers of the same manufacturer.

2.6 KEYING

Locks shall be keyed in sets or subsets as scheduled. Locks shall be furnished with the manufacturer's standard construction key system. Change keys for locks shall be stamped with change number and the inscription "U.S. Property - Do Not Duplicate." Keys shall be supplied as follows:

Locks:	3 change keys each lock.
Master keyed sets:	3 keys each set.

The keys shall be furnished to the Contracting Officer arranged in a container in sets or subsets as scheduled.

2.7 DOOR CLOSING DEVICES

Door closing devices shall conform to BHMA A156.4, Grade 1. Closing devices shall be products of one manufacturer for each type specified. The opening resistance of closing devices shall not exceed 15 1bf applied at the latch stile or exceed 5 1bfwhere low opening resistance is scheduled.

2.7.1 Surface Type Closers

Surface type closers shall be Grade 1, Series with standard cover and with back check position valve. Except as otherwise specified, sizes shall conform to the manufacturer's published recommendations. Closers for outswinging exterior doors shall have parallel arms or shall be top jamb mounted. Closers for doors close to a wall shall be of narrow projection so as not to strike the wall at the 90-degree open position.

2.8 DOOR CONTROLS - OVERHEAD HOLDERS

Door controls - overhead holders shall conform to BHMA A156.8.

2.9 ARCHITECTURAL DOOR TRIM

Architectural door trim shall conform to BHMA A156.6.

2.9.1 Door Protection Plates

2.9.1.1 Kick Plates

Kick plates shall be stainless steel. Width of plates shall be 2 inches less than door width for single doors. Height shall be 12 inches Edges of metal plates shall be beveled.

2.10 MISCELLANEOUS

2.10.1 Metal Thresholds

Thresholds shall conform to BHMA A156.21. Thresholds for exterior doors shall be bronze of the type indicated and shall provide proper clearance and an effective seal with specified weather stripping. Thresholds for use with floor closers shall conform to BHMA A156.4. Air leakage rate of weatherstripping shall not exceed 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.10.2 Rain Drips

Overhead rain drips shall be approximately 1-1/2 inches high by 2-1/2 inches projection and shall extend 2 inches on either side of the door opening width.

2.10.3 Gasketing

Gasketing shall be a compression type seal, silicon based, self-adhesive product for use on steel door frames with steel doors for 20-minute label. Color shall be bronze. Air leakage rate of weatherstripping shall not exceed 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.10.4 Key Control Storage System

Key control storage system shall be properly labeled for key identification. Set up, identification labeling and location of the key control storage shall be as directed at the Predelivery Conference.

2.10.5 Door Stops

Wall stops, floor stops and combination stop and holders shall conform to BHMA A156.16.

2.11 FASTENINGS

Fastenings of proper type, size, quantity, and finish shall be supplied with each article of hardware. Fastenings exposed to the weather in the finished work shall be of brass, bronze, or stainless steel. Screws for the jamb leaf of half-mortise and full-surface hinges attached to

structural steel frames shall be one-way or other approved tamperproof type.

2.12 FINISHES

Unless otherwise specified, finishes shall conform to those identified in BHMA A156.18. Where painting of primed surfaces is required, painting is specified in Section 09900 PAINTING, GENERAL.

PART 3 EXECUTION

3.1 APPLICATION

Hardware shall be located in accordance with DHI Locations for CSD and DHI Locations for SSD, except that deadlocks shall be mounted 48 inches above finish floor. When approved, slight variations in locations or dimensions will be permitted. Application shall be in accordance with DHI ANSI/DHI A115.1G or DHI ANSI/DHI A115-W. Door control devices for exterior doors such as closers and holders, shall be attached to doors with thru bolts and nuts or sex bolts. Alternate fastening methods may be approved by the Contracting Officer when manufacturers' documentation is submitted to verify that the fastening devices and door reinforcements are adequate to resist wind induced stresses. Electric hardware items and access control devices shall be installed in accordance with manufacturer's printed installation procedures.

3.1.1 Door-Closing Devices

Door-closing devices shall be installed and adjusted in accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls and corridors shall have the closer mounted on the room side of the door.

3.1.2 Key Control Storage Systems

Key control storage system shall be furnished to the Contracting Officer.

3.1.3 Kick Plates

Kick plates shall be installed on the push side of single-acting doors.

3.1.4 Thresholds

Thresholds shall be secured with a minimum of three fasteners per single door width. Exterior thresholds shall be installed in a bed of sealant with expansion anchors and stainless steel screws. Minimum screw size shall be No. 10 length, dependent on job conditions, with a minimum of 3/4 inchthread engagement into the anchoring device used.

3.1.5 Rain Drips

Overhead rain drips shall align with bottom edge of door frame rabbet. Drips shall be set in sealant and fastened with stainless steel screws.

3.1.6 Weatherseals

Weatherseals shall be located as indicated, snug to door face and fastened in place with color matched metal screws after door and frames have been finish painted. Screw spacing shall be as recommended by manufacturer.

3.1.7 Gasketing

Gasketing shall be installed at the inside edge of the hinge and head and latch sides of door frame. Frames shall be toleranced for a 1/8 inch clearance between door and frame. Frames shall be treated with tape primer prior to installation.

3.2 FIELD QUALITY CONTROL

Supplier shall inspect the completed installation and certify that the hardware has been furnished and installed in accordance with the manufacturers' instructions and as specified. The inspection report shall identify any malfunctioning items and recommend adjustment or replacement as appropriate.

-- End of Section --

SECTION 08810

GLASS AND GLAZING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; R 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 669	(1995) Glazing Compounds for Back Bedding and Face Glazing of Metal Sash
ASTM C 864	(1999) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C 920	(1998e1) Elastomeric Joint Sealants
ASTM C 1036	(1991; R 1997) Flat Glass
ASTM D 395	(1998) Test Methods for Rubber Property - Compression Set
ASTM E 773	(1997) Accelerated Weathering of Sealed Insulating Glass Units
ASTM E 774	(1997) Classification of the Durability of Sealed Insulating Glass Units
ASTM E 1300	(1998) Determining the Minimum Thickness and Type of Glass Required to Resist a Specified Load

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(1997) Glazing Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Glass; GA. Glazing Accessories; GA.

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-04 Drawings

Glazing Materials and Accessories; GA.

Drawings showing complete details of the proposed setting methods, mullion details, edge blocking, size of openings, frame details, materials, and types and thickness of glass.

SD-13 Certificates

Glass; GA.

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

SD-14 Samples

Glass; GA.

Two 8 x 10 inch samples of each of the following: tinted glass, heat-absorbing glass, and insulating glass units.

1.3 SYSTEM DESCRIPTION

Glazing systems shall be fabricated and installed watertight and airtight to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, and defects in the work. Glazed panels shall comply with the safety standards, as indicated in accordance with ANSI Z97.1. Glazed panels shall comply with indicated wind/snow loading in accordance with ASTM E 1300.

1.4 DELIVERY, STORAGE AND HANDLING

Glazing compounds shall be delivered to the window and door manufacturers shop in the manufacturer's unopened containers. Glass shall be stored indoors in a safe, well ventilated dry location in accordance with manufacturer's instructions, and shall not be unpacked until needed for installation. Glass shall not be stored in the shop over 1 month.

1.5 PROJECT/SITE CONDITIONS

Glazing work shall not be started until outdoor temperature is above 40 degrees F and rising, unless procedures recommended by glass manufacturer and approved by Contracting Officer are made to warm the glass and rabbet

surfaces. Ventilation shall be provided to prevent condensation of moisture on glazing work during installation. Glazing work shall not be performed during damp or raining weather.

1.6 WARRANTY

1.6.1 Insulating Glass

Manufacturer shall warrant the insulating glass to be free of fogging or film formation on the internal glass surfaces caused by failure of the hermetic seal for a period of 10 years from Date of Substantial Completion. Warranty shall be signed by manufacturer.

PART 2 PRODUCTS

2.1 FLOAT GLASS

2.1.1 Annealed Glass

Annealed glass shall be Type I transparent flat type, Class 1 - tinted, Quality q3 - glazing select, 30 percent light transmittance, 40 percent shading coefficient, conforming to ASTM C 1036. Color shall be gray.

2.1.2 Tinted (Light-Reducing) Glass

Tinted (light-reducing) glass shall be Type I transparent flat type, Class 3-tinted, Quality q3 - glazing select, 30 percent light transmittance, 40 percent shading coefficient, conforming to ASTM C 1036. Color shall be gray.

2.2 INSULATING GLASS

Insulating glass shall be Class A preassembled units of dual-seal construction consisting of lites of glass separated by an aluminum, steel, or stainless steel, spacer and dehydrated space conforming to ASTM E 773 and ASTM E 774. Spacer shall be roll-formed, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone. Glass types shall be as follows:

2.2.1 Low-E Insulating Glass

Interior and exterior glass panes for Low-E insulating units shall be Type I annealed flat glass, Class 2-tinted with anti-reflective low-emissivity coating on No. 2 surface (inside surface of exterior pane), Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be R-Value/Winter Nighttime 0.8, shading coefficient 40. Color shall be gray.

2.3 GLAZING ACCESSORIES

2.3.1 Preformed Tape

Preformed tape shall be elastomeric rubber extruded into a ribbon of a width and thickness suitable for specific application. Tape shall be of type which will remain resilient, have excellent adhesion, and be chemically compatible to glass, metal, or wood.

2.3.2 Sealant

Sealant shall be elastomeric conforming to ASTM C 920, Type S or M, Grade NS, Class 12.5, Use G, of type chemically compatible with setting blocks, preformed sealing tape and sealants used in manufacturing insulating glass. Color of sealant shall be as selected.

2.3.3 Glazing Gaskets

Glazing gaskets shall be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening shall be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets shall be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Glazing gasket profiles shall be as indicated on drawings.

2.3.3.1 Fixed Glazing Gaskets

Fixed glazing gaskets shall be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM C 509, Type 2, Option 1.

2.3.3.2 Wedge Glazing Gaskets

Wedge glazing gaskets shall be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to ASTM C 864, Option 1, Shore A durometer between 65 and 75.

2.3.4 Glazing Compound

Glazing compound shall conform to ASTM C 669 for face-glazing metal sash. Glazing compounds shall not be used with insulating glass or laminated glass.

2.3.5 Setting and Edge Blocking

Neoprene setting blocks shall be dense extruded type conforming to ASTM D 395, Method B, Shore A durometer between 70 and 90. Edge blocking shall be Shore A durometer of 50 (+ or - 5). Silicone setting blocks shall be required when blocks are in contact with silicone sealant. Profiles, lengths and locations shall be as required and recommended in writing by glass manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

Openings and framing systems scheduled to receive glass shall be examined for compliance with approved shop drawings, GANA Glazing Manual and glass manufacturer's recommendations including size, squareness, offsets at corners, presence and function of weep system, face and edge clearance requirements and effective sealing between joints of glass-framing members. Detrimental materials shall be removed from glazing rabbet and glass surfaces and wiped dry with solvent. Glazing surfaces shall be dry and free of frost.

3.2 INSTALLATION

Glass and glazing work shall be performed in accordance with approved shop drawings, GANA Glazing Manual, glass manufacturer's instructions and warranty requirements. Glass shall be installed with factory labels intact and removed only when instructed. Wired glass and fire/safety rated glass shall be installed in accordance with NFPA 80. Edges and corners shall not be ground, nipped or cut after leaving factory. Springing, forcing or twisting of units during installation will not be permitted.

3.3 CLEANING

Upon completion of project, outside surfaces of glass shall be washed clean and the inside surfaces of glass shall be washed and polished in accordance with glass manufacturer's recommendations.

3.4 PROTECTION

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Reflective glass shall be protected with a protective material to eliminate any contamination of the reflective coating. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 09250

GYPSUM WALLBOARD

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A118.9	(1992) Test Methods and Specifications for Cementitious Backer Units

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 36	(1997) Gypsum Wallboard
ASTM C 475	(1994) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 514	(1996) Nails for the Application of Gypsum Board
ASTM C 557	(1993a) Adhesive for Fastening Gypsum Wallboard to Wood Framing
ASTM C 630/C 630M	(1996a) Water-Resistant Gypsum Backing Board
ASTM C 754	(1997) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM C 840	(1998) Application and Finishing of Gypsum Board
ASTM C 1002	(1998) Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
ASTM C 1047	(1998) Accessories for Gypsum Wallboard and Gypsum Veneer Base

GYPSUM ASSOCIATION (GA)

GA 216	(1996) Application and Finishing of Gypsum Board
GA 600	(1997) Fire Resistance Design Manual

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir (1998) Fire Resistance Directory (2 Vol.)

1.2 SYSTEM DESCRIPTION

1.2.1 Fire-Rated Construction

Joints of fire-rated gypsum board enclosures shall be closed and sealed in accordance with UL test requirements or GA requirements, and as required to meet pressurization requirements. Penetrations through rated partitions and ceilings shall be sealed tight in accordance with tested systems. Fire ratings shall be as indicated.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Steel Framing; GA. Control Joints; GA. Fire-Resistant Assemblies; GA.

Drawings and installation details for ceiling framing, furring, special wall framing, and framed openings in walls and ceilings.

SD-13 Certificates

Gypsum Wallboard; GA. Water-Resistant Gypsum Board; GA. Steel Framing; GA. Fire-Rated Gypsum Board; GA

Certificates stating that the steel framing and gypsum wallboard meet the specified requirements.

1.4 QUALIFICATIONS

Manufacturer shall specialize in manufacturing the types of material specified and shall have a minimum of 5 years of documented successful experience. Installer shall specialize in the type of gypsum board work required and shall have a minimum of 3 years of documented successful experience.

1.5 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered in original containers bearing the name of manufacturer, contents, and brand name. Materials shall be stored off the ground in a weathertight structure for protection. Gypsum boards shall be stacked flat, off floor and supported to prevent sagging and warpage. Adhesives and joint materials shall be stored in accordance with manufacturer's printed instructions. Damaged or deteriorated materials shall be removed from jobsite.

1.6 ENVIRONMENTAL CONDITIONS

Environmental conditions for application and finishing of gypsum board shall be in accordance with ASTM C 840. During the application of gypsum board without adhesive, a room temperature of not less than 40 degrees F

shall be maintained. During the application of gypsum board with adhesive, a room temperature of not less than 50 degrees F shall be maintained for 48 hours prior to application and continuously afterwards until completely dry. Building spaces shall be ventilated to remove water not required for drying joint treatment materials. Drafts shall be avoided during dry hot weather to prevent materials from drying too rapidly.

PART 2 PRODUCTS

2.1 NON-LOADBEARING STUD WALLS

2.1.1 Studs

Studs for non-loadbearing walls shall conform to SECTION 06100 ROUGH CARPENTRY

2.2 GYPSUM BOARD

Gypsum board shall have square-cut ends, tapered or beveled edges and shall be maximum possible length. Gypsum board thickness shall be as shown.

2.2.1 Standard Gypsum Board

Regular gypsum board shall conform to ASTM C 36, and shall be 48 inches wide.

2.2.2 Fire-Rated Gypsum Board

Fire-rated gypsum board shall conform to ASTM C 36, and shall be Type X or Type C as required, 48 inches wide.

2.2.3 Water-Resistant Gypsum Board

Water-resistant gypsum board shall conform to ASTM C 630/C 630M, regular, with water-resistant paper faces, paintable surfaces, and shall be 48 inch width and maximum permissible length.

2.3 TRIM, MOLDINGS, AND ACCESSORIES

2.3.1 Taping and Embedding Compound

Taping and embedding compound shall conform to ASTM C 475. Compound shall be specifically formulated and manufactured for use in embedding tape at gypsum wallboard joints and fastener heads, and shall be compatible with tape and substrate.

2.3.2 Finishing or Topping Compound

Finishing or topping compound shall conform to ASTM C 475. Compound shall be specifically formulated and manufactured for use as a finishing compound for gypsum board.

2.3.3 All-Purpose Compound

All-purpose compound shall be specifically formulated and manufactured to use as a taping and finishing compound, and shall be compatible with tape and substrate.

2.3.4 Joint Tape

Joint tape shall conform to ASTM C 475 and shall be as recommended by gypsum board manufacturer.

2.3.5 Trim, Control Joints, Beads, Stops and Nosings

Items used to protect edges, corners, and to provide architectural features shall be in accordance with ASTM C 1047.

2.4 FASTENINGS AND ADHESIVES

2.4.1 Nails

Nails shall conform to ASTM C 514. Nails shall be hard-drawn low or medium-low carbon steel, suitable for intended use. Special nails for predecorated gypsum board shall be as recommended by predecorated gypsum board manufacturer.

2.4.2 Screws

Screws shall conform to ASTM C 1002. Screws shall be self-drilling and self-tapping steel Type W for wood framing.

2.4.3 Adhesives

Adhesives shall conform to ASTM C 557. Adhesives shall be formulated to bond gypsum board to wood framing members. For securing gypsum board to metal framing, adhesive shall be as recommended by gypsum board manufacturer.

2.5 CEMENTITIOUS BACKER UNITS

Cementitious backer units shall comply with ANSI A118.9.

PART 3 EXECUTION

3.1 INTERIOR WALL FRAMING

Steel framing and furring members shall be installed in accordance with ASTM C 754. Members shall be in alignment with spacings not to exceed the maximum spacings indicated on drawings. Runners shall be aligned accurately at the floor and ceiling and securely anchored.

3.1.1 Wall Openings

The framing system shall provide for the installation and anchorage of the required subframes or finish frames for wall openings at doors, pass-through openings, and access panels. Partitions abutting continuous suspended ceilings shall be strengthened for rigidity at rough openings of more than 30 inches wide. Studs at openings shall be 0.0329 in minimum bare metal thickness and spot grouted at jamb anchor inserts. Double studs shall be fastened together with screws and secured to floor and overhead runners. Two studs shall be used for framing solid-core doors, doors over 36 inches wide and extra-heavy doors such as X-ray room doors.

3.1.2 Blocking

Blocking shall be provided as necessary for mounted equipment. Blocking shall be metal or wood and shall be cut to fit between framing members.

Blocking shall be rigidly anchored to the framing members. Under no circumstances will accessories or other wall mounted equipment be anchored directly to gypsum wallboard.

3.2 APPLICATION OF GYPSUM BOARD

Gypsum board shall be installed in accordance with ASTM C 840 and GA 216 and as specified. Paragraph 17.3.1 GENERAL of ASTM C 840 which permits usage of water resistant gypsum board as a base for adhesive application of ceramic or plastic tile on ceilings, does not apply. Edges and ends of gypsum boards shall be cut to obtain neat fitting joints. End joints of adjoining boards shall be staggered, and shall be staggered on opposite sides of wall. Boards shall be applied with moderate contact without forcing in place. Holes for pipes, fixtures or other small openings shall be cut with a tool which will provide a neat fit. Screws shall be driven so that the heads are slightly below the plane of paper face. Fracturing the paper face or damaging the core shall be avoided. Trim shall be installed at external and internal angles formed by the intersecting gypsum board surfaces with other surfaces. Corner beads shall be installed to vertical and horizontal corners in accordance with manufacturer's published instructions.

3.2.1 Two-Ply Gypsum Board

Second layer of gypsum board shall be applied perpendicular to first layer with joints staggered and secured with mechanical fasteners and adhesive The use of adhesive shall be in accordance with ASTM C 840.

3.2.2 Adhesively-Applied Gypsum Board

Walls scheduled to receive adhesively-applied gypsum board shall be dry, free of dust, oil, or form release agents, protrusions or voids, or foreign matter that would affect a proper bond.

3.3 TRIM, MOLDINGS, AND ACCESSORIES INSTALLATION

Trim, moldings and accessories shall be installed in accordance with GA 216.

3.4 TAPING AND FINISHING

Gypsum board taping and finishing shall be performed in accordance with ASTM C 840. Boards shall be kept free of dirt, oil and other foreign matter that could cause a lack of bond. Screw heads, dents, gouges, and cut-outs shall be filled with joint compound and sanded. Accessories at exposed joints, edges, corners, openings, and similar locations shall be taped, floated with joint compound, and sanded to produce surfaces ready for gypsum board finishes.

3.5 FIRE-RESISTANT ASSEMBLIES

Gypsum wallboard construction for fire-rated assemblies shall be in accordance with UL Fire Resist Dir, or GA 600 for the design number indicated on drawings.

3.6 PATCHING

Surface defects and damage shall be corrected as required to leave gypsum board smooth, uniform in appearance, and ready to receive finish as specified.

-- End of Section --

SECTION 09510

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 635	(1995) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C 636	(1996) Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM E 119	(2000) Fire Tests of Building Construction and Materials
ASTM E 1264	(1990) Standard Classification for Acoustical Ceiling Products
ASTM E 1414	(1991a) Standard Test for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(1998) Fire Resistance Directory (2 Vol.)

1.2 GENERAL REQUIREMENTS

Acoustical treatment shall consist of sound controlling units mechanically mounted on a ceiling suspension system. The unit size, texture, finish, and color shall be as specified. The location and extent of acoustical treatment shall be as shown on the drawings.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Acoustical Ceiling System; GA.

Manufacturer's descriptive data, catalog cuts, and installation instructions. Submittals which do not provide adequate data for the product evaluation will be rejected.

SD-04 Drawings

Acoustical Ceiling System; GA.

Drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

SD-09 Reports

Fire Resistive Ceilings; GA. Ceiling Attenuation Class and Test; GA.

Reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified fire endurance and sound transmission requirements. Data attesting to conformance of the proposed system to Underwriters Laboratories requirements for the fire endurance rating listed in UL Fire Resist Dir may be submitted in lieu of test reports.

SD-13 Certificates

Acoustical Units; GA.

Certificate attesting that the mineral based acoustical units furnished for the project contains recycled material and showing an estimated percent of such material.

SD-14 Samples

Acoustical Units; GA.

Two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Materials shall be carefully handled and stored in dry, watertight enclosures. Immediately before installation, acoustical units shall be stored for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 ENVIRONMENTAL REQUIREMENTS

A uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent shall be maintained before, during, and after installation of acoustical units.

1.6 SCHEDULING

Interior finish work such as concrete work shall be complete and dry before installation. Mechanical, electrical, and other work above the ceiling line shall be completed and heating, ventilating, and air conditioning

systems shall be installed and operating in order to maintain temperature and humidity requirements.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided. Standard performance guarantee or warranty shall contain an agreement to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of grid system.

1.8 EXTRA MATERIALS

Six spare tiles of each color shall be furnished. Tiles shall be from the same lot as those installed. If more than six spare tiles are left over, all of the spare tiles may be stored in sealed waterproof wrapping in the North Tower Machinery House.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

Acoustical units shall conform to ASTM E 1264, Class A, and the following requirements:

2.1.1 Units for Exposed-Grid System A IX

Type IX (mineral fiber with scrubbable finish). Type IX acoustical units shall have a minimum recycled material content of 18 percent.

Minimum NRC: 0.55 when tested on mounting No. E-400

Pattern: Random.

Nominal size: 24 by 24 inches.

Edge detail: Trimmed and butt.

Finish: White factory-applied standard finish.

Minimum LR coefficient: 0.70.

Minimum CAC: 40.

2.2 SUSPENSION SYSTEM

Suspension system shall be standard fire-resistive exposed-grid standard width flange, and shall conform to ASTM C 635 for heavy-duty systems. Surfaces exposed to view shall be steel with a factory-applied white baked-enamel finish. Wall molding shall have a flange of not less than 15/16 inch. Inside and outside corner caps shall be provided. Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. The suspension system shall have a maximum deflection of 1/360 of span length.

2.3 HANGERS

Hangers shall be galvanized steel wire. Hangers and attachment shall

support a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

2.4 ACCESS PANELS

Access panels shall match adjacent acoustical units and shall be designed and equipped with suitable framing and fastenings for removal and replacement without damage. Panel shall be not less than 12 by 12 inches or more than 12 by 24 inches. An identification plate of 0.032 inch thick aluminum, 3/4 inch in diameter, stamped with the letters "AP" and finished the same as the unit, shall be attached near one corner on the face of each access panel.

2.5 FIRE RESISTIVE CEILINGS

Acoustical ceiling systems indicated as fire resistant shall be rated for fire endurance as indicated when tested in accordance with ASTM E 119. Suspended ceiling shall have been tested with a specimen roof and floor assembly representative of the indicated construction, including mechanical and electrical work within ceiling space openings for light fixtures, and air outlets, and access panels. Ceiling assembly rating shall be 1 hour exposed grid system.

2.6 FINISHES

Acoustical units and suspension system members shall have manufacturer's standard textures, patterns and finishes as specified. Ceiling suspension system components shall be treated to inhibit corrosion.

2.7 CEILING ATTENUATION CLASS AND TEST

Ceiling attenuation class (CAC) range of acoustical units, when required, shall be determined in accordance with ASTM E 1414. Test ceiling shall be continuous at the partition and shall be assembled in the suspension system in the same manner that the ceiling will be installed on the project. System shall be tested with all acoustical units installed.

PART 3 EXECUTION

3.1 INSTALLATION

Acoustical work shall be provided complete with necessary fastenings, clips, and other accessories required for a complete installation. Mechanical fastenings shall not be exposed in the finished work. Hangers shall be laid out for each individual room or space. Hangers shall be placed to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Main runners and carrying channels shall be kept clear of abutting walls and partitions. At least two main runners shall be provided for each ceiling span. Wherever required to bypass an object with the hanger wires, a subsuspension system shall be installed, so that all hanger wires will be plumb.

3.1.1 Suspension System

Suspension system shall be installed in accordance with ASTM C 636 and as specified herein. There shall be no hanger wires or other loads suspended from underside of steel decking.

3.1.1.1 Plumb Hangers

Hangers shall be plumb and shall not press against insulation covering ducts and pipes.

3.1.2 Wall Molding

Wall molding shall be provided where ceilings abut vertical surfaces. Wall molding shall be secured not more than 3 inches from ends of each length and not more than 16 inches on centers between end fastenings. Wall molding springs shall be provided at each acoustical unit in semi-exposed or concealed systems.

3.1.3 Acoustical Units

Acoustical units shall be installed in accordance with the approved installation instructions of the manufacturer. Edges of acoustical units shall be in close contact with metal supports, with each other, and in true alignment. Acoustical units shall be arranged so that units less than one-half width are minimized. Units in exposed-grid system shall be held in place with manufacturer's standard hold-down clips, if units weigh less than 1 psf or if required for fire resistance rating.

3.2 CEILING ACCESS PANELS

Ceiling access panels shall be located directly under the items which require access.

3.3 CLEANING

Following installation, dirty or discolored surfaces of acoustical units shall be cleaned and left free from defects. Units that are damaged or improperly installed shall be removed and new units provided as directed.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4078	(1992; R 1996) Water Emulsion Floor Polish
ASTM F 1066	(1995a) Vinyl Composition Floor Tile
ASTM F 1700	(1996) Solid Vinyl Floor Tile

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Resilient Flooring and Accessories; GA.

Manufacturer's descriptive data and installation instructions including cleaning and maintenance instructions.

SD-09 Reports

Resilient Flooring and Accessories; GA.

Copies of test reports showing that representative product samples of the flooring proposed for use have been tested by an independent testing laboratory within the past three years or when formulation change occurred and conforms to the requirements specified.

SD-14 Samples

Resilient Flooring and Accessories; GA.

Three samples of each indicated color and type of flooring and base. Sample size shall be minimum 2-1/2 x 4 inches.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the building site in original unopened containers bearing the manufacturer's name, project identification, and

handling instructions. Materials shall be stored in a clean dry area with temperature maintained above 70 degrees F for 2 days prior to installation, and shall be stacked according to manufacturer's recommendations. Materials shall be protected from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances.

1.4 ENVIRONMENTAL REQUIREMENTS

Areas to receive resilient flooring shall be maintained at a temperature above 70 degrees F and below 100 degrees F for 2 days before application, during application and 2 days after application. A minimum temperature of 55 degrees F shall be maintained thereafter.

1.5 SCHEDULING

Resilient flooring application shall be scheduled after the completion of other work which would damage the finished surface of the flooring.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

1.7 EXTRA MATERIALS

Extra flooring material of each color and pattern shall be furnished at the rate of 5 tiles. Extra materials shall be from the same lot as those installed. Extra base material composed of 5 linear feet.

PART 2 PRODUCTS

2.1 VINYL-COMPOSITION TILE TYPE A

Vinyl-composition tile shall conform to ASTM F 1066, Class 1, (solid color tile), or Class 2,(through pattern tile), Composition 1, asbestos-free, and shall be 12 or 9 inches square and 1/8 inch thick. Tile shall have the color and pattern uniformly distributed throughout the thickness of the tile. Flooring in any one continuous area shall be from the same lot and shall have the same shade and pattern.

2.2 SOLID VINYL TILE TYPE A

Solid vinyl tile shall conform to ASTM F 1700 Class I, Type A or B Tile shall be 9 inches square by 1/8 inch thick. Tiles shall be of solid unlaminated construction.

2.3 INTEGRAL COVED BASE

A vinyl round cap strip with a minimum radius of 3/4 inch shall be provided for integral coved bases as shown.

2.4 ADHESIVE

Adhesive for flooring and wall base shall be as recommended by the flooring manufacturer.

2.5 POLISH

Polish shall conform to ASTM D 4078.

2.6 CAULKING AND SEALANTS

Caulking and sealants shall be in accordance with Section 07900 JOINT SEALING.

2.7 MANUFACTURER'S COLOR AND TEXTURE

The color of the vinyl composition tile shall be solid grey or grey with a speckled pattern. The integral coved base shall be similar in color to the vinyl composition tile.

PART 3 EXECUTION

3.1 EXAMINATION/VERIFICATION OF CONDITIONS

The Contractor shall examine and verify that site conditions are in agreement with the design package and shall report all conditions that will prevent a proper installation. The Contractor shall not take any corrective action without written permission from the Government.

3.2 SURFACE PREPARATION

Flooring shall be in a smooth, true, level plane, except where indicated as sloped. Before any work under this section is begun, all defects such as rough or scaling concrete, low spots, high spots, and uneven surfaces shall have been corrected, and all damaged portions of concrete slabs shall have been repaired as recommended by the flooring manufacturer. Concrete curing compounds, other than the type that does not adversely affect adhesion, shall be entirely removed from the slabs. Paint, varnish, oils, release agents, sealers, waxers, and adhesives shall be removed, as recommended by the flooring manufacturer.

3.3 MOISTURE TEST

The suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content shall be determined by a moisture test as recommended by the flooring manufacturer.

3.4 INSTALLATION OF VINYL-COMPOSITION TILE AND SOLID VINYL TILE

Tile flooring shall be installed with adhesive in accordance with the manufacturer's installation instructions. Tile lines and joints shall be kept square, symmetrical, tight, and even. Edge width shall vary as necessary to maintain full-size tiles in the field, but no edge tile shall be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Flooring shall be cut to, and fitted around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Edge tile shall be cut, fitted, and scribed to walls and partitions after field flooring has been applied.

3.5 INSTALLATION OF INTEGRAL COVED BASE

Integral coved base shall be formed by extending the flooring material 4 inches onto the wall surface. Cove shall be supported by a plastic, rubber or wood coved filler having a minimum radius of 3/4 inch. Coved base shall be installed with adhesive in accordance with the manufacturer's written instructions.

3.6 CLEANING

Immediately upon completion of installation of tile in a room or an area, flooring and adjacent surfaces shall be cleaned to remove all surplus adhesive. After installation, flooring shall be washed with a cleaning solution, rinsed thoroughly with clear cold water, and, given two coats of polish in accordance with manufacturers written instructions. After each polish coat, floors shall be buffed to an even luster with an electric polishing machine. Rubber tile shall be cleaned and maintained as recommended by the manufacturer.

3.7 PROTECTION

From the time of laying until acceptance, flooring shall be protected from damage as recommended by the flooring manufacturer. Flooring which becomes damaged, loose, broken, or curled shall be removed and replaced.

-- End of Section --

SECTION 09900

PAINTING, GENERAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values	(1999) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1186	(1993) Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
ASTM D 4214	(1998) Evaluating Degree of Chalking of Exterior Paint Films

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.94	Ventilation
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910, Subpart I	Personal Protective Equipment

FEDERAL SPECIFICATIONS (FS)

CID A-A-2246B	(1997) Paint, Latex
CID A-A-2336A	(1995) Primer Coating (Alkyd, Exterior Wood, White, and Tints)
CID A-A-2994	(1996) Primer Coating, Interior, for Walls and Wood

FEDERAL SPECIFICATIONS (Fed. Spec.)

Fed. Std. 595B	Federal Colors

REASEARCH COUNCIL ON STRUCTURAL CONNECTIONS

Appendix A	(1996) Specification for Structural Joints using ASTM A 325 and A 490 Bolts

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electrical Code

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(1982)(R91) Zinc-Rich Primers (Type I - "Inorganic" and Type II - "Organic")
SSPC Paint 22	(1982)(R91) Epoxy-Polyamide Paints (Primer, Intermediate, and Topcoat)
SSPC Paint 23	(1991) Latex Primer for Steel surfaces
SSPC Paint 36	(2000) Two-Component Weatherable Aliphatic Polyurethane Topcoat
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 6/NACE 3	(1994) Commercial Blast Cleaning
SSPC SP 10/NACE 2	Near White Metal Cleaning

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Paint; GA

The names, quantity represented, and intended use for the proprietary brands of materials proposed to be substituted for the specified materials regardless of quantities in states where VOC content limitations apply. Manufacturer's catalog cuts for each proposed paint product shall include surface preparation requirements, top coat compatibility undercoat capability, substrate compatibility, thicknesses (wet and dry), and slip coefficient for steel primers.

SD-06 Instructions

Mixing and Thinning; GA, Application; GA

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each coating system. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times between coats for epoxy, moisture-curing polyurethane.

SD-09 Reports

Paint; GA

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 50 gallons:

a. A test report showing that the proposed batch to be used meets specified requirements:

b. A test report showing that a previous batch of the same formulation as the batch to be used met specified requirements, plus, on the proposed batch to be used, a report of test results for properties of weight per gallon, viscosity, fineness of grind, drying time, color, and gloss.

SD-13 Certificates

Lead; GA. Volatile Organic Compound (VOC) Content; GA

Certificate stating that paints for interior use contain no mercurial mildewcide or insecticide. Certificate stating that paints proposed for use contain not more than 0.06 percent lead by weight of the total nonvolatile. Certificate stating that paints proposed for use meet Federal VOC regulations and those of the of the local Air Pollution Control Districts having jurisdiction over the geographical area in which the project is located.

SD-14 Samples

Paint; FIO. Concrete Sealer; FIO

While the material is at the site or source of supply, and at a time agreeable to the Contractor and the Contracting Officer, a 1 quart sample of each color and batch, except for quantities of 50 gallons or less, shall be taken by a representative of the Contracting Officer. The contents of the containers to be sampled shall be thoroughly mixed to ensure that the sample is representative. Samples shall be identified by designated name, specification number, manufacturer name and address, batch number, project contract number, intended use, and quantity involved. Samples shall be held in storage by Contracting Officer for testing, if required.

Specification and Proprietary Paints; GA.

Federal, Military, Commercial Item Description, and SSPC: The Society for Protective Coatings specification paints are those formulated to meet federal, military, government and industry specifications. When the required quantity of any type is 50 gallons or less, the Contractor can submit:

a. A certified test report showing the results of required tests made on the material and a statement that it meets all of the specification requirements.

b. A certified test report showing the results of required tests made on a previous batch of paint produced by the same firm using the same ingredients and formulation except for minor differences necessitated by a color change and a statement that the previous batch met all of the specification requirements. A report of tests on the proposed batch showing the following properties applicable to the material specifications shall be furnished: color, gloss, drying time, opacity, viscosity, weight per gallon, and fineness of grind.

c. A proprietary paint - When the required quantity of a particular type or color of a paint is 10 gallons or less, a proprietary, name-brand, shelf item paint of the same type and with similar

properties to the material specified may be proposed without sampling. Proprietary paints are any which do not follow the complete specification requirements of the government or industry specifications. To receive consideration, a statement from the supplier that the paint is appropriate as to type, color, and gloss and is a premium grade of paint shall be furnished.

Thinners; GA.

Samples shall be submitted of the thinners which are those solvents used to reduce the viscosity of the paint.

Colors; GA

A 6 inch by 18 inch sample of each of the following paint systems shall be submitted:

a. New Structural Steel

b. Existing Structural Steel

c. Clearance Gauge

d. Interior Gypsum Walls

e. Concrete Sealer

A steel sheet (12 ga. minimum thickness) shall be used for each sample. The primer shall cover one entire flat surface. The intermediate coat shall cover all but a 6 inch length of primer. The top coat shall cover a 6 inch length of the intermediate coat. For the clearance gauge a 3 inch by 1 inch black line shall be painted on the white top coat.

The interior gypsum wall paint shall be applied to a 6 inch by 18 inchpiece of gypsum wall board. Three 6 inch wide pieces shall be painted for the three coats of paint as per the steel painted samples above.

The concrete sealer shall be applied to a 6 inch by 12 inch concrete slab that is one inch thick with a smooth surface. The first sealer coat shall be applied to one entire flat surface. The second sealer coat shall be applied to half of the coated surface.

SD-18 Records

Inspections and Operations; GA.

The Contractor shall document and submit records of inspections and operations performed. Submittals shall be made on a daily basis and shall include but are not limited to:

a. Inspections performed, including the area of the structure involved and the results of the inspection.

b. Surface preparation operations performed, including the area of the structure involved, the mode of preparation, the kinds of solvent, abrasive, or power tools employed, and whether contract requirements were met.

c. Thinning operations performed, including thinners used, batch

numbers, and thinner/paint volume ratios.

d. Application operations performed, including the area of the structure involved, mode of application employed, ambient temperature, substrate temperature, dew point, relative humidity, type of paint with batch numbers, elapsed time between surface preparation and application, elapsed time for recoat, condition of underlying coat, number of coats applied, and if specified, measured dry film thickness or spreading rate of each new coating.

1.3 PAINT PACKAGING, LABELING, DELIVERY, AND STORING

Paints shall be processed and packaged to ensure that within a period of one year from date of manufacture, they will not gel, liver, or thicken deleteriously, or form gas in the closed container. Paints shall be in sealed containers that legibly show the purchaser's order number, designated name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name of manufacturer. Paints, unless otherwise specified or permitted, shall be packaged in standard containers not larger than 5 gallons, with removable friction or lug-type covers. Paints and thinner shall be stored in accordance with the manufacturer's written directions and as a minimum stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors and at temperatures between 40 and 95 degrees F. All paints shall be stored under cover from the elements and in locations free from sparks and flames. Paints shall be stored on the project site or segregated at the source of supply sufficiently in advance of need to allow 30 days for testing.

1.4 APPROVAL OF MATERIALS

When samples are tested, approval of materials will be based on tests of the samples; otherwise, materials will be approved based on test reports furnished with them. If materials are approved based on test reports furnished, samples will be retained by the Government for testing should the materials appear defective during or after application. In addition to any other remedies under the contract the cost of retesting defective materials will be at the Contractor's expense. Manufacturer's certificates of previous testing may be accepted.

1.5 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the paint manufacturer, the ambient temperature shall be between 45 and 95 degrees F when applying coatings other than water-thinned, epoxy, and moisture-curing polyurethane coatings. Water-thinned coatings shall be applied only when ambient temperature is between 50 and 90 degrees F. Epoxy, and moisture-curing polyurethane coatings shall be applied only within the minimum and maximum temperatures recommended by the coating manufacturer. Moisture-curing polyurethane shall not be applied when the relative humidity is below 30 percent. Paint shall be applied only to surfaces that are above the dew point temperature and that are completely free of moisture as determined by sight and touch. Paint shall not be applied to surfaces upon which there is detectable frost or ice. Except as otherwise specified, the temperature of the surfaces to be painted and of air in contact therewith shall be not less than 45 degrees F during paint application nor shall paint be applied if the surfaces can be expected to drop to 32 degrees F or lower before the film has dried to a reasonably firm condition. During periods of inclement

weather, painting may be continued by enclosing the surfaces and applying artificial heat, provided the minimum temperatures and surface dryness requirements prescribed previously are maintained. Paint shall not be applied to surfaces heated by direct sunlight or other sources to temperatures that will cause detrimental blistering, pinholing, or porosity of the film.

1.6 SAFETY AND HEALTH

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Worker Exposures

Exposure of workers to hazardous chemical substances shall not exceed limits established by ACGIH Limit Values, or as required by a more stringent applicable regulation.

1.6.2 Cleaning with Solvents

1.6.2.1 Ventilation

Ventilation shall be provided where required by 29 CFR 1910.146 or where the concentration of solvent vapors exceeds 10 percent of the Lower Explosive Limit (LEL). Ventilation shall be in accordance with 29 CFR 1910.94, paragraph (c)(5). Solvent vapors shall be exhausted outdoors, away from air intakes and workers.

1.6.2.2 Personal Protective Equipment

Personal protective equipment shall be provided where required by 29 CFR 1910.146 and in accordance with 29 CFR 1910, Subpart I.

1.6.3 Paint Application

1.6.3.1 Ventilation

When using solvent-based paint in confined spaces, ventilation shall be provided to exchange air in the space at a minimum rate of 5,000 cubic feet per minute per spray gun in operation. Ventilation in larger work zones shall be maintained by means of mechanical exhaust. Return air inlets in the work zone shall be temporarily sealed before start of work until the coatings have dried. It may be necessary to install both a mechanical supply and exhaust ventilation system to effect adequate air changes within the confined space. All air-moving devices shall be located and affixed to an opening of the confined space in a manner that assures that the airflow is not restricted or short circuited and is supplied in the proper direction. Means of egress shall not be blocked. Ventilation shall be continued after completion of painting and through the drying phase of the operation. If the ventilation system fails or the concentration of volatiles exceeds 10 percent of the LEL (except in the zone immediately adjacent to the spray nozzle), painting shall be stopped and spaces evacuated until such time that adequate ventilation is provided. An audible alarm that signals system failure shall be an integral part of the ventilation system. The effectiveness of the ventilation shall be checked

by using ventilation smoke tubes and making frequent oxygen and combustible gas readings during painting operations. Exhaust ducts shall discharge clear of the working areas and away from possible sources of ignition.

1.6.3.2 Explosion Proof Equipment

Electrical wiring, lights, and other equipment located in the paint spraying area shall be of the explosion proof type designed for operation in Class I, Division 1, Group D, hazardous locations as required by the NFPA 70. Electrical wiring, motors, and other equipment, outside of but within 20 feet of any spraying area, shall not spark and shall conform to the provisions for Class I, Division 2, Group D, hazardous locations. Electric motors used to drive exhaust fans shall not be placed inside spraying areas or ducts. Fan blades and portable air ducts shall be constructed of nonferrous materials. Motors and associated control equipment shall be properly maintained and grounded. The metallic parts of air-moving devices, spray guns, connecting tubing, and duct work shall be electrically bonded and the bonded assembly shall be grounded.

1.6.3.3 Further Precautions

a. Workers shall wear nonsparking safety shoes.

b. Solvent drums taken into the spraying area shall be placed on nonferrous surfaces and shall be grounded. Metallic bonding shall be maintained between containers and drums when materials are being transferred.

c. Insulation on all power and lighting cables shall be inspected to ensure that the insulation is in excellent working condition and is free of all cracks and worn spots. Cables shall be further inspected to ensure that no connections are within 50 feet of the operation, that lines are not overloaded, and that they are suspended with sufficient slack to prevent undue stress or chafing.

1.6.3.4 Ignition Sources

Ignition sources, to include lighted cigarettes, cigars, pipes, matches, or cigarette lighters shall be prohibited in area of solvent cleaning, paint storage, paint mixing, or paint application.

1.6.4 Health Protection

1.6.4.1 Respirators

During all spray painting operations, spray painters shall use approved SCBA or SAR (air line) respirators, unless valid air sampling has demonstrated contaminant levels to be consistently within concentrations that are compatible with air-purifying respirator Assigned Protection Factor (APF). Persons with facial hair that interferes with the sealing surface of the facepiece to faceseal or interferes with respirator valve function shall not be allowed to perform work requiring respiratory protection. Air-purifying chemical cartridge/canister half- or full-facepiece respirators that have a particulate prefilter and are suitable for the specific type(s) of gas/vapor and particulate contaminant(s) may be used for nonconfined space painting, mixing, and cleaning (using solvents). These respirators may be used provided the measured or anticipated concentration of the contaminant(s) in the breathing zone of the exposed worker does not exceed the APF for the

respirator and the gas/vapor has good warning properties or the respirator assembly is equipped with a NIOSH-approved end of service life indicator for the gas(es)/vapor anticipated or encountered. Where paint contains toxic elements such as lead, cadmium, chromium, or other toxic particulates that may become airborne during painting in nonconfined spaces, air-purifying half-and full-facepiece respirators or powered air-purifying respirators equipped with appropriate gas vapor cartridges, in combination with a high-efficiency filter, or an appropriate canister incorporating a high-efficiency filter, shall be used.

1.6.4.2 Protective Clothing and Equipment

All workers shall wear safety shoes or boots, appropriate gloves to protect against the chemical to be encountered, and breathable, protective, full-body covering during spray-painting applications. Where necessary for emergencies, protective equipment such as life lines, body harnesses, or other means of personnel removal shall be used during confined-space work.

1.6.5 Toxic Compounds

Toxic products having ineffective physiological warning properties, such as no or low odor or irritation levels, shall not be used unless approved by the Contracting Officer.

1.6.6 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MDSS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive mists and odors from the painting operations. Workers involved in preparation, painting and clean-up shall be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

1.6.7 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from preparation, painting and clean-up operations.

PART 2 PRODUCTS

2.1 PAINT

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Paint shall conform to the requirements listed in the painting schedules at the end of this section, except when the required amount of a material of a particular batch is 50 gallons or less, an approved first-line proprietary paint material with similar intended formulation, usage and color to that specified may be used. Additional requirements are as follows:

2.1.1 Colors and Tints

Colors shall be as selected from manufacturer's standard colors, as

indicated, except for the topcoat of paint for the steel structure. Manufacturer's standard color is for identification of color only. Tinting of epoxy and urethane paints shall be done by the manufacturer. The color of the undercoats shall vary slightly from the color of the next coat.

2.1.2 Lead

Paints containing lead in excess of 0.06 percent by weight of the total nonvolatile content calculated as lead metal shall not be used.

2.1.3 Chromium

Paints containing zinc chromate or strontium chromate pigments shall not be used.

2.1.4 Volatile Organic Compound (VOC) Content

Paints shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards and shall conform to the restrictions of the local air pollution control authority.

2.2 THREE COAT ZINC-RICH PAINT SYSTEM

This paint system shall be used to paint all new structural steel and existing steel to be used in the final structure, unless noted. Surface preparation is described in SECTION 13281.

2.2.1 Primer Paint

The primer paint for all new structural steel shall be an inorganic zinc-rich primer that conforms to SSPC Paint 20, Type I. All existing structural steel to be used in the final structure shall be primed with an organic zinc-rich primer that conforms to SSPC Paint 20, Type II. Both the inorganic and organic primer shall have a Class B slip co-efficient when tested in accordance with the Testing Method to Determine the Slip Coefficient for Coatings Used in Bolted Connections of the Appendix A of the Research Council on Structural Connections.

2.2.1.1 Painted Surfaces

All surfaces of the new and existing structural steel shall be prime painted prior to assembly, unless noted. The faying surfaces of two pieces of new steel that are bolted together shall be prime painted before assembly. Surfaces of structural steel that will be in embedded in concrete or in contact with concrete shall be prime painted.

2.2.1.2 Unpainted Surfaces

The following surfaces shall not be prime painted:

a. All galvanized surfaces shall not be prime painted either before or after assembly.

b. All rolling or sliding bearing surfaces shall not be painted.

c. All surfaces within one inch of the interface of two surfaces that will be welded shall not be painted. The welding of the two pieces of steel may occur before the two pieces of steel are prime painted provided that the exposed surfaces are capable of being prime painted.

2.2.1.3 Partial Priming

The surfaces that will be embedded in concrete and will have stud shear connectors welded to these surfaces shall either be masked of the primer paint or shall receive a light coat of primer paint. If a light coat of paint has been applied, the light coat of paint shall be remove in the area of the stud installation

2.2.2 Intermediate Paint

The intermediate coat of paint shall be an epoxy polyamide paint that conforms to SSPC Paint 22. The color of the intermediate coat shall contrast the primer paint or the top coat of paint.

2.2.2.1 Painted Surfaces

The primed painted surfaces shall be painted with an intermediate coat of paint after the pieces of steel have been assembled in the shop to the largest size of units that can be shipped to the bridge site.

2.2.2.2 Non-Painted Surfaces

The faying surfaces of shop assembled and field assembled structural steel shall not be painted with an intermediate paint. The area on the outside surface of bolted connections shall not be primed painted until after the structural steel has been connected with all of the fasteners. All prime painted surfaces that are to be embedded in concrete or be in contact with concrete shall not be painted with intermediate coat of paint.

2.2.3 Top Coat of Paint

The coat of paint shall be an aliphatic urethane that conforms to one of the types of urethane paints listed in SSPC Paint 36. The urethane paint type shall be compatible with the intermediate coat of paint and shall be provided by the same paint manufacturer. The top coat of paint shall be applied only to surfaces that have been coated with an intermediate coat of paint. The color of the top coat of paint shall be medium green, Fed. Std. 595B #24449.

For the clearance gauge, a white white urethane paint shall be used to cover the entire steel plate. Black urethane paint shall be used for the numbers and lines.

2.3 INTERIOR PAINT

The interior walls and gypsum board ceilings shall be prime painted with an interior latex primer. Two additional coats of gloss enamel paint shall be applied to the primed surfaces. An alkyd paint system may be used, if approved by the Contracting Officer, at no additional cost to the Government. The color for the top coat of enamel paint shall be either off-white or egg shell. The same interior paint system shall be used on the interior surfaces of the doors, door framing and window framing. A manufacture's primer may be applied to the interior and exterior surface of the doors and windows. If there is a compatibility problem with the selected paints, adjustments may be made, if approved by the Contracting Officer and at no additional cost to the Government.

2.4 DOORS AND WINDOWS

2.4.1 Steel Doors and Windows

The steel door and framing and steel window framing shall be primed with the same primer used on the steel structure, unless these components are galvanized. Galvanized surfaces shall be solvent cleaned as stated in SSPC SP 1 and treated with a preparatory galvanized surface treatment as recommend by the paint manufacturer. The exterior surfaces shall have the same intermediate coat and top coats of paint as the steel bridge. The color of the exterior surfaces shall match the color of the steel bridge.

2.4.2 Wood Windows

The wood windows frames shall be prime painted with an alkyd primer. A tie coat or a barrier coat as recommended by the paint manufacturer may be required to permit the exterior top coat to be the structural steel top coat. The same may be true for the interior frame.

2.5 CONCRETE SEALER

The interior surfaces of the concrete slabs in the machinery houses and electrical equipment room shall be sealed with a waterborne, permeable, non-cementitious, anti-skid coating. The sealer shall be resistant to oil and grease stains and shall be light gray or tan in color. Sealer shall require a minimum of two applications per manufacturer's instructions.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS NOT TO BE PAINTED

Items not to be painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations. Items removed prior to painting shall be replaced when painting is completed. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Surfaces contaminated by coating materials shall be restored to original condition.

3.2 SURFACE PREPARATION

Surfaces to be painted shall be clean and free of foreign matter before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning and painting shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas. Welding of, or in the vicinity of, previously painted surfaces shall be conducted in a manner to prevent weld spatter from striking the paint and to otherwise reduce coating damage to a minimum; paint damaged by welding operations shall be restored to original condition. Surfaces to be painted that will be inaccessible after construction, erection, or installation operations are completed shall be painted before they become inaccessible.

3.2.1 New Structural Steel

All new structural steel that is to be painted shall be blast-cleaned to SSPC SP 10/NACE 2 (Near-White Blast Cleaning) prior to primer painting.

Afer shop-coating, new structural steel surfaces shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1, as required. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection. All surfaces shall be primed within eight hours after cleaning but prior to contamination or deterioration of the prepared surfaces.

3.2.2 Existing Structural Steel

Previously painted surfaces specified to be re painted shall be thoroughly cleaned of all grease, dirt, dust, loose rust, loose mill scale, all existing paint and other foreign substances by blast-cleaning, according to SSPC SP 6/NACE 3 (Commerical Blast Cleaning). Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed. Slick surfaces shall be roughened. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting. Chalk shall be removed so that when tested in accordance with ASTM D 4214, the chalk resistance rating is no less than 8. All surfaces shall be primed within four hours after cleaning but prior to contamination or deterioration of the prepared surfaces. The existing paint shall be cleaned, contained, collected and disposed of as specified in Section 13281.

3.2.3 Nonferrous Metallic Surfaces

Galvanized steel doors shall be treated to prepare the galvanized surface for painting as recommended by the paint manufacturer.

3.2.4 Gypsum Board Surfaces

Gypsum board surfaces shall be dry and shall have all loose dirt and dust removed by brushing with a soft brush, rubbing with a cloth, or vacuum-cleaning prior to application of the first-coat material. A damp cloth or sponge may be used if paint will be water-based.

3.2.5 Wood Surfaces

Wood surfaces shall be cleaned of foreign matter. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter, unless otherwise authorized. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints. Small, dry seasoned knots shall be scraped, cleaned, and given a thin coat of commercial knot sealer, before application of the priming coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or, if it is still soft, removed with mineral spirits or turpentine, and the resinous area shall be thinly coated with knot sealer. Finishing nails shall be set, and all holes and surface imperfections shall be primed. After priming, holes and imperfections in finish surfaces shall be filled with putty or plastic wood filler, colored to match the finish coat if natural finish is required, allowed to dry, and sanded smooth. Putty or wood filler shall be compatible with subsequent coatings.

3.2.6 Concrete Surfaces

Concrete surfaces shall be prepared according to the concrete sealer manufacturer's instructions.

3.2.7 Clearance Gauge

The white painted surface of the clearance gauge steel plate shall be sanded to roughen the urethane paint at the location of black numbers and lines.

3.3 MIXING AND THINNING

Paints shall be thoroughly mixed, strained where necessary, and kept at a uniform composition and consistency during application. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.3.1 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.4 APPLICATION

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

3.4.1 First Coat (Nonferrous Surfaces)

The first coat on gypsum wallboard, and other surfaces shall include repeated touching up of suction spots or overall application of primer or sealer to produce uniform color and gloss. Excess sealer shall be wiped off after each application. The first coat on both faces of wood windows shall be applied at essentially the same time. Glazed sashes shall be given the specified coating system within 3 weeks of the time they are glazed, but not before the glazing material has set; paint shall overlay glass about 70 mils all around.

3.4.2 Timing

Surfaces that have been cleaned, pretreated, and otherwise prepared for painting shall be given a coat of the specified first coat as soon as practical after such pretreatment has been completed, but prior to any deterioration of the prepared surface. Sufficient time shall elapse between successive coats to permit proper drying. This period shall be modified as necessary to suit weather conditions. Oil-based or oleo resinous solvent-type paints shall be considered dry for recoating when the

paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause the undercoat to lift or lose adhesion. Manufacturer's instructions for application, curing and drying time between coats of two-component systems shall be followed.

3.4.3 Ferrous-Metal Primer

Primer for ferrous-metal shall be applied to ferrous surfaces to receive paint other than asphalt varnish prior to deterioration of the prepared surface. The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be over coated with the specified ferrous-metal primer prior to application of finish coats.

3.4.4 Method of Paint Application

Unless otherwise specified, paint shall be applied by brush or spray to ferrous and nonferrous metal surfaces. Special attention shall be directed toward ensuring adequate coverage of edges, corners, crevices, pits, rivets, bolts, welds, and similar surface irregularities. Other methods of application to metal surfaces shall be subject to the specific approval of the Contracting Officer. Paint on plaster, concrete, or other nonmetallic surfaces shall be applied by brush, roller, and/or spray.

3.4.5 Coverage and Film Thickness

Film thickness or spreading rates shall be as specified hereinafter. Where no spreading rate is specified, the paint shall be applied at a rate normal for the type of material being used. In any event, the combined coats of a specified paint system shall completely hide base surface and the finish coats shall completely hide undercoats of dissimilar color.

3.4.5.1 Measurement on Ferrous Metal

Where dry film thickness requirements are recommended by paint manufacturer for coatings on ferrous surfaces, measurements shall be made with one of the thickness gages listed below. They shall be calibrated and used in accordance with ASTM D 1186. They shall be calibrated using plastic shims with metal practically identical in composition and surface preparation to that being coated, and of substantially the same thickness (except that for measurements on metal thicker than 1/4 inch, the instrument may be calibrated on metal with a minimum thickness of 1/4 inch). Frequency of measurements shall be as recommended for field measurements by ASTM D 1186 and reported as the mean for each spot determination. The instruments shall be calibrated or calibration verified prior to, during, and after each use. Authorized thickness gages:

a. Mikrotest, Elektro-Physik, Inc.
b. Inspector Gage, Elcometer Instruments, Ltd.
c. Positest, Defelsko Corporation
d. Minitector, Elcometer Instruments, Ltd.
e. Positector 2000, Defelsko Corporation

3.4.6 Progress of Painting Work

Where field painting on any type of surface has commenced, the complete painting operation, including priming and finishing coats, on that portion of the work shall be completed as soon as practicable, without prolonged delays. Sufficient time shall elapse between successive coats to permit

them to dry properly for recoating, and this period shall be modified as necessary to suit adverse weather conditions. Paint shall be considered dry for recoating when it feels firm, does not deform or feel sticky under moderate pressure of the finger, and the application of another coat of paint does not cause film irregularities such as lifting or loss of adhesion of the undercoat. All coats of all painted surfaces shall be unscarred and completely integral at the time of application of succeeding coats. At the time of application of each successive coat, undercoats shall be cleaned of dust, grease, overspray, or foreign matter by means of airblast, solvent cleaning, or other suitable means. Cement and mortar deposits on painted steel surfaces, not satisfactorily removed by ordinary cleaning methods, shall be brush-off blast cleaned and completely repainted as required. Undercoats of high gloss shall, if necessary for establishment of good adhesion, be scuff sanded, solvent wiped, or otherwise treated prior to application of a succeeding coat. Field coats on metal shall be applied after erection except as otherwise specified and except for surfaces to be painted that will become inaccessible after erection.

3.4.7 Contacting Surfaces

When riveted or ordinary bolted contact is to exist between surfaces of ferrous or other metal parts of substantially similar chemical composition, such surfaces will not be required to be painted, but any resulting crevices shall subsequently be filled or sealed with paint. Contacting metal surfaces formed by high-strength bolts in friction-type connections shall not be painted. Where a nonmetal surface is to be in riveted or bolted contact with a metal surface, the contacting surfaces of the metal shall be cleaned and given three coats of the specified primer. Unless otherwise specified, corrosion-resisting metal surfaces, including cladding therewith, shall not be painted.

3.4.8 Protection of Painted Surfaces

Where shelter and/or heat are provided for painted surfaces during inclement weather, such protective measures shall be maintained until the paint film has dried and discontinuance of the measures is authorized. Items that have been painted shall not be handled, worked on, or otherwise disturbed until the paint coat is fully dry and hard. All metalwork coated in the shop or field prior to final erection shall be stored out of contact with the ground in a manner and location that will minimize the formation of water-holding pockets; soiling, contamination, and deterioration of the paint film, and damaged areas of paint on such metalwork shall be cleaned and touched up without delay. The first field coat of paint shall be applied within a reasonable period of time after the shop coat and in any event before weathering of the shop coat becomes extensive.

3.5 SURFACES TO BE PAINTED

Surfaces listed in the painting schedules at the end of this section, other than those listed in paragraph SURFACES NOT TO BE PAINTED, shall be painted as scheduled.

3.6 SURFACES NOT TO BE PAINTED

Surfaces of hardware, fittings, and other factory finished items shall not be painted.

3.7 CLEANING

Cloths, cotton waste and other debris that might constitute a fire hazard shall be placed in closed metal containers and removed at the end of each day. Upon completion of the work, staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint and other deposits on adjacent surfaces shall be removed and the entire job left clean and acceptable.

3.8 PAINTING SCHEDULES

The following painting schedules identify the surfaces to be painted and prescribe the paint to be used and the number of coats of paint to be applied. Contractor options are indicated by ------or------ between optional systems or coats.

EXTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Wood	CID A-A-2336A	Tie Coat and/or SSPC Paint 22	SSPC Paint 36
Ferrous metal			
New structural steel	SSPC Paint 20 Type I	SSPC Paint 22	SSPC Paint 36
Existing structural steel	SSPC Paint 20 Type II	SSPC Paint 22	SSPC Paint 36
Machinery	SSPC Paint 23	SSPC Paint 22	SSPC Paint 36
Clearance gauge	SSPC Paint 20 Type I	SSPC Paint 22	SSPC Paint 36
Galvanized metal			
Doors	galvanized prep coat	SSPC Paint 22	SSPC Paint 36

INTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Gypsum board smooth finish, unless otherwise specified	CID A-A-2994 Type II	CID A-A-2246B (eggshell)	CID A-A-2246B (eggshell) on gypsum board faced with recycled paper
		or	
		CID A-A-2246B (semi-gloss)	CID A-A-2246B (semi-gloss) on gypsum board faced with recycled paper
		or	
		CID A-A-2246B (flat)	CID A-A-2246B (flat) on gypsum board faced with recycled paper
Concrete floor, machinery houses electrical room operator room	concrete sealant	concrete sealant	

-- End of Section --

SECTION 13120

STANDARD METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA Design Manual	(1994) Aluminum Design Manual: Specifications & Guidelines for Aluminum Structures

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program Description
AISC Pub No. S303	(1992) Code of Standard Practice for Steel Buildings and Bridges
AISC Pub No. S329	(1985; Appx A June 1994) Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts
AISC Pub No. S342 L	(1993) Load and Resistance Factor Design Specifications for Structural Steel Buildings
AISC ASD Spec S335	(1989) Specification for Structural Steel Buildings - Allowable Stress Design, Plastic Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Mnl	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997ae1) Carbon Structural Steel
ASTM A 53	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 325	(1997) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds

	and Shapes
ASTM A 501	(1999) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 529/A 529M	(1996) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 570/A 570M	(1998) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 572/A 572M	(1999a) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 588/A 588M	(1997) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 606	(1998) Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A 607	(1998) Steel, Sheet and Strip, High-Strength, Low-Alloy, Columbium or Vanadium, or Both, Hot-Rolled and Cold-Rolled
ASTM A 618	(1999) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A 653/A 653M	(1999) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 518	(1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 991	(1998) Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1999) Specular Gloss
ASTM D 610	(1995) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(1987; R 1994e1) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1308	(1987; R 1998) Effect of Household Chemicals on Clear and Pigmented Organic Finishes

ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1995) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1997) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1997) Measuring Adhesion by Tape Test
ASTM D 4214	(1998) Evaluating Degree of Chalking of Exterior Paint Films
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 4587	(1991) Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light - and Water-Exposure Apparatus
ASTM D 5894	(1996) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM E 84	(2000a) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1998) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

ENGINEERING TECHNICAL INSTRUCTIONS AND ENERGY SAVINGS ANALYSIS

TI 809-04	(1998) Seismic Design for Buildings
TI 809-07	(1998) Design of Cold-Formed Load Bearing Steel Systems and Masonry Veneer/Steel Stud Walls

MATERIAL HANDLING INDUSTRY (MHI)

MHI CMAA 70	(1994) Electric Overhead Traveling Cranes

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA Low Rise Manual	(1996) Low Rise Building Systems Manual

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA Arch. Manual	(1993; Errata; Addenda Oct 1997) Architectural Sheet Metal Manual

UNDERWRITERS LABORATORIES (UL)

UL 580	(1994; Rev thru Feb 1998) Tests for Uplift Resistance of Roof Assemblies

1.2 GENERAL REQUIREMENTS

The metal building system covered under this specification shall be provided by a single manufacturer and shall include all components and assemblies that form a building. Structural Standing Seam Metal Roofing System, when specified, shall be furnished as part of a single manufacturer's system.

1.2.1 Building Configuration

Buildings shall have structural steel main building frames, and secondary framing including purlins and girts, engineered and fabricated by the building systems supplier. Buildings shall have vertical steel walls and single-slope roof system including soffits, gutters, and downspouts. Roof slope shall be as shown on the drawings. Buildings shall be single-span structures with one of the following framing systems: Column with single-span beam frames. Exterior doors, windows, floor-vault doors,and louvers shall be included in the metal building system. Building dimensions shall be not less than those indicated. The minimum inside clear dimensions shall be as shown on the drawings.

1.2.2 Qualifications

1.2.2.1 Manufacturer

Metal building shall be the product of a recognized steel building systems manufacturer who has been in the practice of manufacturing steel building systems for a period of not less than 5 years. The manufacturer shall be chiefly engaged in the practice of designing and fabricating steel building systems. The manufacturer shall be certified under the Metal Building Systems (MB) Certification Program, AISC FCD. Structural framing and covering shall be designed by a licensed Professional Engineer experienced in design of this work.

1.2.2.2 Installer

Erector shall have specialized experience in the erection of steel building systems for a period of at least 3 years. Framing shall be erected in accordance with MBMA Low Rise Manual, common industry practices and erection instructions describing the basic sequence of assembly, temporary bracing, shoring, and related information necessary for erection of the metal building including its structural framework and components. The erector shall furnish temporary guys and bracing where needed for squaring,

plumbing, and securing the structural framing against loads acting on the exposed framing, such as wind loads and seismic forces, as well as loads due to erection equipment and erection operation. Bracing furnished by the manufacturer for the metal building system shall not be assumed to be adequate during erection. Structural members shall not be field cut or altered without approval of the metal building manufacturer. Welds, abrasions, and surfaces not galvanized shall be primed after erection.

1.2.2.3 Manufacturer's Representative

A representative designated by the building manufacturer, who is familiar with the design of the building supplied and experienced in the erection of metal buildings similar in size to the one required under this contract, shall be present at the job site during construction, from the start of the structural framing erection until completion of the installation of the exterior covering, to assure that the building is erected properly.

1.3 DESIGN REQUIREMENTS

Criteria and definitions shall be in accordance with MBMA Low Rise Manual, except criteria for seismic loads which shall be in accordance with TI 809-04 and all other loads and load combinations in accordance with ASCE 7.

1.3.1 Dead Loads

The dead load shall consist of the weight of all permanent construction such as roof, framing, covering members and all other materials of the building system.

1.3.2 Roof Live Loads

1.3.2.1 Uniform Loads

Uniform roof live loads, including maintenance traffic and construction loads, shall be determined and applied in accordance with ASCE 7.

1.3.2.2 Concentrated Loads

In addition to ASCE 7 roof live loads, a minimum design concentrated load of 300 pounds shall be used to simulate a construction load on roof panels. The concentrated load shall be applied at the panel midspan and shall be resisted by a single standing seam metal roof panel, or a 24 inches wide corrugated metal panel, assumed to be acting as a beam. The undeformed shape of the panel shall be used to determine the section properties.

1.3.3 Roof Snow Loads

The design roof snow loads, including effects of drifting, shall be determined and applied in accordance with ASCE 7.

1.3.4 Wind Loads

Wind pressures shall be computed and applied in accordance with ASCE 7.

1.3.5 Seismic Loads

Seismic loads shall be computed in accordance with TI 809-04.

1.3.6 Framing and Structural Members

Structural steel members and their connections shall be designed in accordance with AISC ASD Spec S335 or AISC Pub No. S342 L. Structural cold-formed steel framing members and their connections shall be designed in accordance with TI 809-07. Members with openings in their webs shall be designed with consideration of the additional stresses which will result due to the openings. Deflections of the steel framing above and along the side of commercially framed door openings shall be limited to a maximum allowable deflection of 1/360 of the opening width to ensure proper operation of the doors. The contractor shall include the loads that the door transfers to the building frame in the design. Framed openings shall be designed to structurally replace the covering and framing displaced. The subpurlin and/or purlin spacing shall not exceed 30 inches on centers at the corner, edge and ridge zones, and 5 foot maximum on centers for the remainder of the roof. The maximum deflection of steel framing that provides lateral support for masonry veneer panels shall be 1/600 of the height of framing span.

1.3.7 Roofing and Siding

Except as otherwise specified, steel roofing and siding shall be designed in accordance with AISI Cold-Formed Mnl. Maximum deflection for wall and roof panels under applied live load, snow or wind loads shall not exceed 1/180th of the span length. The design analysis shall establish that the roof, when deflected under loading combinations, shall not result in ponding. Maximum deflections shall be based on sheets continuous across two or more supports with sheets unfastened and fully free to deflect. The calculated deflection from the concentrated load shall not exceed 1/180 of the span length. The methods for resisting lateral loads shall be cross-bracing, rigid frames, or wind columns.

1.3.8 Provisions for Gutters And Downspouts

Gutters and downspouts shall be designed according to the requirements of SMACNA Arch. Manual for storms which should be exceeded only once in 5 years and with adequate provisions for thermal expansion and contraction. Supports for gutters and downspouts shall be designed for the anticipated loads. Roof drainage system to withstand rainfall intensity of 2 inches per hour, with 5 minute duration.

1.3.9 Provisions for Louvers

Exhaust fan with louvers shall be fixed-blade type designed for a minimum net open area of 6 square feet, and shall be rainproof.

1.3.10 Drift Provisions

Lateral deflections, or drift, at the roof level of a structure in relation to the floor or slab on grade, caused by deflection of horizontal force resisting elements, shall conform to MBMA Low Rise Manual

1.4 DESIGN ANALYSIS

The design analysis shall be the design of a licensed Professional Engineer experienced in design of this work and shall include complete calculations for the building, its components, and the foundations. Foundations shown on the drawings are based on loads derived from a representative set of similar building types. Formulas and references shall be identified. Assumptions and conclusions shall be explained, and cross-referencing shall

be clear. Wind forces on various parts of the structure, both positive and negative pressure, shall be calculated with the controlling pressure summarized. Lateral forces due to seismic loading shall be calculated and tabulated for the various parts and portions of the building. Computer programmed designs shall be accompanied by stress values and a letter of certification, signed by a licensed Professional Engineer, stating the design criteria and procedures used and attesting to the adequacy and accuracy of the design. A narrative of the computer program delineating the basic methodology shall be included. Computer program output shall be annotated and supplemented with sketches to verify the input and output. Critical load conditions used in the final sizing of the members shall be emphasized. The design analysis shall include the name and office phone number of the designer, who shall function as a point of contact to answer questions during the detail drawing review.

1.5 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Design Analysis; GA.

Design analysis (building including anchor bolt plans) as one package with the drawings.

Instruction Manuals; GA.

Manufacturer's literature for individual building component systems.

Erection Procedures; GA.

Manufacturer's erection instruction and erection drawings describing the preparation requirements, assembly sequence, temporary bracing, shoring, and related information necessary for erection of the metal building including its structural framework and components.

SD-04 Drawings

Metal Building Systems; GA.

Detail drawings consisting of catalog cuts, design and erection drawings, and an isometric view of the roof showing the design wind uplift pressure and dimensions of edge and corner zones. Shop painting and finishing specifications. Anchor bolt placement plan and column reactions.

SD-08 Statements

Qualifications; GA.

Qualifications of the manufacturer, the manufacturer's Representative when one is used, and qualifications and experience of the building erector. A brief list of locations where buildings of similar design have been used shall be included with the detail drawings and shall also include information regarding date of completion, name and address of owner, and

how the structure is used.

SD-13 Certificates

Metal Building Systems; GA.

a. A Certificate from the metal building manufacturer stating that the metal building was designed from a complete set of the contract drawings and specifications and that the building furnished complies with the specified requirements.

b. Mill certification for structural bolts, framing steel, roofing and siding, and steel wall liner panels.

c. Warranty certificate. At the completion of the project the Contractor shall furnish signed copies of the 5-year Warranty for Metal Building System, a sample copy of which is attached to this section, the 20-year Manufacturer's Material Warranties, and the Manufacturer's 20-year System Weathertightness Warranty when one is required.

Insulation; GA.

Certificate attesting that the polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

SD-14 Samples

Accessories; GA.

One sample of each type of flashing, trim, closure, cap and similar items. Size shall be sufficient to show construction and configuration.

Roofing and Siding; GA.

One piece of each type and finish (exterior and interior) to be used, 9 inches long, full width. The sample for factory color finished covering shall be accompanied by certified laboratory test reports showing that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than 5 pieces has been tested and has met the quality standards specified for factory color finish.

Fasteners; GA.

Two samples of each type to be used, with statement regarding intended use. If so requested, random samples of bolts, nuts, and washers as delivered to the job site shall be taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

Insulation; GA.

One piece of each type to be used, and descriptive data covering installation.

Gaskets and Insulating Compounds; GA.

Two samples of each type to be used and descriptive data.

Sealant; GA.

One sample, approximately 1 pound, and descriptive data.

Wall Liners; GA.

One piece, 9 inches long, full width.

1.6 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials other than framing and structural members shall be covered with weathertight coverings and kept dry. Storage accommodations for roofing and siding shall provide good air circulation and protection from surface staining.

1.7 WARRANTIES

The Metal Building System, composed of framing and structural members, roofing and siding, gutters and downspouts, accessories, fasteners, trim, and miscellaneous building closure items such as doors and windows (when furnished by the manufacturer) shall be warranted as described below against material and workmanship deficiencies, system deterioration caused by exposure to the elements and service design loads, leaks and wind uplift damage. Any emergency temporary repairs conducted by the owner shall not negate the warranties.

1.7.1 Prime Contractor's Weathertightness Warranty

The Metal Building System shall be warranted by the Contractor on a no penal sum basis for a period of five years against materials and workmanship deficiencies; system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The Metal Building System covered under this warranty shall include but is not limited to the following: framing and structural members, roofing and siding panels and seams, interior or exterior gutters and downspouts, accessories, fasteners, trim, flashings and miscellaneous building closure items such as doors and windows (when furnished by the manufacturer), connectors, components, and fasteners, and other system components and assemblies installed to provide a weathertight system; and items specified in other sections of these specifications that become part of the metal building system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. See the attached Contractor's written warranty for issue resolution of warrantable defects. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and/or system manufacturer, which shall be submitted along with Contractor's warranty. However, the Contractor is ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in attached **WARRANTY FOR METAL BUILDING SYSTEMS**, and start upon final acceptance of the facility. The Contractor shall provide a separate bond in an amount equal to the installed total metal building system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the five year Contractor's warranty period for the entire metal

building system as outlined above.

1.7.2 Manufacturer's Material and/or System Weathertightness Warranties

The Contractor shall furnish, in writing, the following manufacturer's material warranties to the Contracting Officer which cover all Metal Building System components:

a. A manufacturer's 20 year material warranty warranting that the specified zinc-coated steel will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed securement system including fasteners and coil material.

b. A manufacturer's 20 year exterior material finish warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight, as determined by ASTM D 4214test procedures; or change colors in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to replacing the defective coated material.

1.8 COORDINATION MEETING

A coordination meeting shall be held within 45 days after contract award for mutual understanding of the metal building system contract requirements. This meeting shall take place at the building site and shall include representatives from the Contractor, the roofing/metal building system manufacturer, the roofing/metal building supplier, the erector, the designer, and the Contracting Officer. All items required by paragraph SUBMITTALS shall be discussed, including applicable standard manufacturer shop drawings, and the approval process. The Contractor shall coordinate time and arrangements for the meeting

PART 2 PRODUCTS

2.1 BUILDING COMPONENTS

Each piece or part of the assembly shall be clearly and legibly marked to correspond with the drawings.

2.2 FRAMING AND STRUCTURAL MEMBERS

Steel 1/8 inch or more in thickness shall conform to ASTM A 36/A 36M, ASTM A 529/A 529M, ASTM A 572/A 572M, or ASTM A 588/A 588M. Uncoated steel less than 1/8 inch in thickness shall conform to ASTM A 570/A 570M, ASTM A 606, or ASTM A 607. Galvanized steel shall conform to ASTM A 653/A 653M, G 90 coating designation, 0.045 inch minimum thickness. Structural pipe shall conform to ASTM A 53, ASTM A 500, ASTM A 501, ASTM A 618. Holes for structural connections shall be made in the shop.

2.3 ROOFING AND SIDING

Roofing and siding shall be steel and shall have a factory color finish.

2.3.1 Roofing

Roofing is specified in Section 07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope unless otherwise approved. Width of sheets with interlocking ribs shall provide not less than 12 inches of coverage in place. Provisions shall be made for thermal expansion and contraction consistent with the type of system to be used. Panel shall have configurations for overlapping sheets. Roof deck assemblies shall be Class 90 as defined in UL 580. Exposed, penetrating fastener may be used. Height of corrugation at overlap of adjacent roof sheets shall be the building manufacturer's standard for the indicated roof slope.

2.3.2 Siding

Siding is specified in Section 07413 METAL SIDING. Length of sheet shall be sufficient to cover the entire height of any unbroken height of wall surface unless otherwise approved. Width of sheets with interlocking ribs shall provide not less than 12 inches of coverage in place. Provisions shall be made for thermal expansion and contraction consistent with the type of system to be used. Siding shall have configurations for overlapping adjacent sheets or interlocking ribs for securing adjacent sheets. Siding shall be fastened to framework using exposed or concealed fasteners.

2.3.3 Steel Panels

Steel roofing panels are specified in Section 07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM. Roofing and Siding Siding shall be zinc-coated steel conforming to ASTM A 653/A 653M, G 90 coating designation. Panels shall be 0.024 inch thick minimum, except that when the mid field of the roof is subject to design wind uplift pressures of 60 psf or greater or the steel covering is used as a diaphragm, the entire roof system shall have a minimum thickness of 0.030 inch. Prior to shipment, mill finish panels shall be treated to inhibit the formation of oxide corrosion. Panels that have become wet during shipment but have not started to oxidize shall be dried, and retreated in accordance with manufacturer's standard practice.

2.3.4 Factory Color Finish

Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Exterior color shall be a standard color from the manufacturer that is very similar to that of the structural steel specified in Section 09900 PAINTING, GENERAL. The exterior coating shall be a nominal 1 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than 0.15 mil thickness. The interior color finish shall consist of a nominal 1 mil thick PVF2 finish otherwise the same as the exterior or acker coat with a dry film thickness of 0.35 mil. The exterior color finish shall meet the test requirements specified below.

2.3.4.1 Salt Spray Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2016 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by

ASTM D 610 and a rating of 6, over 1/16 to 1/8 inch failure at scribe, as determined by ASTM D 1654.

2.3.4.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of cracking to the naked eye.

2.3.4.3 Accelerated Weathering, Chalking Resistance and Color Change

A sample of the sheets shall be tested in accordance with ASTM D 4587, test condition D for 8 total hours. The coating shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.3.4.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.3.4.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.500 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no loss of adhesion.

2.3.4.6 Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.3.4.7 Specular Gloss

Finished roof surfaces for Operator House and Electrical Room shall have a specular gloss value of 10 or less at an angle of 85 degrees when measured in accordance with ASTM D 523.

2.3.4.8 Pollution Resistance

Coating shall show no visual effects when covered spot tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.3.5 Accessories

Flashing, trim, metal closure strips and curbs, fascia, caps, diverters,

and similar metal accessories shall be the manufacturer's standard products. Exposed metal accessories shall be finished to match the building finish. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the roofing or siding and shall not absorb or retain water.

2.4 FASTENERS

Fasteners for standing seam metal roofs shall be in accordance with Section 07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM and steel wall panels shall be zinc-coated steel, and size specified below or as otherwise approved for the applicable requirements. Fasteners for steelpanels to supports shall provide both tensile and shear strength of not less than 750 lbs per fastener. Fasteners for accessories shall be the manufacturer's standard. Exposed wall fasteners shall be color finished or provided with plastic color caps to match the covering. Nonpenetrating fastener system for wall panels using concealed clips shall be manufacturer's standard for the system provided.

2.4.1 Screws

Screws shall be as recommended by the manufacturer to meet the design strength requirements.

2.4.2 End-Welded Studs

Automatic end-welded studs shall be shouldered type with a shank diameter of not less than 3/16 inch and cap or nut for holding covering against the shoulder.

2.4.3 Explosive Actuated Fasteners

Fasteners for use with explosive actuated tools shall have a shank of not less than 0.145 inch with a shank length of not less than 1/2 inch for fastening panels to steel and not less than 1 inch for fastening panels to concrete.

2.4.4 Bolts

Bolts shall be not less than 1/4 inch diameter, shouldered or plain shank as required, with proper nuts.

2.5 GUTTERS AND DOWNSPOUTS

Gutters and downspouts shall be fabricated of zinc-coated steel have manufacturer's factory color finish. Minimum uncoated thickness of materials shall be 0.018 inch for steel. All accessories necessary for the complete installation of the gutters and downspouts shall be furnished. Accessories shall include gutter straps, downspout elbows, downspout straps and fasteners fabricated from metal compatible with the gutters and downspouts.

2.6 LOUVERS

Louvers shall be fabricated of zinc-coated steel and shall have manufacturer's factory color finish; and shall be furnished with insect screens. Minimum uncoated thickness of materials shall be 0.048 inch for steel. Manually operated louvers shall be designed to be opened and closed

from the operating floor.

2.7 DOORS

2.7.1 Hinged Doors

Hinged doors and frames shall receive a galvanic coating and factory primer and shall conform to the requirements of Section 08110 STEEL DOORS AND FRAMES. Exterior doors shall have top edges closed flush and sealed against water penetration. Hardware shall be as specified in Section 08700 BUILDERS' HARDWARE.

2.8 WINDOWS

Windows shall be of clad wood in accordance with 08550 WOOD WINDOWS. for the Operator House and Electrical Room. Windows shall be steel in accordance with Section 08510 STEEL WINDOWS for the Machinery Houses. Windows shall be of the type shown, furnished complete with operating and locking hardware, glazing, aluminum screened panels, weather stripping, framing, and fasteners to properly install the windows.

2.9 INSULATION

Thermal resistance of insulation shall be not less than the R-values shown on the contract drawings. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518. Insulation shall be a standard product with the insulation manufacturer, factory marked or identified with insulation manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Blanket insulation shall have a facing as specified in paragraph VAPOR RETARDER. Roof and wall insulation, including facings, shall have a flame spread not in excess of 10 and a smoke developed rating not in excess of 10 when tested in accordance with ASTM E 84. The stated R-value of the insulation shall be certified by an independent Registered Professional Engineer if tests are conducted in the insulation manufacturer's laboratory.

2.9.1 INSULATION

2.9.1.1 Blanket Insulation

Blanket insulation shall conform to ASTM C 991.

2.9.1.2 Insulation Retainers

Retainers shall be type, size and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams, shall have a fire resistance classification not less than that permitted for the insulation.

2.10 SEALANT

Sealant shall be an elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color and shall cure to a rubber like consistency.

2.11 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.12 VAPOR RETARDER

2.12.1 Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be white reinforced polypropylene kraft laminate (PSK). Facings and finishes shall be factory applied.

2.12.2 Vapor Retarders Separate from Insulation

Vapor retarder material shall be polyethylene sheeting conforming to the requirements of ASTM D 4397. A single ply of 10 mil polyethylene sheet; or, at the option of the Contractor, a double ply of 6 mil polyethylene sheet shall be used. A fully compatible polyethylene tape shall be provided which has equal or better water vapor control characteristics than the vapor retarder material. A cloth industrial duct tape in a utility grade shall also be provided to use as needed to protect the vapor retarder from puncturing.

2.13 SHOP PRIMING

Ferrous surfaces shall be cleaned of oil, grease, loose rust, loose mill scale, and other foreign substances and shop primed. Primer coating shall be in accordance with the manufacturer's standard system.

PART 3 EXECUTION

3.1 ERECTION

Dissimilar materials which are not compatible when contacting each other shall be insulated from each other by means of gaskets or insulating compounds. Improper or mislocated drill holes in panels shall be plugged with an oversize screw fastener and gasketed washer; however, panels with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces shall be kept clean and free from sealant, metal cuttings, excess material from thermal cutting, and other foreign materials. Exposed surfaces which have been thermally cut shall be finished smooth within a tolerance of 1/8 inch. Stained, discolored or damaged sheets shall be removed from the site. Welding of steel shall conform to AWS D1.1; welding of aluminum shall conform to AA Design Manual.

3.1.1 Framing Members and Anchor Bolts

Erection shall be in accordance with the approved erection instructions and drawings and with applicable provision of AISC ASD Spec S335. Framing members fabricated or modified on site shall be saw or abrasive cut; bolt holes shall be drilled. Onsite flame cutting of framing members, with the exception of small access holes in structural beam or column webs, will not be permitted. High-strength bolting shall conform to AISC Pub No. S329 using ASTM A 325. Improper or mislocated bolt holes in structural members or other misfits caused by improper fabrication or erection, shall be repaired in accordance with AISC Pub No. S303. Concrete work is specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Anchor bolts shall be accurately set by template while the concrete is in a plastic state.

Uniform bearing under base plates and sill members shall be provided using a nonshrinking grout. Separate leveling plates under column base plates shall not be used. Members shall be accurately spaced to assure proper fitting of panels. As erection progresses, the work shall be securely fastened to resist the dead load and wind and erection stresses. Supports for electric overhead traveling cranes shall be positioned and aligned in accordance with MHI CMAA 70.

3.1.2 Roofing and Siding Installation

Siding shall be applied with the longitudinal configurations in the vertical position. Roofing shall be applied with the longitudinal configurations in the direction of the roof slope. Accessories shall be fastened into framing members, except as otherwise approved. Closure strips shall be provided as indicated and where necessary to provide weathertight construction. Fastener and fastener spacing shall be in accordance with manufacture design.

3.1.3 Installation of Gutters and Downspouts

Gutters and downspouts shall be rigidly attached to the building. Spacing of cleats for gutters shall be 16 inches maximum. Spacing of brackets and spacers for gutters shall be 36 inches maximum. Supports for downspouts shall be spaced according to manufacturer's recommendations.

3.1.4 Louvers and Ventilators

Louvers and ventilators shall be rigidly attached to the supporting construction to assure a weather tight installation.

3.1.5 Doors and Windows

Doors and windows, including frames and hardware, shall be securely anchored to the supporting construction, shall be installed plumb and true, and shall be adjusted as necessary to provide proper operation. Joints at doors and windows shall be sealed according to manufacturer's recommendations to provide weathertight construction.

3.1.6 Insulation Installation

Insulation shall be installed as indicated and in accordance with manufacturer's instructions.

3.1.6.1 Board Insulation with Blanket Insulation

Rigid or semirigid board insulation shall be laid in close contact. If more than one layer of insulation is required, joints in the second layer shall be offset from joints in the first layer. A layer of blanket insulation shall be placed over the rigid or semirigid board insulation to be compressed against the underside of the metal roofing to reduce thermal bridging, dampen noise, and prevent roofing flutter. This layer of blanket insulation shall be compressed a minimum of 50 percent.

3.1.6.2 Blanket Insulation

Blanket insulation shall be installed over the purlins and held tight against the metal roofing. It shall be supported by an integral facing or other commercially available support system.

3.1.7 Vapor Retarder Installation

3.1.7.1 Integral Facing on Blanket Insulation

Integral facing on blanket insulation shall have the facing lapped and sealed with a compatible tape to provide a vapor tight membrane.

3.1.7.2 Polyethylene Vapor Retarder

The polyethylene vapor retarder membrane shall be installed over the entire surface. A fully compatible polyethylene tape shall be used to seal the edges of the sheets to provide a vapor tight membrane. Sheet edges shall be lapped not less than 6 inches. Sufficient material shall be provided to avoid inducing stresses in the sheets due to stretching or binding. All tears or punctures that are visible in the finished surface at any time during the construction process shall be sealed with polyethylene tape.

3.1.8 Wall Liner

Wall liner shall be securely fastened into place in accordance with the manufacturer's recommendation and in a manner to present a neat appearance.

3.2 FIELD PAINTING

Immediately upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with the same material used for the shop coat. Shop-primed ferrous surfaces exposed on the outside of the building and all shop-primed surfaces of doors and windows shall be painted with two coats of an approved exterior enamel. Factory color finished surfaces shall be touched up as necessary with the manufacturer's recommended touch-up paint.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM

FACILITY
DESCRIPTION:_____

BUILDING
NUMBER:_____

CORPS OF ENGINEERS CONTRACT
NUMBER:_____

CONTRACTOR

CONTRACTOR:_____
ADDRESS:_____

POINT OF
CONTACT:_____

TELEPHONE
NUMBER:_____

OWNER

OWNER:_____

ADDRESS:_____

POINT OF
CONTACT:_____

TELEPHONE
NUMBER:_____

CONSTRUCTION AGENT

CONSTRUCTION
AGENT:_____
ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE
NUMBER:_____

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM
(continued)

THE METAL BUILDING SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY [_____] FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCIES, WIND DAMAGE AND STRUCTURAL FAILURE WITHIN PROJECT SPECIFIED DESIGN LOADS, AND LEAKAGE. THE METAL BUILDING SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING: FRAMING AND STRUCTURAL MEMBERS, ROOFING AND SIDING PANELS AND SEAMS, INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS, ACCESSORIES, TRIM, FLASHINGS AND MISCELLANEOUS BUILDING CLOSURE ITEMS SUCH AS DOORS AND WINDOWS (WHEN FURNISHED BY THE MANUFACTURER), CONNECTORS, COMPONENTS, AND FASTENERS, AND OTHER SYSTEM COMPONENTS AND ASSEMBLIES INSTALLED TO PROVIDE A WEATHERTIGHT SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THESE SPECIFICATIONS THAT BECOME PART OF THE METAL BUILDING SYSTEM. ALL MATERIAL AND WORKMANSHIP DEFICIENCIES, SYSTEM DETERIORATION CAUSED BY EXPOSURE TO THE ELEMENTS AND/OR INADEQUATE RESISTANCE TO SPECIFIED SERVICE DESIGN LOADS, WATER LEAKS AND WIND UPLIFT DAMAGE SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER

ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE AND LEAKAGE ASSOCIATED WITH THE METAL BUILDING SYSTEM COVERED UNDER THIS WARRANTY SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON [_____] AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Company President) (Date)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM
(continued)

THE CONTRACTOR SHALL SUPPLEMENT THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE METAL BUILDING SYSTEM, WHICH SHALL BE SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR WILL BE ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).

2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.

3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.

4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.

5. FAILURE OF ANY PART OF THE BUILDING SYSTEM DUE TO ACTIONS BY THE OWNER WHICH INHIBIT FREE DRAINAGE FROM THE ROOF, AND GUTTERS AND DOWNSPOUTS; OR CONDITIONS WHICH CREATE PONDING WATER ON THE ROOF OR AGAINST THE BUILDING SIDING.

6. THIS WARRANTY APPLIES TO THE METAL BUILDING SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.

7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES. REPORTS OF LEAKS AND BUILDING SYSTEM DEFICIENCIES SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE BY TELEPHONE OR IN WRITING FROM EITHER THE OWNER, OR CONTRACTING OFFICER. EMERGENCY REPAIRS, TO PREVENT FURTHER ROOF LEAKS, SHALL BE INITIATED IMMEDIATELY; A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS SSSMR SYSTEM WITHIN SEVEN CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM
(Exclusions from Coverage Continued)

IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE METAL BUILDING SYSTEM REPLACED OR REPAIRED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR. IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION, UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. THE REQUEST FOR AN ARBITRATOR MUST BE MADE WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED THE PARTIES SHALL, WITHIN 10 DAYS JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES SHALL CONFER WITHIN 10 DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE NAME REMAINS. THE REMAINING PERSON SHALL BE THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED ETC., SHALL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT SHALL PAY FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. A WRITTEN ARBITRATOR'S DECISION WILL BE REQUESTED NOT LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT. A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 13280

ASBESTOS ABATEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2	(1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z87.1	(1989; Errata; Z87.1a) Occupational and Educational Eye and Face Protection
ANSI Z88.2	(1992) Respiratory Protection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1331	(1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E 1368	(1997) Visual Inspection of Asbestos Abatement Projects

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations and Definitions
49 CFR 172	Hazardous Materials Table, Special

	Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7	(1990) Compressed Air for Human Respiration
CGA G-7.1	(1997) Commodity Specification for Air

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual (http://www.hq.usace.army.mil/soh/hqusace_soh.htm)

ENGINEERING PAMPHLET (EP)

EP 1110-1-11	(1992) Asbestos Abatement Guideline Detail Sheets

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90-018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 340/1-90-019	(1990) Asbestos/NESHAP Adequately Wet Guidance
EPA 560/5-85-024	(1985) Guidance for Controlling Asbestos-Containing Materials in Buildings

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(1999) Methods of Fire Tests for Flame-Resistant Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 84-100	(1984; Supple 1985, 1987, 1988 & 1990) NIOSH Manual of Analytical Methods

UNDERWRITERS LABORATORIES (UL)

UL 586	(1996; Rev thru Aug 1999) High-Efficiency, Particulate, Air Filter Units

1.2 DEFINITIONS

a. Adequately Wet: A term defined in 40 CFR 61, Subpart M, and EPA 340/1-90-019 meaning to sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.

b. Aggressive Method: Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact asbestos-containing material (ACM).

c. Amended Water: Water containing a wetting agent or surfactant with a surface tension of at least 29 dynes per square centimeter when tested in accordance with ASTM D 1331.

d. Asbestos: Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophylite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

e. Asbestos-Containing Material (ACM): Any materials containing more than one percent asbestos.

f. Asbestos Fiber: A particulate form of asbestos, 5 micrometers or longer, with a length-to-width ratio of at least 3 to 1.

g. Authorized Person: Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

h. Building Inspector: Individual who inspects buildings for asbestos and has EPA Model Accreditation Plan (MAP) "Building Inspector" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

* i. Certified Industrial Hygienist (CIH): An Industrial Hygienist certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

j. Class I Asbestos Work: Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.

k. Class II Asbestos Work: Activities defined by OSHA involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos - containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials which would fit into a glovebag may be classified as a Class III job.

l. Class III Asbestos Work: Activities defined by OSHA that involve repair and maintenance operations, where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

m. Class IV Asbestos Work: Maintenance and custodial construction activities during which employees contact but do not disturb ACM and activities to clean-up dust, waste and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists

and cleaning up loose ACM debris from TSI or surfacing ACM following construction.

n. Clean room: An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

o. Competent Person: In addition to the definition in 29 CFR 1926, Section .32(f), a person who is capable of identifying existing asbestos hazards as defined in 29 CFR 1926, Section .1101, selecting the appropriate control strategy, has the authority to take prompt corrective measures to eliminate them and has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

p. Contractor/Supervisor: Individual who supervises asbestos abatement work and has EPA Model Accreditation Plan "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.

q. Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.

r. Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

s. Demolition: The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

t. Disposal Bag: A 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926, Section .1101, used for transporting asbestos waste from containment to disposal site.

u. Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in 1 standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.

v. Equipment Room or Area: An area adjacent to the regulated area used for the decontamination of employees and their equipment.

w. Employee Exposure: That exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

x. Fiber: A fibrous particulate, 5 micrometers or longer, with a length to width ratio of at least 3 to 1.

y. Friable ACM: A term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40

CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent, as determined by a method other than point counting by PLM, the asbestos content is verified by point counting using PLM.

z. Glovebag: Not more than a 60 by 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

aa. High-Efficiency Particulate Air (HEPA) Filter: A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

bb. Homogeneous Area: An area of surfacing material or thermal system insulation that is uniform in color and texture.

cc. Industrial Hygienist: A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.

dd. Intact: ACM which has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. Removal of "intact" asphaltic, resinous, cementitious products does not render the ACM non-intact simply by being separated into smaller pieces.

ee. Model Accreditation Plan (MAP): USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763, Subpart E, Appendix C.

ff. Modification: A changed or altered procedure, material or component of a control system, which replaces a procedure, material or component of a required system.

gg. Negative Exposure Assessment: A demonstration by the Contractor to show that employee exposure during an operation is expected to be consistently below the OSHA Permissible Exposure Limits (PELs).

hh. NESHAP: National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61, Subpart M.

ii. Nonfriable ACM: A NESHAP term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

jj. Nonfriable ACM (Category I): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

kk. Nonfriable ACM (Category II): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos, as determined using the methods specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

ll. Permissible Exposure Limits (PELs):

(1) PEL-Time weighted average(TWA): Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8 hour time weighted average (TWA), as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

(2) PEL-Excursion Limit: An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.

mm. Regulated Area: An OSHA term defined in 29 CFR 1926, Section .1101 meaning an area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is conducted; also any adjoining area where debris and waste from such asbestos work accumulate; and an area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limit.

nn. Removal: All operations where ACM is taken out or stripped from structures or substrates, and includes demolition operations.

oo. Repair: Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM attached to structures or substrates. If the amount of asbestos so "disturbed" cannot be contained in 1 standard glovebag or waste bag, Class I precautions are required.

pp. Spills/Emergency Cleanups: Cleanup of sizable amounts of asbestos waste and debris which has occurred, for example, when water damage occurs in a building, and sizable amounts of ACM are dislodged. A Competent Person evaluates the site and ACM to be handled, and based on the type, condition and extent of the dislodged material, classifies the cleanup as Class I, II, or III. Only if the material was intact and the cleanup involves mere contact of ACM, rather than disturbance, could there be a Class IV classification.

qq. Surfacing ACM: Asbestos-containing material which contains more than 1% asbestos and is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

rr. Thermal system insulation (TSI) ACM: ACM which contains more than 1% asbestos and is applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components

to prevent heat loss or gain or water condensation.

ss. Transite: A generic name for asbestos cement wallboard and pipe.

tt. Worker: Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926, Section .1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation required by 40 CFR 763, Subpart E, Appendix C, if required by the OSHA Class of work to be performed or by the state where the work is to be performed.

1.3 DESCRIPTION OF WORK

The work covered by this section includes the removal of asbestos-containing materials (ACM) which are encountered during demolition activities associated with this project and describes procedures and equipment required to protect workers and occupants of the regulated area from contact with airborne asbestos fibers and ACM dust and debris. Activities may include all OSHA Classes of work operations involving ACM. The work also includes containment, storage, transportation and disposal of the generated ACM wastes. More specific operational procedures shall be detailed in the required Accident Prevention Plan and its subcomponents, the Asbestos Hazard Abatement Plan and Activity Hazard Analyses required in paragraph SAFETY AND HEALTH PROGRAM AND PLANS.

1.3.1 Abatement Work Tasks

The specific ACMs to be abated are identified on the project drawings. Each individual ACM abatement work task shall be included in Table 1, "Individual Work Task Data Elements" at the end of this section. Appropriate RESPONSE ACTION DETAIL SHEET item to be abated and methods to be used and SET-UP DETAIL SHEETS containment techniques to include safety precautions and methods shall be included. Refer to EP 1110-1-11 for RESPONSE ACTION DETAIL SHEET and SET-UP DETAIL SHEETS. Throughout this section references to "Sheet XX" refer to the numerous detail sheets included in EP 1110-1-11.

1.3.2 Unexpected Discovery of Asbestos

For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify the Contracting Officer (CO) who will have the option of ordering up to 5 bulk samples to be obtained at the Contractor's expense and delivered to a laboratory accredited under the National Institute of Standards and Technology (NIST) "National Voluntary Laboratory Accreditation Program (NVLAP)" and analyzed by PLM at no additional cost to the Government. Any additional components identified as ACM that have been approved by the Contracting Officer for removal shall be removed by the Contractor and will be paid for by an equitable adjustment to the contract price under the CONTRACT CLAUSE titled "changes". Sampling activities undertaken to determine the presence of additional ACM shall be conducted by personnel who have successfully completed the EPA Model Accreditation Plan (MAP) "Building Inspector" training course required by 40 CFR 763, Subpart E, Appendix C.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation;

submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Materials and Equipment; FIO.

Manufacturer's catalog data for all materials and equipment to be used in the work, including brand name, model, capacity, performance characteristics and any other pertinent information. Test results and certificates from the manufacturer of encapsulants substantiating compliance with performance requirements of this specification. Material Safety Data Sheets for all chemicals to be used onsite in the same format as implemented in the Contractor's HAZARD COMMUNICATION PROGRAM. Data shall include, but shall not be limited to, the following items:

a. High Efficiency Filtered Air (HEPA) local exhaust equipment

b. Vacuum cleaning equipment

c. Pressure differential monitor for HEPA local exhaust equipment

d. Air monitoring equipment

e. Respirators

f. Personal protective clothing and equipment

(1) Coveralls
(2) Underclothing
(3) Other work clothing
(4) Foot coverings
(5) Hard hats
(6) Eye protection
(7) Other items required and approved by Contractors Designated IH and Competent Person

g. Glovebag

h. Duct Tape

i. Disposal Containers

(1) Disposal bags
(2) Fiberboard drums
(3) Paperboard boxes

j. Sheet Plastic

(1) Polyethylene Sheet - General
(2) Polyethylene Sheet - Flame Resistant
(3) Polyethylene Sheet - Reinforced

k. Wetting Agent

(1) Amended Water
(2) Removal encapsulant

l. Strippable Coating

m. Prefabricated Decontamination Unit

n. Other items

o. Chemical encapsulant

p. Chemical encasement materials

q. Material Safety Data Sheets (for all chemicals proposed)

SD-04 Drawings

Site Layout; GA.

Descriptions, detail project drawings, and site layout to include worksite containment area techniques as prescribed on applicable SET-UP DETAIL SHEETS, local exhaust ventilation system locations, decontamination units and load-out units, other temporary waste storage facility, access tunnels, location of temporary utilities (electrical, water, sewer) and boundaries of each regulated area.

SD-08 Statements

Qualifications; GA.

A written report providing evidence of qualifications for personnel, facilities and equipment assigned to the work.

Training Program; FIO.

A copy of the written project site-specific training material as indicated in 29 CFR 1926, Section .1101 that will be used to train onsite employees. The training document shall be signed by the Contractor's Designated IH and Competent Person.

Medical Requirements; FIO.

Physician's written opinion.

Encapsulants; GA.

Certificates stating that encapsulants meet the applicable specified performance requirements.

SD-09 Reports

Exposure Assessment and Air Monitoring; GA.

Initial exposure assessments, negative exposure assessments, air-monitoring results and documentation.

Local Exhaust Ventilation; FIO.

Pressure differential recordings.

Licenses, Permits and Notifications; GA.

Licenses, permits, and notifications.

Response Action Detail Sheet; GA

Submit one sheet per location of known asbestos.

Set-Up Detail Sheets;GA

Submit whichever detail sheets are relevant to this project.

SD-13 Certificates

Vacuum, Filtration and Ventilation Equipment; FIO.

Manufacturer's certifications showing compliance with ANSI Z9.2 for:

a. Vacuums.

b. Water filtration equipment.

c. Ventilation equipment.

d. Other equipment required to contain airborne asbestos fibers.

SD-18 Records

Respiratory Protection Program; GA.

Records of the respirator program.

Cleanup and Disposal; GA.

Waste shipment records. Weigh bills and delivery tickets shall be furnished for information only.

1.5 QUALIFICATIONS

1.5.1 Written Qualifications and Organization Report

The Contractor shall furnish a written qualifications and organization report providing evidence of qualifications of the Contractor, Contractor's Project Supervisor, Designated Competent Person, supervisors and workers; Designated IH (person assigned to project and firm name); independent testing laboratory (including name of firm, principal, and analysts who will perform analyses); all subcontractors to be used including disposal transportation and disposal facility firms, subcontractor supervisors, subcontractor workers; and any others assigned to perform asbestos abatement and support activities. The report shall include an organization chart showing the Contractor's staff organization for this project by name and title, chain of command and reporting relationship with all subcontractors. The report shall be signed by the Contractor, the Contractor's onsite project manager, Designated Competent Person, Designated IH, designated testing laboratory and the principals of all subcontractors to be used. The Contractor shall include the following statement in the report: "By signing this report I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and the federal, state and local requirements specified in paragraph

SAFETY AND HEALTH PROGRAM AND PLANS for those asbestos abatement activities that they will be involved in."

1.5.2 Specific Requirements

The Contractor shall designate in writing, personnel meeting the following qualifications:

a. Designated Competent Person: The name, address, telephone number, and resume of the Contractor's Designated Competent Person shall be provided. Evidence that the full-time Designated Competent Person is qualified in accordance with 29 CFR 1926, Sections .32 and .1101, has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and is experienced in the administration and supervision of asbestos abatement projects, including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees onsite, etc. The duties of the Competent Person shall include the following: controlling entry to and exit from the regulated area; supervising any employee exposure monitoring required by 29 CFR 1926, Section .1101; ensuring that all employees working within a regulated area wear the appropriate personal protective equipment (PPE), are trained in the use of appropriate methods of exposure control, and use the hygiene facilities and decontamination procedures specified; and ensuring that engineering controls in use are in proper operating conditions and are functioning properly. The Designated Competent Person shall be responsible for compliance with applicable federal, state and local requirements, the Contractor's Accident Prevention Plan and Asbestos Hazard Abatement Plan. The Designated Competent Person shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that this person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The Designated Competent Person shall be onsite at all times during the conduct of this project.

b. Project and Other Supervisors: The Contractor shall provide the name, address, telephone number, and resume of the Project Supervisor and other supervisors who have responsibility to implement the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses, the authority to direct work performed under this contract and verify compliance, and have EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C. The Project Supervisor and other supervisors shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this

paragraph. The Contractor shall submit evidence that the Project Supervisor has a minimum of 2 years of on-the-job asbestos abatement experience relevant to project supervisor responsibilities and the other supervisors have a minimum of 1 year on-the-job asbestos abatement experience commensurate with the responsibilities they will have on this project.

c. Designated Industrial Hygienist: The Contractor shall provide the name, address, telephone number, resume and other information specified below for the Industrial Hygienist (IH) selected to prepare the Contractor's Asbestos Hazard Abatement Plan, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring that safety and health requirements are complied with during the performance of all required work. The Designated IH shall be a person who is board certified in the practice of industrial hygiene or board eligible (meets all education and experience requirements) as determined and documented by the American Board of Industrial Hygiene (ABIH), has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and has a minimum of 2 years of comprehensive experience in planning and overseeing asbestos abatement activities. The Designated IH shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Designated IH shall be completely independent from the Contractor according to federal, state, or local regulations; that is, shall not be a Contractor's employee or be an employee or principal of a firm in a business relationship with the Contractor negating such independent status. A copy of the Designated IH's current valid ABIH certification or confirmation of eligibility in writing from the ABIH shall be included. The Designated IH shall be visit the site at least twice per week for the duration of asbestos activities and shall be available for emergencies. In addition, the Designated IH shall prepare, and the Contractor shall submit, the name, address, telephone numbers and resumes of additional IH's and industrial hygiene technicians (IHT) who will be assisting the Designated IH in performing onsite tasks. IHs and IHTs supporting the Designated IH shall have a minimum of 2 years of practical onsite asbestos abatement experience. The formal reporting relationship between the Designated IH and the support IHs and IHTs, the Designated Competent Person, and the Contractor shall be indicated.

d. Asbestos Abatement Workers: Asbestos abatement workers shall meet the requirements contained in 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment" in this paragraph.

e. Worker Training and Certification of Worker Acknowledgment: Training documentation will be required for each employee who will perform OSHA Class I, Class II, Class III, or Class IV asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same

format and containing the same information as the example certificate at the end of this section. Training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.

f. Physician: The Contractor shall provide the name, medical qualifications, address, telephone number and resume of the physician who will or has performed the medical examinations and evaluations of the persons who will conduct the asbestos abatement work tasks. The physician shall be currently licensed by the state where the workers will be or have been examined, have expertise in pneumoconiosis and shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1926, Section .1101 and paragraph MEDICAL REQUIREMENTS. The physician shall be familiar with the site's hazards and the scope of this project.

g. First Aid and CPR Trained Persons: The names of at least 2 persons who are currently trained in first aid and CPR by the American Red Cross or other approved agency shall be designated and shall be onsite at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030 and shall be included in the Contractor's Bloodborne Pathogen Program. These persons may perform other duties but shall be immediately available to render first aid when needed. A copy of each designated person's current valid First Aid and CPR certificate shall be provided.

h. Independent Testing Laboratory: The Contractor shall provide the name, address and telephone number of the independent testing laboratory selected to perform the sample analyses and report the results. The testing laboratory shall be completely independent from the Contractor as recognized by federal, state or local regulations. Written verification of the following criteria, signed by the testing laboratory principal and the Contractor, shall be submitted:

(1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting PCM of airborne samples using the methods specified by 29 CFR 1926, Section .1101, OSHA method ID-160, the most current version of NIOSH Pub No. 84-100 Method 7400, and NIOSH Pub No. 84-100 Method 7402, transmission electron microscopy (TEM); the laboratory is currently judged proficient (classified as acceptable) in counting airborne asbestos samples by PCM by successful participation in each of the last 4 rounds in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program; the names of the selected microscopists who will analyze airborne samples by PCM with verified documentation of their proficiency to conduct PCM analyses by being judged proficient in counting samples as current participating analysts in the AIHA PAT Program, and having successfully completed the Asbestos Sampling and Analysis course (NIOSH 582 or equivalent) with a copy of course completion certificate provided; when the PCM analysis is to be conducted onsite, documentation shall be provided certifying that the onsite analyst meets the same requirements.

(2) Polarized light microscopy (PLM): The laboratory is fully equipped and proficient in conducting PLM analyses of suspect ACM bulk samples in accordance with 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for bulk asbestos analysis and will use analysts (names shall be provided) with demonstrated proficiency to conduct PLM to include its application to the identification and quantification of asbestos content.

(3) Transmission electron microscopy (TEM): The laboratory is fully equipped and proficient in conducting TEM analysis of airborne samples using the mandatory method specified by 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for airborne sample analysis of asbestos by TEM; the laboratory will use analysts (names shall be provided) that are currently evaluated as competent with demonstrated proficiency under the NIST NVLAP for airborne sample analysis of asbestos by TEM.

(4) PCM/TEM: The laboratory is fully equipped and each analyst (name shall be provided) possesses demonstrated proficiency in conducting PCM and TEM analysis of airborne samples using NIOSH Pub No. 84-100Method 7400 PCM and NIOSH Pub No. 84-100 Method 7402 (TEM confirmation of asbestos content of PCM results) from the same filter.

i. Disposal Facility, Transporter: The Contractor shall provide written evidence that the landfill to be used is approved for asbestos disposal by the USEPA, state and local regulatory agencies. Copies of signed agreements between the Contractor including subcontractors and transporters and the asbestos waste disposal facility to accept and dispose of all asbestos containing waste generated during the performance of this contract shall be provided. Qualifications shall be provided for each subcontractor or transporter to be used, indicating previous experience in transport and disposal of asbestos waste to include all required state and local waste hauler requirements for asbestos. The Contractor and transporters shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61, Section .150(b), and other applicable state or local requirements.

1.5.3 Federal, State or Local Citations on Previous Projects

The Contractor and all subcontractors shall submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated including projects, dates, and reasons for terminations. If there are none, a negative declaration signed by an officer of the company shall be provided.

1.6 REGULATORY REQUIREMENTS

In addition to detailed requirements of this specification, work performed under this contract shall comply with EM 385-1-1, applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. This includes, but is not limited to, OSHA standards, 29 CFR 1926, especially Section .1101, 40 CFR 61, Subpart M and 40 CFR 763. Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply. The following state and local laws, rules and regulations regarding demolition, removal, cleanup, housekeeping, handling, storing, transporting and disposing of asbestos material apply.

1.7 SAFETY AND HEALTH PROGRAM AND PLANS

The Contractor shall develop and submit a written comprehensive site-specific Accident Prevention Plan at least 30 days prior to the preconstruction conference. The Accident Prevention Plan shall address requirements of EM 385-1-1, Appendix A, covering onsite work to be performed by the Contractor and subcontractors. The Accident Prevention Plan shall incorporate an Asbestos Hazard Abatement Plan, and Activity Hazard Analyses as separate appendices into 1 site specific Accident Prevention Plan document. Any portions of the Contractor's overall Safety and Health Program that are referenced in the Accident Prevention Plan, e.g., respirator program, hazard communication program, confined space entry program, etc., shall be included as appendices to the Accident Prevention Plan. The plan shall take into consideration all the individual asbestos abatement work tasks identified in Table 1. The plan shall be prepared, signed (and sealed, including certification number if required), and dated by the Contractor's Designated IH, Competent Person, and Project Supervisor.

1.7.1 Asbestos Hazard Abatement Plan Appendix

The Asbestos Hazard Abatement Plan appendix to the Accident Prevention Plan shall include, but not be limited to, the following:

a. The personal protective equipment to be used;

b. The location and description of regulated areas including clean and dirty areas,access tunnels, and decontamination unit (clean room, shower room, equipment room, storage areas such as load-out unit);

c. Initial exposure assessment in accordance with 29 CFR 1926, Section .1101;

d. Level of supervision;

e. Method of notification of other employers at the worksite;

f. Abatement method to include containment and control procedures;

g. Interface of trades involved in the construction;

h. Sequencing of asbestos related work;

i. Storage and disposal procedures and plan;

j. Type of wetting agent and asbestos encapsulant to be used;

k. Location of local exhaust equipment;

l. Air monitoring methods (personal, environmental and clearance);

m. Bulk sampling and analytical methods (if required);

n. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber concentrations;

o. Fire and medical emergency response procedures;

p. The security procedures to be used for all regulated areas.

1.7.2 Activity Hazard Analyses Appendix

Activity Hazard Analyses, for each major phase of work, shall be submitted and updated during the project. The Activity Hazard Analyses format shall be in accordance with EM 385-1-1 (Figure 1-1). The analysis shall define the activities to be performed for a major phase of work, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the Activity Hazard Analyses has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the onsite Government representatives. The Activity Hazard Analyses shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations.

1.8 PRECONSTRUCTION CONFERENCE AND ONSITE SAFETY

The Contractor and the Contractor's Designated Competent Person, Project Supervisor, and Designated IH shall meet with the Contracting Officer prior to beginning work at a safety preconstruction conference to discuss the details of the Contractor's submitted Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses appendices. Deficiencies in the Accident Prevention Plan will be discussed and the Accident Prevention Plan shall be revised to correct the deficiencies and resubmitted for acceptance. Any changes required in the specification as a result of the Accident Prevention Plan shall be identified specifically in the plan to allow for free discussion and acceptance by the Contracting Officer, prior to the start of work. Onsite work shall not begin until the Accident Prevention Plan has been accepted. A copy of the written Accident Prevention Plan shall be maintained onsite. Changes and modifications to the accepted Accident Prevention Plan shall be made with the knowledge and concurrence of the Designated IH, the Project Supervisor, Designated Competent Person, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Designated IH shall bring such hazard to the attention of the Project Supervisor, Designated Competent Person, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Once accepted by the Contracting Officer, the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses will be enforced as if an addition to the contract. Disregarding the provisions of this contract or the accepted

Accident Prevention Plan will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

1.9 SECURITY

Fenced and locked security area shall be provided for each regulated area. A log book shall be kept documenting entry into and out of the regulated area. Entry into regulated areas shall only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas shall be trained, be medically evaluated, and wear the required personal protective equipment for the specific regulated area to be entered.

1.10 MEDICAL REQUIREMENTS

Medical requirements shall conform to 29 CFR 1926, Section .1101.

1.10.1 Medical Examinations

Before being exposed to airborne asbestos fibers, workers shall be provided with a medical examination as required by 29 CFR 1926, Section .1101 and other pertinent state or local requirements. This requirement shall have been satisfied within the last 12 months. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. X-ray films of asbestos workers shall be identified to the consulting radiologist and medical record jackets shall be marked with the word "asbestos."

1.10.1.1 Information Provided to the Physician

The Contractor shall provide the following information in writing to the examining physician:

a. A copy of 29 CFR 1926, Section .1101 and Appendices D, E, G, and I;

b. A description of the affected employee's duties as they relate to the employee's exposure;

c. The employee's representative exposure level or anticipated exposure level;

d. A description of any personal protective and respiratory equipment used or to be used;

e. Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

1.10.1.2 Written Medical Opinion

For each worker, a written medical opinion prepared and signed by a licensed physician indicating the following:

a. Summary of the results of the examination.

b. The potential for an existing physiological condition that would place the employee at an increased risk of health impairment from exposure to asbestos.

c. The ability of the individual to wear personal protective equipment, including respirators, while performing strenuous work tasks under cold and/or heat stress conditions.

d. A statement that the employee has been informed of the results of the examination, provided with a copy of the results, informed of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure, and informed of any medical condition that may result from asbestos exposure.

1.10.2 Medical and Exposure Records

Complete and accurate records shall be maintained of each employee's medical examinations, medical records, and exposure data, as required by 29 CFR 1910, Section .1910.20 and 29 CFR 1926, Section .1101 for a period of 50 years after termination of employment. Records of the required medical examinations and exposure data shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health (OSHA) or authorized representatives of the employee and an employee's physician upon request of the employee or former employee. A copy of the required medical certification for each employee shall be maintained on file at the worksite for review, as requested by the Contracting Officer or the representatives.

1.11 TRAINING PROGRAM

1.11.1 General Training Requirements

The Contractor shall establish a training program as specified by EPA Model Accreditation Plan (MAP), training requirements at 40 CFR 763, Subpart E, Appendix C, OSHA requirements at 29 CFR 1926, Section .1101(k)(9), and this specification. Contractor employees shall complete the required training for the type of work they are to perform and such training shall be documented and provided to the Contracting Officer as specified in paragraph QUALIFICATIONS.

1.11.2 Project Specific Training

Prior to commencement of work, each worker shall be instructed by the Contractor's Designated IH and Competent Person in the following project specific training:

a. The hazards and health effects of the specific types of ACM to be abated;

b. The content and requirements of the Contractor's Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses and site-specific safety and health precautions;

c. Hazard Communication Program;

d. Hands-on training for each asbestos abatement technique to be employed;

e. Heat and/or cold stress monitoring specific to this project;

f. Air monitoring program and procedures;

g. Medical surveillance to include medical and exposure record-keeping procedures;

h. The association of cigarette smoke and asbestos-related disease;

i. Security procedures;

j. Specific work practice controls and engineering controls required for each Class of work in accordance with 29 CFR 1926, Section .1101.

1.12 RESPIRATORY PROTECTION PROGRAM

The Contractor's Designated IH shall establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1926, Section .1101, 29 CFR 1910, Section .134, ANSI Z88.2, CGA G-7, CGA G-7.1 and DETAIL SHEET 12. The Contractor's Designated IH shall establish minimum respiratory protection requirements based on measured or anticipated levels of airborne asbestos fiber concentrations encountered during the performance of the asbestos abatement work. The Contractor's respiratory protection program shall include, but not be limited to, the following elements:

a. The company policy, used for the assignment of individual responsibility, accountability, and implementation of the respiratory protection program.

b. The standard operating procedures covering the selection and use of respirators. Respiratory selection shall be determined by the hazard to which the worker is exposed.

c. Medical evaluation of each user to verify that the worker may be assigned to an activity where respiratory protection is required.

d. Training in the proper use and limitations of respirators.

e. Respirator fit-testing, i.e., quantitative, qualitative and individual functional fit checks.

f. Regular cleaning and disinfection of respirators.

g. Routine inspection of respirators during cleaning and after each use when designated for emergency use.

h. Storage of respirators in convenient, clean, and sanitary locations.

i. Surveillance of regulated area conditions and degree of employee exposure (e.g., through air monitoring).

j. Regular evaluation of the continued effectiveness of the respiratory protection program.

k. Recognition and procedures for the resolution of special problems as they affect respirator use, e.g., no facial hair that comes between the respirator face piece and face or interferes with valve function; prescription eye wear usage; contact lenses usage; etc..

l. Proper training in putting on and removing respirators.

1.12.1 Respiratory Fit Testing

A qualitative or quantitative fit test conforming to 29 CFR 1926, Section 1101, Appendix C shall be conducted by the Contractor's Designated IH for each Contractor worker required to wear a respirator, and for the Contracting Officer and authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test shall be performed for each worker wearing a negative-pressure respirator prior to initially wearing a respirator on this project and every 6 months thereafter. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, or of full-facepiece air purifying respirators where they are worn at levels at which half-facepiece air purifying respirators are permitted. If physical changes develop that will affect the fit, a new fit test for the worker shall be performed. Functional fit checks shall be performed by employees each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.12.2 Respirator Selection and Use Requirements

The Contractor shall provide respirators, and ensure that they are used as required by 29 CFR 1926, Section .1101 and in accordance with the manufacturer's recommendations. Respirators shall be jointly approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (MSHA/NIOSH), or by NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. Personnel who handle ACM, enter regulated areas that require the wearing of a respirator, or who are otherwise carrying out abatement activities that require the wearing of a respirator, shall be provided with approved respirators that are fully protective of the worker at the measured or anticipated airborne asbestos concentration level to be encountered. For air-purifying respirators, the particulate filter portion of the cartridges or canister approved for use in airborne asbestos environments shall be high-efficiency particulate air (HEPA). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type shall be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered. Recommendations made by the Contractor's Designated IH to downgrade respirator type shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person in consultation with the Designated IH, shall have the authority to take immediate action to upgrade or downgrade respiratory type when there is an immediate danger to the health and safety of the wearer. Respirators shall be used in the following circumstances:

a. During all Class I asbestos jobs.

b. During all Class II work where the ACM is not removed in a substantially intact state.

c. During all Class II work which is not performed using wet methods. Respirators need not be worn during removal of ACM from sloped roofs when a negative exposure assessment has been made and ACM is removed in an intact state.

d. During all Class II and III asbestos jobs where the Contractor

does not produce a negative exposure assessment.

e. During all work where employees are exposed above the PEL-TWA or PEL-Excursion Limit.

f. In emergencies

1.12.3 Class I Work

The Contractor shall provide: (1) a tight-fitting, powered air purifying respirator equipped with high efficiency filters, or (2) a full-facepiece supplied air respirator operated in the pressure demand mode, equipped with HEPA egress cartridges, or (3) an auxiliary positive pressure self-contained breathing apparatus, for all employees within the regulated area where Class I work is being performed; provided that a negative exposure assessment has not been produced, and that the exposure level will not exceed 1 f/cc as an 8-hour time weighted average. A full-facepiece supplied air respirator, operated in the pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus shall be provided under such conditions, if the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.

1.12.4 Class II and III Work

The Contractor shall provide an air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment ; and Class III jobs where TSI or surfacing ACM is being disturbed.

1.12.5 Sanitation

Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

1.13 HAZARD COMMUNICATION PROGRAM

A hazard communication program shall be established and implemented in accordance with 29 CFR 1926, Section .59. Material safety data sheets (MSDSs) shall be provided for all hazardous materials brought onto the worksite. One copy shall be provided to the Contracting Officer and 1 copy shall be included in the Contractor's Hazard Communication Program.

1.14 LICENSES, PERMITS AND NOTIFICATIONS

1.14.1 General Legal Requirements

Necessary licenses, permits and notifications shall be obtained in conjunction with the project's asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by federal, state, regional, and local authorities. The Contractor shall notify the Regional Office of the USEPA, state's environmental protection agency responsible for asbestos air emissions, local air pollution control district/agency state and the Contracting Officer in writing, at least 10 days prior to the commencement of work, in accordance with 40 CFR 61, Subpart M, and state and local requirements to include the mandatory "Notification of Demolition and Renovation Record" form and other required notification documents. Notification shall be by

Certified Mail, Return Receipt Requested. The Contractor shall furnish copies of the receipts to the Contracting Officer, in writing, prior to the commencement of work. Local fire department shall be notified 3 days before fire-proofing material is removed from a building and the notice shall specify whether or not the material contains asbestos. A copy of the rental company's written acknowledgment and agreement shall be provided as required by paragraph RENTAL EQUIPMENT. For licenses, permits, and notifications that the Contractor is responsible for obtaining, the Contractor shall pay any associated fees or other costs incurred.

1.14.2 Litigation and Notification

The Contractor shall notify the Contracting Officer if any of the following occur:

a. The Contractor or any of the subcontractors are served with notice of violation of any law, regulation, permit or license which relates to this contract;

b. Proceedings are commenced which could lead to revocation of related permits or licenses; permits, licenses or other Government authorizations relating to this contract are revoked;

c. Litigation is commenced which would affect this contract;

d. The Contractor or any of the subcontractors become aware that their equipment or facilities are not in compliance or may fail to comply in the future with applicable laws or regulations.

1.15 PERSONAL PROTECTIVE EQUIPMENT

Three complete sets of personal protective equipment shall be made available to the Contracting Officer and authorized visitors for entry to the regulated area. Contracting Officer and authorized visitors shall be provided with training equivalent to that provided to Contractor employees in the selection, fitting, and use of the required personal protective equipment and the site safety and health requirements. Contractor workers shall be provided with personal protective clothing and equipment and the Contractor shall ensure that it is worn properly. The Contractor's Designated IH and Designated Competent Person shall select and approve all the required personal protective clothing and equipment to be used.

1.15.1 Respirators

Respirators shall be in accordance with paragraph RESPIRATORY PROTECTION PROGRAM.

1.15.2 Whole Body Protection

Personnel exposed to airborne concentrations of asbestos that exceed the PELs, or for all OSHA Classes of work for which a required negative exposure assessment is not produced, shall be provided with whole body protection and such protection shall be worn properly. The Contractor's Designated IH and Competent Person shall select and approve the whole body protection to be used. The Competent Person shall examine work suits worn by employees at least once per work shift for rips or tears that may occur during performance of work. When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the work suit shall be immediately replaced. Disposable whole body protection

shall be disposed of as asbestos contaminated waste upon exiting from the regulated area. Reusable whole body protection worn shall be either disposed of as asbestos contaminated waste upon exiting from the regulated area or be properly laundered in accordance with 29 CFR 1926, Section .1101. Whole body protection used for asbestos abatement shall not be removed from the worksite by a worker to be cleaned. Recommendations made by the Contractor's Designated IH to downgrade whole body protection shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person, in consultation with the Designated IH, has the authority to take immediate action to upgrade or downgrade whole body protection when there is an immediate danger to the health and safety of the wearer.

1.15.2.1 Coveralls

Disposable-impermeable coveralls with a zipper front shall be provided. Sleeves shall be secured at the wrists, and foot coverings secured at the ankles. See DETAIL SHEET 13.

1.15.2.2 Underwear

Disposable underwear shall be provided. If reusable underwear are used, they shall be disposed of as asbestos contaminated waste or laundered in accordance with 29 CFR 1926, Section .1101. Asbestos abatement workers shall not remove contaminated reusable underwear worn during abatement of ACM from the site to be laundered.

1.15.2.3 Work Clothing

An additional coverall shall be provided when the abatement and control method employed does not provide for the exit from the regulated area directly into an attached decontamination unit. Cloth work clothes for wear under the protective coverall, and foot coverings, shall be provided when work is being conducted in low temperature conditions. Cloth work clothes shall be either disposed of as asbestos contaminated waste or properly laundered in accordance with 29 CFR 1926, Section .1101.

1.15.2.4 Gloves

Gloves shall be provided to protect the hands. Where there is the potential for hand injuries, i.e., scrapes, punctures, cuts, etc. ,a suitable glove shall be provided and used.

1.15.2.5 Foot Coverings

Cloth socks shall be provided and worn next to the skin. Footwear, as required by OSHA and EM 385-1-1, that is appropriate for safety and health hazards in the area shall be worn. Rubber boots shall be used in moist or wet areas. Reusable footwear removed from the regulated area shall be thoroughly decontaminated or disposed of as ACM waste. Disposable protective foot covering shall be disposed of as ACM waste. If rubber boots are not used, disposable foot covering shall be provided.

1.15.2.6 Head Covering

Hood type disposable head covering shall be provided. In addition, protective head gear (hard hats) shall be provided as required. Hard hats shall only be removed from the regulated area after being thoroughly decontaminated.

1.15.2.7 Protective Eye Wear

Eye protection provided shall be in accordance with ANSI Z87.1.

1.16 HYGIENE FACILITIES AND PRACTICES

The Contractor shall establish a decontamination area for the decontamination of employees, material and equipment. The Contractor shall ensure that employees enter and exit the regulated area through the decontamination area.

1.16.1 Shower Facilities

Shower facilities, when provided, shall comply with 29 CFR 1910, Section .141(d)(3).

1.16.2 3-Stage Decontamination Area

Utilization of prefabricated units shall have prior approval of the Contracting Officer. The decontamination unit shall have an equipment room and a clean room separated by a shower that complies with 29 CFR 1910, Section .141, unless the Contractor can demonstrate that such facilities are not feasible. Equipment and surfaces of containers filled with ACM shall be cleaned prior to removing them from the equipment room or area. Surfaces of the equipment room shall be wet wiped 2 times after each shift. Materials used for wet wiping shall be disposed of as asbestos contaminated waste. Two separate lockers shall be provided for each asbestos worker, one in the equipment room and one in the clean room. Should sufficient hot water be unavailable, the Contractor shall provide a minimum 40 gal. electric water heater with minimum recovery rate of 20 gal. per hour and a temperature controller for each showerhead. The Contractor shall provide a minimum of 2 showers. Instantaneous type in-line water heater may be incorporated at each shower head in lieu of hot water heater, upon approval by the Contracting Officer. Flow and temperature controls shall be located within the shower and shall be adjustable by the user. The wastewater pump shall be sized for 1.25 times the showerhead flow-rate at a pressure head sufficient to satisfy the filter head loss and discharge line losses. The pump shall supply a minimum 25 gpm flow with 35 ft. of pressure head. Used shower water shall be collected and filtered to remove asbestos contamination. Filters and residue shall be disposed of as asbestos contaminated material, per DETAIL SHEETS 9 and 14. Filtered water shall be discharged to the sanitary system. Wastewater filters shall be installed in series with the first stage pore size of 20 microns and the second stage pore size of 5 microns. The floor of the decontamination unit's clean room shall be kept dry and clean at all times. Water from the shower shall not be allowed to wet the floor in the clean room. Surfaces of the clean room and shower shall be wet-wiped 2 times after each shift change with a disinfectant solution. Proper housekeeping and hygiene requirements shall be maintained. Soap and towels shall be provided for showering, washing and drying. Any cloth towels provided shall be disposed of as ACM waste or shall be laundered in accordance with 29 CFR 1926, Section .1101.

1.16.3 Load-Out Unit

A temporary load-out unit that is adjacent and connected to the regulated area. Utilization of prefabricated units shall have prior approval of the Contracting Officer. The load-out unit shall be attached in a leak-tight

manner to each regulated area. Surfaces of the load-out unit and access tunnel shall be adequately wet-wiped 2 times after each shift change. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

1.16.4 Single Stage Decontamination Area

A decontamination area (equipment room/area) shall be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment produced before the operation. The equipment room or area shall be adjacent to the regulated area for the decontamination of employees, material, and their equipment which is contaminated with asbestos. The equipment room or area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area. Surfaces of the equipment room shall be wet wiped 2 times after each shift. Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

1.16.5 Decontamination Requirements for Class IV Work

The Contractor shall ensure that employees performing Class IV work within a regulated area comply with the hygiene practice required of employees performing work which has a higher classification within that regulated area, or the Contractor shall provide alternate decontamination area facilities for employees cleaning up debris and material which is TSI or surfacing ACM.

1.16.6 Decontamination Area Entry Procedures

The Contractor shall ensure that employees entering the decontamination area through the clean room or clean area:

a. Remove street clothing in the clean room or clean area and deposit it in lockers.

b. Put on protective clothing and respiratory protection before leaving the clean room or clean area.

c. Pass through the equipment room to enter the regulated area.

1.16.7 Decontamination Area Exit Procedures

The Contractor shall ensure that the following procedures are followed:

a. Before leaving the regulated area, respirators shall be worn while employees remove all gross contamination and debris from their work clothing using a HEPA vacuum.

b. Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers (see Detail Sheets 9 and 14) for disposal and/or laundering.

c. Employees shall not remove their respirators in the equipment room.

d. Employees shall shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, the Contractor shall ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.

e. After showering, employees shall enter the clean room before changing into street clothes.

1.16.8 Lunch Areas

The Contractor shall provide lunch areas in which the airborne concentrations of asbestos are below 0.01 f/cc.

1.16.9 Smoking

Smoking, if allowed by the Contractor, shall only be permitted in designated areas approved by the Contracting Officer.

1.17 REGULATED AREAS

All Class I, II, asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they shall demarcate the regulated area. Access to regulated areas shall be limited to authorized persons. The Contractor shall control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

1.18 WARNING SIGNS AND TAPE

Warning signs and tape printed in English and Spanish and on pictographs and graphics shall be provided at the regulated boundaries and entrances to regulated areas. The Contractor shall ensure that all personnel working in areas contiguous to regulated areas comprehend the warning signs. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs, as shown and described in DETAIL SHEET 11, shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926, Section .1101, a minimum of 20 by 14 inches, and displaying the following legend in the lower panel:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

Spacing between lines shall be at least equal to the height of the upper of any two lines. Warning tape shall be provided as shown and described on DETAIL SHEET 11. Decontamination unit signage shall be as shown and described on DETAIL SHEET 15.

1.19 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall be as described in DETAIL SHEET 14, shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

1.20 LOCAL EXHAUST VENTILATION

Local exhaust ventilation units shall conform to ANSI Z9.2 and 29 CFR 1926, Section .1101. Filters on local exhaust system equipment shall conform to ANSI Z9.2 and UL 586. Filter shall be UL labeled.

1.21 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture and collection system, or has otherwise been approved for use by the Contracting Officer. Residual asbestos shall be removed from reusable tools prior to storage and reuse. Reusable tools shall be thoroughly decontaminated prior to being removed from regulated areas.

1.22 RENTAL EQUIPMENT

If rental equipment is to be used, written notification shall be provided to the rental agency, concerning the intended use of the equipment, the possibility of asbestos contamination of the equipment and the steps that will be taken to decontaminate such equipment. A written acceptance of the terms of the Contractor's notification shall be obtained from the rental agency.

1.23 AIR MONITORING EQUIPMENT

The Contractor's Designated IH shall approve air monitoring equipment to be used to collect samples. The equipment shall include, but shall not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute when equipped with a sampling train of tubing and filter cassette.

b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped

with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands, to be used with low flow pumps in accordance with 29 CFR 1926, Section .1101 for personal air sampling.

d. Single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands, to be used with high flow pumps when conducting environmental area sampling using NIOSH Pub No. 84-100 Methods 7400 and 7402, (and the transmission electric microscopy method specified at 40 CFR 763 if required).

e. Appropriate plastic tubing to connect the air sampling pump to the selected filter cassette.

f. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

1.24 EXPENDABLE SUPPLIES

1.24.1 Glovebag

Glovebags shall be provided as described in 29 CFR 1926, Section .1101 and SET-UP DETAIL SHEET 10. The glovebag assembly shall be 6 mil thick plastic, prefabricated and seamless at the bottom with preprinted OSHA warning label.

1.24.2 Duct Tape

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container shall be provided.

1.24.3 Disposal Containers

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers shall be provided for ACM wastes as required by 29 CFR 1926 Section .1101 and DETAIL SHEETS 9A, 9B, 9C and 14.

1.24.4 Disposal Bags

Leak-tight bags, 6 mil thick, shall be provided for placement of asbestos generated waste as described in DETAIL SHEET 9A.

1.24.5 Fiberboard Drums

Fiberboard drums shall be plastic coated.

1.24.6 Cardboard Boxes

Heavy-duty corrugated cardboard boxes, coated with plastic or wax to retard deterioration from moisture, shall be provided as described in DETAIL SHEET 9C, if required by state and local requirements. Boxes shall fit into

selected ACM disposal bags. Filled boxes shall be sealed leak-tight with duct tape.

1.24.7 Sheet Plastic

Sheet plastic shall be polyethylene of 6 mil minimum thickness and shall be provided in the largest sheet size necessary to minimize seams ,as indicated on the project drawings. Film shall be clear or frosted and conform to ASTM D 4397, except as specified below:

1.24.7.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets shall be provided. Film shall be frosted or black and shall conform to the requirements of NFPA 701.

1.24.7.2 Reinforced

Reinforced sheets shall be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

1.24.8 Amended Water

Amended water shall meet the requirements of ASTM D 1331.

1.24.9 Mastic Removing Solvent

Mastic removing solvent shall be nonflammable and shall not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite shall have a flash point greater than 140 degrees F.

1.24.10 Leak-tight Wrapping

Two layers of 6 mil minimum thick polyethylene sheet stock shall be used for the containment of removed asbestos-containing components or materials such as insulated pipe segments and other materials too large to be placed in disposal bags as described in DETAIL SHEET 9B. Upon placement of the ACM component or material, each layer shall be individually leak-tight sealed with duct tape.

1.24.11 Viewing Inspection Window

Where feasible, a minimum of 1 clear, 1/8 inch thick, acrylic sheet, 18 by 24 inches, shall be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows shall be sealed leak-tight with industrial grade duct tape.

1.24.12 Wetting Agents

Removal encapsulant (a penetrating encapsulant) shall be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant shall be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS.

1.24.13 Strippable Coating

Strippable coating in aerosol cans shall be used to adhere to surfaces and to be removed cleanly by stripping, at the completion of work. This work shall only be done in well ventilated areas.

1.25 MISCELLANEOUS ITEMS

A sufficient quantity of other items, such as, but not limited to: scrapers, brushes, brooms, staple guns, tarpaulins, shovels, rubber squeegees, dust pans, other tools, scaffolding, staging, enclosed chutes, wooden ladders, lumber necessary for the construction of containments, UL approved temporary electrical equipment, material and cords, ground fault circuit interrupters, water hoses of sufficient length, fire extinguishers, first aid kits, portable toilets, logbooks, log forms, markers with indelible ink, spray paint in bright color to mark areas, project boundary fencing, etc., shall be provided.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Asbestos abatement work tasks shall be performed as summarized in paragraph DESCRIPTION OF WORK and the Contractor's Accident Prevention Plan, Asbestos Hazard Abatement Plan, and the Activity Hazard Analyses. The Contractor shall use the engineering controls and work practices required in 29 CFR 1926, Section .1101(g) in all operations regardless of the levels of exposure. Personnel shall wear and utilize protective clothing and equipment as specified. The Contractor shall not permit eating, smoking, drinking, chewing or applying cosmetics in the regulated area. All hot work (burning, cutting, welding, etc.) shall be conducted under controlled conditions in conformance with 29 CFR 1926, Section .352, Fire Prevention. Personnel of other trades, not engaged in asbestos abatement activities, shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions of the Contractor's Accident Prevention Plan are complied with. Power to the regulated area shall be locked-out and tagged in accordance with 29 CFR 1910, and temporary electrical service with ground fault circuit interrupters shall be provided as needed. Temporary electrical service shall be disconnected when necessary for wet removal. The Contractor shall stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. The Contractor shall correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work shall resume only upon notification by the Contracting Officer. Corrective actions shall be documented.

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement shall be performed without damage to or contamination of adjacent work or area. Where such work or area is damaged or contaminated, as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated

by the Contractor at no expense to the Government, as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and air sampling analysis results are obtained and have been evaluated by the Contractor's Designated IH and the Contracting Officer, work shall proceed.

3.3 OBJECTS

3.3.1 Removal of Mobile Objects

Mobile objects, furniture, machinery and equipment will be removed from the area of work by the Contractor before asbestos abatement work begins. The bridge operational control panel may not be removed if the bridge is still operational. DETAIL SHEET 27, contains a summary of Contractor's required handling, cleaning and storage and reinstallation of mobile objects, furniture and equipment located in each abatement area. Mobile objects and furnishings identified in DETAIL SHEET 27 are not considered contaminated with asbestos fibers. Mobile objects and furnishings shall be precleaned using HEPA filtered vacuum followed by wet wiping. These objects shall be removed to an area or site designated on DETAIL SHEET 27 and as identified by the Contracting Officer, and stored; or other appropriate action taken as identified on DETAIL SHEET 27. Carpets, draperies, and other items which may not be suitable for onsite wet cleaning methods shall be properly laundered in accordance with 29 CFR 1926, Section .1101 disposed of as asbestos contaminated material.

3.3.2 Stationary Objects

Stationary objects, furniture, large machinery items, and equipment as shown on DETAIL SHEET 27, shall remain in place and shall be precleaned using HEPA vacuum followed by adequate wet wiping. Stationary objects and furnishings shall be covered with 2 layers of polyethylene and edges sealed with duct tape.

3.3.3 Reinstallation of Mobile Objects

At the conclusion of the asbestos abatement work in each regulated area, and after meeting the final clearance requirements for each regulated area, objects previously removed shall be stored in the area if they are to be reused in the rehabilitated bridge.

3.4 BUILDING VENTILATION SYSTEM AND CRITICAL BARRIERS

Building ventilating systems supplying air into or returning air out of a regulated area shall be shut down and isolated by airtight seals to prevent the spread of contamination throughout the system. Air-tight critical barriers shall be installed on building ventilating openings located inside the regulated area that supply or return air from the building ventilation system or serve to exhaust air from the building.

3.5 PRECLEANING

Surfaces shall be cleaned by HEPA vacuum and adequately wet wiped prior to establishment of containment. The following interior surfaces of the Operator House, Electrical Room, and the Machinery House shall be be wiped and vacuumed.

3.6 METHODS OF COMPLIANCE

3.6.1 Mandated Practices

The Contractor shall employ proper handling procedures in accordance with 29 CFR 1926 and 40 CFR 61, Subpart M, and the specified requirements. The specific abatement techniques and items identified shall be detailed in the Contractor's Asbestos Hazard Abatement Plan including, but not limited to, details of construction materials, equipment, and handling procedures. The Contractor shall use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters to collect debris and dust containing ACM.

b. Wet methods or wetting agents to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup; except where it can be demonstrated that the use of wet methods is unfeasible due to, for example, the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean-up and disposalin leak-tight containers of wastes and debris contaminated with asbestos.

d. Inspection and repair of polyethylene in work and high traffic areas.

e. Cleaning of equipment and surfaces of containers filled with ACM prior to removing them from the equipment room or area.

3.6.2 Control Methods

The Contractor shall use the following control methods to comply with the PELs:

a. Local exhaust ventilation equipped with HEPA filter dust collection systems;

b. Enclosure or isolation of processes producing asbestos dust;

c. Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;

d. Use of other work practices and engineering controls;

e. Where the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the PELs, the Contractor shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with paragraph, RESPIRATORY PROTECTION PROGRAM.

3.6.3 Unacceptable Practices

The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure

assessments:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean-up of dust and debris containing ACM.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.6.4 Class I Work Procedures

In addition to requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the installation and operation of the control system.

b. For jobs involving the removal of more than 25 feet or 10 square feet of TSI or surfacing material, the Contractor shall place critical barriers over all openings to the regulated area.

c. HVAC systems shall be isolated in the regulated area by sealing with a double layer of plastic or air-tight rigid covers.

d. Impermeable dropcloths (6 mil or greater thickness) shall be placed on surfaces beneath all removal activity.

e. Objects within the regulated area shall be handled as specified in paragraph OBJECTS.

f. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area shall be ventilated to move contaminated air away from the employee's breathing zone toward a HEPA unit or collection device.

3.6.5 Specific Control Methods for Class I Work

In addition to requirements of paragraph Class I Work Procedures, Class I asbestos work shall be performed using the control methods identified in the subparagraphs below.

3.6.5.1 Glovebag Systems

Glovebag systems shall be as shown in SETUP DETAIL SHEET 10. The glovebag system shall be used to remove ACM from straight runs of piping and elbows and other connections. Glovebags shall be used without modification and shall be smoke-tested for leaks and any leaks sealed prior to use. Glovebags shall be installed to completely cover the circumference of pipe or other structures where the work is to be done. Glovebags shall be used only once and shall not be moved. Glovebags shall not be used on surfaces

that have temperatures exceeding 150 degrees F. Prior to disposal, glovebags shall be collapsed by removing air within them using a HEPA vacuum. Before beginning the operation, loose and friable material adjacent to the glovebag operation shall be wrapped and sealed in 2 layers of plastic or otherwise rendered intact. At least 2 persons shall perform Class I glovebag removal. Asbestos regulated work areas shall be established as specified and shown on detailed drawings and plans for glovebag abatement. Designated boundary limits for the asbestos work shall be established with rope or other continuous barriers and all other requirements for asbestos control areas shall be maintained, including area signage and boundary warning tape as specified in SET-UP DETAIL SHEET 11.

a. In addition to requirements for negative pressure glovebag systems above, the Contractor shall attach HEPA vacuum systems or other devices to the bag to prevent collapse during removal of ACM from straight runs of piping and elbows and other connections.

b. The negative pressure glove boxes used to remove ACM from pipe runs shall be fitted with gloved apertures and a bagging outlet and constructed with rigid sides from metal or other material which can withstand the weight of the ACM and water used during removal. A negative pressure shall be created in the system using a HEPA filtration system. The box shall be smoke tested for leaks prior to each use.

3.6.5.2 Wrap and Cut Operation

Wrap and cut operations shall be as shown in SETUP DETAIL SHEET 9B or 10. Prior to cutting pipe, the asbestos-containing insulation shall be wrapped with polyethylene and securely sealed with duct tape to prevent asbestos becoming airborne as a result of the cutting process. The following steps shall be taken: install glovebag, strip back sections to be cut 6 inches from point of cut, and cut pipe into manageable sections.

3.6.6 Class II Work

In addition to the requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the work.

b. For indoor work, critical barriers shall be placed over all openings to the regulated area.

c. Impermeable dropcloths shall be placed on surfaces beneath all removal activity.

3.6.7 Specific Control Methods for Class II Work

In addition to requirements of paragraph Class II Work, Class II work shall be performed using the following methods:

3.6.7.1 Vinyl and Asphalt Flooring Materials

When removing vinyl and asphalt flooring materials which contain ACM the Contractor shall use the following practices as shown in RESPONSE ACTION DETAIL SHEET 56, 57, 58, 59, 60, 61, 62, 63, .or 64 Resilient sheeting shall be removed by adequately wet methods. Tiles shall be removed intact

(if possible); wetting is not required when tiles are heated and removed intact. Flooring or its backing shall not be sanded. Scraping of residual adhesive and/or backing shall be performed using wet methods. Mechanical chipping is prohibited unless performed in a negative pressure enclosure. Dry sweeping is prohibited. The Contractor shall use vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) to clean floors.

3.6.7.2 Gaskets

Gaskets shall be thoroughly wetted with amended water prior to removal and immediately placed in a disposal container. If a gasket is visibly deteriorated and unlikely to be removed intact, removal shall be undertaken within a glovebag. Any scraping to remove residue shall be performed wet.

3.6.7.3 Other Class II Jobs

The Contractor shall use the following work practices when performing Class II removal of wallboard ACM: The material shall be thoroughly wetted with amended water prior and during its removal. The material shall be removed in an intact state. Cutting, abrading or breaking the material is prohibited. The ACM removed shall be immediately bagged or wrapped.

3.6.8 Specific Control Methods for Class III Work

Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees. The work shall be performed using wet methods and, to the extent feasible, using local exhaust ventilation. The Contractor shall use impermeable dropcloths and shall isolate the operation, using mini-enclosures or glovebag systems, where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of TSI or surfacing material.

3.6.9 Specific Control Methods for Class IV Work

Class IV jobs shall be conducted using wet methods, HEPA vacuums, and prompt clean-up of debris containing ACM. Employees cleaning up debris and waste in a regulated area where respirators are required shall wear the selected respirators.

3.6.10 Cleaning After Asbestos Removal

After completion of all asbestos removal work, surfaces from which ACM has been removed shall be wet wiped or sponged clean, or cleaned by some equivalent method to remove all visible residue. Run-off water shall be collected and filtered through a dual filtration system. A first filter shall be provided to remove fibers 20 micrometers and larger, and a final filter provided that removes fibers 5 micrometers and larger. After the gross amounts of asbestos have been removed from every surface, remaining visible accumulations of asbestos on floors shall be collected using plastic shovels, rubber squeegees, rubber dustpans, and HEPA vacuum cleaners as appropriate to maintain the integrity of the regulated area. When TSI and surfacing material has been removed, workmen shall use HEPA vacuum cleaners to vacuum every surface. Surfaces or locations which could harbor accumulations or residual asbestos dust shall be checked after vacuuming to verify that no asbestos-containing material remains; and shall be re-vacuumed as necessary to remove the ACM.

3.6.11 Class I Asbestos Work Response Action Detail Sheets

The following Class I Asbestos Work Response Action Detail Sheet is specified on Table 1 for each individual work task to be performed:

j. Fireproofing or Thermal Surface Insulation: See Sheet 68

k. Acoustical Ceiling Insulation: See Sheet 70

m. Duct Insulation: Duct work insulation removal shall not begin without the written authorization of the Contracting Officer stating that the HVAC system to be worked on is either isolated or of service. Forced air circulation is not permitted in ductwork while abatement work is in progress. See Sheet 101

n. Pipe Insulation (Using a Glovebag): See Sheet 87

o. Horizontal Pipe Insulation (Using a Containment Area): See Sheet 88

p. Pipe Insulation (Using a Mini-Containment Area): See Sheet 89

w. Pipe and Fitting Insulation (using Glovebag): See Sheet 86

y. Duct Insulation: See Sheet 100.

3.6.12 Class II Asbestos Work Response Action Detail Sheets

The following Class II Asbestos Work Response Action Detail Sheet is specified on Table 1 for each individual work task to be performed:

b. Interior Asbestos Cement, Fiberboard and Drywall Panels: See Sheet 48

c. Suspended Asbestos Cement Ceiling Tile: See Sheet 52

f. Suspended Acoustical Ceiling Tile: See Sheet 54

g. Vinyl or Vinyl Asbestos Tile Adhered to Concrete Floor System by Asbestos-Containing Adhesive: See Sheet 56

i. Vinyl Asbestos Tile Adhered to Concrete Floor System by Asbestos Containing Adhesive: See Sheet 57

j. Vinyl Asbestos Tile Adhered to Concrete Floor System by Asbestos Free Adhesive: See Sheet 58

k. Vinyl Asbestos Tile and Chemical Dissolution of Asbestos-Containing Adhesives on Concrete Floor System: See Sheet 59

o. Asbestos-Containing Sheet Flooring Adhered to Concrete Floor System by Asbestos-Containing Adhesive: See Sheet 64

q. Miscellaneous Asbestos-Containing Materials: See Sheet 45

3.6.13 Abatement of Asbestos Contaminated Soil

Asbestos contaminated soil shall be removed from areas to a minimum depth

of 6 inches. Soil shall be thoroughly dampened with amended water and then removed by manual shoveling into labeled containers. The workers shall be closely monitored for heat exhaustion. The minimum ventilation shall be 8 air changes per hour through a local exhaust HEPA system. See DETAIL SHEET 73. The Contractor has the option to propose encapsulation of soil instead of removal. Since soil encapsulation is highly dependent on soil chemistry, available skills for application and proprietary products, the Contractor shall first test the proposed soil encapsulant on a minimum 100 square feet of soil area onsite. The test shall be witnessed by the Contracting Officer's and the manufacturer's representative. A written application for encapsulation shall be submitted to the Contracting Officer with test results, encapsulant manufacturer's positive recommendation for use, a guarantee for satisfactory performance for 10 years, and limitation of application. The Contracting Officer reserves the right to accept or reject the application with no effect to the contract. If the application is accepted, the soil encapsulation shall proceed in compliance with all provisions and instructions of the encapsulant manufacturer and under the supervision of a person certified by the manufacturer who is trained and experienced in the proper application of the soil encapsulant. See DETAIL SHEET 72.

3.6.14 Response Action Detail Sheets for Repair of Class II Materials

a. Vinyl or Vinyl Asbestos Tile Adhered to Concrete Floor System by Asbestos-Containing Adhesive: See Detail Sheet 56

3.7 FINAL CLEANING AND VISUAL INSPECTION

Upon completion of abatement, the regulated area shall be cleaned by collecting, packing, and storing all gross contamination; see SET-UP DETAIL SHEETS 9, 14 and 20. A final cleaning shall be performed using HEPA vacuum and wet cleaning of all exposed surfaces and objects in the regulated area. Upon completion of the cleaning, the Contractor shall conduct a visual pre-inspection of the cleaned area in preparation for a final inspection before final air clearance monitoring and recleaning, as necessary. Upon completion of the final cleaning, the Contractor and the Contracting Officer shall conduct a final visual inspection of the cleaned regulated area in accordance with ASTM E 1368 and document the results on the Final Cleaning and Visual Inspection as specified on the SET-UP DETAIL SHEET 19. If the Contracting Officer rejects the clean regulated area as not meeting final cleaning requirements, the Contractor shall reclean as necessary and have a follow-on inspection conducted with the Contracting Officer. Recleaning and follow-up reinspection shall be at the Contractor's expense.

3.8 EXPOSURE ASSESSMENT AND AIR MONITORING

3.8.1 General Requirements For Exposure

Exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926, Section .1101, the Contractor's air monitoring plan, and as specified. Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be performed by the Contractor's Designated IH. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. Air monitoring results at the 95 percent confidence level shall be calculated as shown in Table 2 at the end of this section. The Contractor shall provide an onsite independent testing laboratory with qualified analysts

and appropriate equipment to conduct sample analyses of air samples using the methods prescribed in 29 CFR 1926, Section .1101, to include NIOSH Pub No. 84-100 Method 7400. Preabatement and abatement environmental air monitoring shall be performed by the Contractor's Designated IH . Final clearance environmental air monitoring, shall be performed by the Contractor's Designated IH. Environmental and final clearance air monitoring shall be performed using NIOSH Pub No. 84-100 Method 7400 (PCM) with optional confirmation of results by the EPA TEM Method specified in 40 CFR 763. For environmental and final clearance, air monitoring shall be conducted at a sufficient velocity and duration to establish the limit of detection of the method used at 0.005 f/cc. Confirmation of asbestos fiber concentrations (asbestos f/cc) from environmental and final clearance samples collected and analyzed by NIOSH Pub No. 84-100 Method 7400 (total f/cc) may be conducted using TEM in accordance with NIOSH Pub No. 84-100 Method 7402. When such confirmation is conducted, it shall be from the same sample filter used for the NIOSH Pub No. 84-100 Method 7400 PCM analysis. For all Contractor required environmental or final clearance air monitoring, confirmation of asbestos fiber concentrations, using NIOSH Pub No. 84-100 Method 7402, shall be at the Contractor's expense. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. Results of breathing zone samples shall be posted at the job site and made available to the Contracting Officer. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with the Contracting Officer to determine the cause. At the discretion of the Contracting Officer, fiber concentration may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should either an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify the Contracting Officer, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by the Contracting Officer.

3.8.2 Initial Exposure Assessment

The Contractor's Designated IH shall conduct an exposure assessment immediately before or at the initiation of an asbestos abatement operation to ascertain expected exposures during that operation. The assessment shall be completed in time to comply with the requirements which are triggered by exposure data or the lack of a negative exposure assessment, and to provide information necessary to assure that all control systems planned are appropriate for that operation. The assessment shall take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the Contractor which indicate the levels of airborne asbestos likely to be encountered on the job. For Class I asbestos work, until the employer conducts exposure monitoring and documents that employees on that job will not be exposed in excess of PELs, or otherwise makes a negative exposure assessment, the Contractor shall presume that employees are exposed in excess of the PEL-TWA and PEL-Excursion Limit.

3.8.3 Negative Exposure Assessment

The Contractor shall provide a negative exposure assessment for the specific asbestos job which will be performed. The negative exposure assessment shall be provided within 5 days of the initiation of the project and conform to the following criteria:

a. Objective Data: Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the PEL-TWA and PEL-Excursion Limit under those work conditions having the greatest potential for releasing asbestos.

b. Prior Asbestos Jobs: Where the Contractor has monitored prior asbestos jobs for the PEL and the PEL-Excursion Limit within 12 months of the current job, the monitoring and analysis were performed in compliance with asbestos standard in effect; the data were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations; the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job; and these data show that under the conditions prevailing and which will prevail in the current workplace, there is a high degree of certainty that the monitoring covered exposure from employee exposures will not exceed the PEL-TWA and PEL-Excursion Limit.

c. Initial Exposure Monitoring: The results of initial exposure monitoring of the current job, made from breathing zone air samples that are representative of the 8-hour PEL-TWA and 30-minute short-term exposures of each employee. The monitoring covered exposure from operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

3.8.4 Preabatement Environmental Air Monitoring

Preabatement environmental air monitoring shall be established 1 day prior to the masking and sealing operations for each regulated area to determine background concentrations before abatement work begins. As a minimum, preabatement air samples shall be collected using NIOSH Pub No. 84-100 Method 7400, PCM at these locations: outside the building; inside the building, but outside the regulated area perimeter; and inside each regulated work area. One sample shall be collected for every 2000 square feet of floor space. At least 2 samples shall be collected outside the building: at the exhaust of the HEPA unit; and downwind from the abatement site. The PCM samples shall be analyzed within 24 hours; and if any result in fiber concentration greater than 0.01 f/cc, asbestos fiber concentration shall be confirmed using NIOSH Pub No. 84-100 Method 7402 (TEM).

3.8.5 Environmental Air Monitoring During Abatement

Until an exposure assessment is provided to the Contracting Officer, environmental air monitoring shall be conducted at locations and frequencies that will accurately characterize any evolving airborne asbestos fiber concentrations. The assessment shall demonstrate that the product or material containing asbestos minerals, or the abatement

involving such product or material, cannot release airborne asbestos fibers in concentrations exceeding 0.01 f/cc as a TWA under those work conditions having the greatest potential for releasing asbestos. The monitoring shall be at least once per shift at locations including, but not limited to, close to the work inside a regulated area; preabatement sampling locations; outside entrances to a regulated area; close to glovebag operations; representative locations outside of the perimeter of a regulated area; inside clean room; and at the exhaust discharge point of local exhaust system ducted to the outside of a containment (if used). If the sampling outside regulated area shows airborne fiber levels have exceeded background or 0.01 f/cc, whichever is greater, work shall be stopped immediately, and the Contracting Officer notified. The condition causing the increase shall be corrected. Work shall not restart until authorized by the Contracting Officer.

3.8.6 Final Clearance Air Monitoring

Prior to conducting final clearance air monitoring, the Contractor and the Contracting Officer shall conduct a final visual inspection of the regulated area where asbestos abatement has been completed. The final visual inspection shall be as specified in SET-UP DETAIL SHEET 19. Final clearance air monitoring shall not begin until acceptance of the Contractor's final cleaning by the Contracting Officer. The Contractor's Designated IH shall conduct final clearance air monitoring using aggressive air sampling techniques as defined in EPA 560/5-85-024 or as otherwise required by federal or state requirements. The sampling and analytical method used will be the EPA TEM Method specified at 40 CFR 763 and Table 4.

3.8.6.1 Final Clearance Requirements, NIOSH PCM Method

For PCM sampling and analysis using NIOSH Pub No. 84-100 Method 7400, the fiber concentration inside the abated regulated area, for each airborne sample, shall be less than 0.01 f/cc. The abatement inside the regulated area is considered complete when every PCM final clearance sample is below the clearance limit. If any sample result is greater than 0.01 total f/cc, the asbestos fiber concentration (asbestos f/cc) shall be confirmed from that same filter using NIOSH Pub No. 84-100 Method 7402 (TEM) at Contractor's expense. If any confirmation sample result is greater than 0.01 asbestos f/cc, abatement is incomplete and cleaning shall be repeated. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria shall be done.

3.8.6.2 Final Clearance Requirements, EPA TEM Method

For EPA TEM sampling and analysis, using the EPA Method specified in 40 CFR 763, abatement inside the regulated area is considered complete when the arithmetic mean asbestos concentration of the 5 inside samples is less than or equal to 70 structures per square millimeter (70 S/mm). When the arithmetic mean is greater than 70 S/mm, the 3 blank samples shall be analyzed. If the 3 blank samples are greater than 70 S/mm, resampling shall be done. If less than 70 S/mm, the 5 outside samples shall be analyzed and a Z-test analysis performed. When the Z-test results are less than 1.65, the decontamination shall be considered complete. If the Z-test results are more than 1.65, the abatement is incomplete and cleaning shall be repeated. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria shall be done.

3.8.6.3 Air Clearance Failure

If clearance sampling results fail to meet the final clearance requirements, the Contractor shall pay all costs associated with the required recleaning, resampling, and analysis, until final clearance requirements are met.

3.8.7 Air-Monitoring Results and Documentation

Air sample fiber counting shall be completed and results provided within 24 hours (breathing zone samples), and 48 hours (environmental/clearance monitoring) after completion of a sampling period. The Contracting Officer shall be notified immediately of any airborne levels of asbestos fibers in excess of established requirements. Written sampling results shall be provided within 5 working days of the date of collection. The written results shall be signed by testing laboratory analyst, testing laboratory principal and the Contractor's Designated IH. The air sampling results shall be documented on a Contractor's daily air monitoring log. The daily air monitoring log shall contain the following information for each sample:

a. Sampling and analytical method used;

b. Date sample collected;

c. Sample number;

d. Sample type: BZ = Breathing Zone (Personal), P = Preabatement, E = Environmental, C = Abatement Clearance;

e. Location/activity/name where sample collected;

f. Sampling pump manufacturer, model and serial number, beginning flow rate, end flow rate, average flow rate (L/min);

g. Calibration date, time, method, location, name of calibrator, signature;

h. Sample period (start time, stop time, elapsed time (minutes);

i. Total air volume sampled (liters);

j. Sample results (f/cc and S/mm square) if EPA methods are required for final clearance;

k. Laboratory name, location, analytical method, analyst, confidence level. In addition, the printed name and a signature and date block for the Industrial Hygienist who conducted the sampling and for the Industrial Hygienist who reviewed the daily air monitoring log verifying the accuracy of the information.

3.9 CLEARANCE CERTIFICATION

When asbestos abatement is complete, ACM waste is removed from the regulated areas, and final clean-up is completed, the Contracting Officer will certify the areas as safe before allowing the warning signs and boundary warning tape to be removed. After final clean-up and acceptable airborne concentrations are attained, but before the HEPA unit is turned off and the containment removed, the Contractor shall remove all pre-filters on the building HVAC system and provide new pre-filters. The Contractor shall dispose of such filters as asbestos contaminated materials. HVAC, mechanical, and electrical systems shall be

re-established in proper working order. The Contractor and the Contracting Officer shall visually inspect all surfaces within the containment for residual material or accumulated debris. The Contractor shall reclean all areas showing dust or residual materials. The Contracting Officer will certify in writing that the area is safe before unrestricted entry is permitted. The Government will have the option to perform monitoring to certify the areas are safe before entry is permitted.

3.10 CLEANUP AND DISPOSAL

3.10.1 Title to ACM Materials

ACM material resulting from abatement work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified and in accordance with applicable federal, state and local regulations.

3.10.2 Collection and Disposal of Asbestos

All ACM waste shall be collected and including contaminated wastewater filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing, shall be collected and placed in leak-tight containers such as double plastic bags (see DETAIL SHEET 9A); sealed double wrapped polyethylene sheet (see DETAIL 9B); sealed fiberboard boxes (see DETAIL SHEET 9C); or other approved containers. Waste within the containers shall be wetted in case the container is breeched. Asbestos-containing waste shall be disposed of at an EPA, state and local approved asbestos landfill and off Government property. For temporary storage, sealed impermeable containers shall be stored in an asbestos waste load-out unit or in a storage/transportation conveyance (i.e., dumpster, roll-off waste boxes, etc.) in a manner acceptable to and in an area assigned by the Contracting Officer. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional, and local standards.

3.10.3 Scale Weight Measurement

Scales used for measurement shall be public scales. Weighing shall be at a point nearest the work at which a public scale is available. Scales shall be standard truck scales of the beam type; scales shall be equipped with the type registering beam and an "over and under" indicator; and shall be capable of accommodating the entire vehicle. Scales shall be tested, approved and sealed by an inspector of the State of Pennsylvania. Scales shall be calibrated and resealed as often as necessary and at least once every three months to ensure continuous accuracy. Vehicles used for hauling ACM shall be weighed empty daily at such time as directed and each vehicle shall bear a plainly legible identification mark.

3.10.4 Weigh Bill and Delivery Tickets

Copies of weigh bills and delivery tickets shall be submitted to the Contracting Officer during the progress of the work. The Contractor shall furnish the Contracting Officer scale tickets for each load of ACM weighed and certified. These tickets shall include tare weight; identification mark for each vehicle weighed; and date, time and location of loading and unloading. Tickets shall be furnished at the point and time individual trucks arrive at the worksite. A master log of all vehicle loading shall be furnished for each day of loading operations. Before the final statement is allowed, the Contractor shall file with the Contracting

Officer certified weigh bills and/or certified tickets and manifests of all ACM actually disposed by the Contractor for this contract.

3.10.5 Asbestos Waste Shipment Record

The Contractor shall complete and provide the Contracting Officer final completed copies of the Waste Shipment Record for all shipments of waste material as specified in 40 CFR 61, Subpart M and other required state waste manifest shipment records, within 3 days of delivery to the landfill. Each Waste Shipment Record shall be signed and dated by the Contractor, the waste transporter and disposal facility operator.

TABLE 1

INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet_____ of _____

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER _____
2. LOCATION OF WORK TASK_____
_____
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED:_____
_____

   a. Type of Asbestos _____
   b. Percent asbestos content _____%

4. ABATEMENT TECHNIQUE TO BE USED_____
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK_____
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK
   Friable _____ Non-friable Category I _____
   Non-friable Category II_____
7. FORM _____ and CONDITION OF ACM: GOOD_____ FAIR_____ POOR_____
8. QUANTITY: METERS_____, SQUARE METERS_____
8a. QUANTITY: LINEAR FT._____, SQUARE FT._____
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK_____
10. SET-UP DETAIL SHEET NUMBERS
    FOR WORK TASK _____, _____, _____, _____,
    _____, _____, _____, _____.

NOTES:

(1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
(2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
(3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile, amosite, crocidolite, etc.); and % asbestos content.
(4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
(5) Class designation: Class I, II, III, or IV (OSHA designation).
(6) Friability of materials: Check the applicable EPA NESHAP friability designation.
(7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.
Condition: Good = G; Fair = F; Poor = P.
(8) Quantity of ACM for each work task in meters or square meters.
(8a) Quantity of ACM for each work task in linear feet or square feet.
(9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
(10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 2

FORMULA FOR CALCULATION OF THE 95 PERCENT CONFIDENCE LEVEL
(Reference: NIOSH 7400)

Fibers/cc(01.95 percent CL) = X + [(X) * (1.645) * (CV)]

Where: X = ((E)(AC))/((V)(1000))

E = ((F/Nf) - (B/Nb))/Af

CV = The precision value; 0.45 shall be used unless the analytical laboratory provides the Contracting Officer with documentation (Round Robin Program participation and results) that the laboratory's precision is better.

AC = Effective collection area of the filter in square millimeters

V = Air volume sampled in liters

E = Fiber density on the filter in fibers per square millimeter

F/Nf = Total fiber count per graticule field

B/Nb = Mean field blank count per graticule field

Af = Graticule field area in square millimeters

TWA = C1/T1 + C2/T2 = Cn/Tn

Where: C = Concentration of contaminant

T = Time sampled.

TABLE 3

NI0SH METHOD 7400

PCM ENVIRONMENTAL AIR SAMPLING PROTOCOL (NON-PERSONAL)

Sample Location	Minimum No. of Samples	Filter Pore Size (Note 1)	Min. Vol. (Note 2) (Liters)	Sampling Rate (liters/min.)
Inside Abatement Area	0.5/140 Square Meters (Notes 3 & 4)	0.45 microns	3850	2-16
Each Room in 1 Abatement Area Less than 140 Square meters		0.45 microns	3850	2-16
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:

1. Type of filter is Mixed Cellulose Ester.

2. Ensure detection limit for PCM analysis is established at 0.005 fibers/cc.

3. One sample shall be added for each additional 140 square meters. (The corresponding I-P units are 5/1500 square feet).

4. A minimum of 5 samples are to be taken per abatement area, plus 2 field blanks.

TABLE 4

EPA AHERA METHOD: TEM AIR SAMPLING PROTOCOL

Location Sampled	Minimum No. of Samples	Filter Pore Size	Min. Vol. (Liters)	Sampling Rate (liters/min.)
Inside Abatement Area	5	0.45 microns	1500	2-16
Outside Abatement Area	5	0.45 microns	1500	2-16
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:

1. Type of filter is Mixed Cellulose Ester.

2. The detection limit for TEM analysis is 70 structures/square mm.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ CONTRACT NO. _____
PROJECT ADDRESS _____
CONTRACTOR FIRM NAME _____
EMPLOYEE'S NAME _____,_____,_____,
(Print) (Last) (First) (MI)

Social Security Number: _____-_____-_____,

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior to signing this certification.

FORMAL TRAINING:
_____ a. For Competent Persons and Supervisors: I have completed EPA's Model Accreditation Program (MAP) training course, "Contractor/Supervisor", that meets this State's requirements.

b. For Workers:
_____ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials, i.e., roofing, siding, floor tile, etc.): I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
(3) For OSHA Class II work (there will only be abatement of one type of Class II material):
_____ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls of 29 CFR 1926, Section .1101(g) and hands-on training.
_____ (b) I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, Section .92(a)(2) and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101, and hands-on training.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

_____ (5) For OSHA Class IV work: I have completed at least a 2-hr course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, (a)(1), and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101(g) and hands-on training.

_____ c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA's MAP that meets this State's requirements.

PROJECT SPECIFIC TRAINING:
_____ I have been provided and have completed the project specific training required by this Contract. My employer's Designated Industrial Hygienist and Designated Competent Person conducted the training.

RESPIRATORY PROTECTION:
_____ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair and contact lens use policy of my employer.

RESPIRATOR FIT-TEST TRAINING:
_____ I have been trained in the proper selection, fit, use, care, cleaning,maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

MEDICAL EXAMINATION:
_____ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

_____ were no limitations to performing the required work tasks.
_____ were identified physical limitations to performing the required work tasks.

Date of the medical examination _____

Employee Signature _____ date _____
Contractor's Industrial
Hygienist Signature _____ date _____

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 13281

LEAD HAZARD CONTROL ACTIVITIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z87.1	(1989; Errata; Z87.1a) Occupational and Educational Eye and Face Protection
ANSI Z9.2	(1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 1553	(1993) Practice for Collection of Airborne Particulate Lead During Abatement and Construction Activities
ASTM E 1613	(1999) Standard Method for Determination of Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometery (FAAS), or Graphite Furnace Atomic Absorption Spectrometery (GFAAS) Techniques
ASTM E 1726	(1995) Sample Digestion of Soils for the Determination of Lead by Atomic Spectrometry
ASTM E 1727	(1995) Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques

CODE OF FEDERAL REGULATIONS (CFR)

24 CFR 35	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.20	Access to Employee Exposure and Medical Records
29 CFR 1910.139	Respiratory Protection
29 CFR 1910.146	Permit-required Confined Spaces

29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.62	Lead
40 CFR 50.6	National Primary and Secondary Ambient Air Quality Standards for Particulate Matter
40 CFR 50.12	National Primary and Secondary Ambient Air Quality Standards for Lead
40 CFR 50, App B	Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere
40 CFR 58, App E	Probe Siting Criteria for Ambient Air Quality Monitoring
40 CFR 60, App A, Mtd 22	Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares
40 CFR 117	Determination of Reportable Quantities for Hazardous Substances
40 CFR 122	EPA Administered Permit Programs: The National Pollutant Discharge Elimination System
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261, App III	Chemical Analysis Test Methods
40 CFR 261, App II, Mtd 1311	Toxicity Characteristic Leaching Procedure (TCLP)
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 262.22	Number of Copies
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
49 CFR 171, Subchapter C	Hazardous Materials Regulations
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(1999) Methods of Fire Tests for

Flame-Resistant Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 84-100	(1984; Supple 1985, 1987, 1988 & 1990) NIOSH Manual of Analytical Methods

SSPC: THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Guide 6	(1995) Containing Debris Generated During Paint Removal Operations

UNDERWRITERS LABORATORIES (UL)

UL 586	(1996; Rev thru Aug 1999) High-Efficiency, Particulate, Air Filter Units

U.S ARMY CORPS OF ENGINEERS ENGINEERING MANUAL (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual (http://www.hq.usace.army.mil/soh/hqusace_soh.htm)

1.2 DEFINITIONS

Lead Hazard Control Activity - Any construction work where a worker may be occupationally exposed to lead and procedures have to be followed to assure that: 1). Lead inside the lead hazard control area is cleaned up to appropriate levels and 2). Lead dust does not disperse outside the lead hazard control area at unacceptable levels.

1.3 DESCRIPTION OF WORK

The work covered by this section includes work tasks as indicated below, and the precautions specified in this section for the protection of workers and the environments.

1.3.1 Work Areas

The existing bridge was constructed in the 1940's and had never been cleaned to bare steel during its existence. It can be assumed that the original paint that was applied contained lead. The following types of existing paint removal, containment, collection, storage and disposal shall be used for the existing structure:

1.3.1.1 Tower Structural Steel

The two bridge towers, tower spans and counterweights shall be demolished and removed from the site. These two structures shall be prepared for demolition by localized spot cleaning of the structural steel where rivet removal and cutting of steel members will be needed to disassemble the structures. The remainder of the paint on the steel members may remain on the steel as the steel is being disposed of at a salvage site.

1.3.1.2 Lift Span Structural Steel

The structural steel of the lift span will be reused except for minor modifications. After the lift span has been floated out to a work site,

the existing paint shall be removed, except for members that shall be removed for disposal. Full containment, full collection, and complete disposal of paint waste shall be used for the lift span.

1.3.2 Protection of Existing Areas To Remain

All project work including, but not limited to, lead hazard work, storage, transportation, and disposal shall be performed without damaging or contaminating adjacent work and areas. Where such work or areas are damaged or contaminated, the Contractor shall restore work and areas to the original condition at no additional cost to the Government.

1.3.3 Coordination with Other Work

The contractor shall coordinate lead hazard control activities with work being performed in adjacent areas. Coordination procedures shall be explained in the Contractor's Accident Prevention Plan and shall describe how the Contractor will prevent lead exposure to other contractors and/or Government personnel performing work unrelated to lead hazard control activities.

1.4 WORK PERFORMANCE

Work shall be performed in accordance with the requirements of 29 CFR 1910, 29 CFR 1926, EM 385-1-1, and other references as listed herein. Matters of interpretation of the standards shall be submitted to the Contracting Officer for resolution before starting work. Where the regulations conflict, the most stringent requirements shall apply.

1.5 LEAD PROTECTION PROGRAM

For all jobsites where lead is present, the Contractor shall develop a comprehensive lead protection program in accordance with 29 CFR 1926.62. The program shall include, but is not limited to the following:

a. Containment Plan

b. Visible Emissions Monitoring Plan

c. Ambient Air Monitoring Plan

d. Water Quality Plan

e. Soil Quality Plan

1.6 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Materials and Equipment; GA

A description of the material, equipment and expendable supplies required in paragraphs MATERIALS AND EQUIPMENT and EXPENDABLE SUPPLIES; including

Material Safety Data Sheets (MSDSs) for material brought onsite to perform the work.

SD-08 Statements

Qualifications; GA.

The Contractor shall provide certification pursuant to paragraph QUALIFICATIONS for all job sites. Submittal of the qualifications and experience of any additional qualified and competent persons the CIH, IH, CSP employs to provide on-site safety and health will also be provided. Acceptance of this submission must be obtained prior to the submission of other required safety and health submittal items.

SD-09 Reports

Pressure Differential Recordings; FIO.

Report in accordance with subparagraph NEGATIVE AIR PRESSURE SYSTEM CONTAINMENT.

Licenses, Permits, and Reports; GA.

Report in accordance with paragraph LICENSES, PERMITS, AND NOTIFICATIONS.

Accident Prevention Plan (APP); GA.

A report describing how the Contractor will protect workers, while performing lead hazard control activities; and how project clearance will be performed. The plan shall meet all the requirements in paragraph ACCIDENT PREVENTION PLAN. The requirements included in Section 01 of EM 385-1-1 shall be followed by the Contractor when preparing the Accident Prevention Plan. The plan shall be prepared for all sites and shall include, but is not limited to, each of the topic areas listed in Table 1-1 therein and the requirements of paragraph SAFETY AND HEALTH PROVISIONS; each topic shall be developed in a concise manner to include management and operational aspects.

Analytical Results; GA.

A log of the analytical results for the sampling required in paragraph SAMPLING AND ANALYSIS. The log shall be kept current.

Clearance Report; GA.

Report in accordance with paragraph CLEARANCE REPORT.

Confined Space Procedures; GA.

The Contractor shall develop detailed written standard operating procedures for confined spaces for all job sites in accordance with 29 CFR 1910.146 and as further described in this paragraph.

a. The contractor shall supply certificates of calibration for all testing and monitoring equipment. The certificates of calibration shall include: type of equipment, model number, date of calibration, firm conducting calibration, and signature of individual certifying calibration.

b. The procedures shall include methods of inspection of personal protective equipment prior to use.

c. The procedures shall include work practices and other engineering controls designed to reduce airborne hazardous chemical exposures to a minimum.

d. The procedures shall include specification of the design and installation of ventilation systems which shall provide adequate oxygen content and provide for the dilution of paint solvent vapor, lead, and other toxic particulates within the confined space. In addition, the contractor shall include plans to evaluate the adequacy of air flow patterns.

Respiratory Protection Program; GA.

The Contractor shall develop a comprehensive written respiratory protection program for all job sites in accordance with 29 CFR 1910.139, 29 CFR 1926.62, and Section 05.E of EM 385-1-1.

Airborne Sampling Plan; GA.

The contractor shall develop an Airborne Sampling Plan for all job sites detailing the NIOSH Pub No. 84-100, Factory Mutual, or Underwriters Laboratories approved equipment, equipment calibration procedures, sampling methods, sampling to be performed, and analytical procedures to be used based on the type of work to be performed and anticipated toxic contaminants to be generated. The contractor shall include the name of the accredited laboratory, listed by the American Industrial Hygiene Association (AIHA), to be used to conduct the analysis of any collected air samples. In addition, the contractor shall provide the Contracting Officer with a copy of the test results from the laboratory within 5 working days of the sampling date and shall provide results from direct-reading instrumentation on the same day the samples are collected.

Medical Surveillance Plan; GA.

The Contractor shall develop a plan to provide medical surveillance to the workforce for all job sites as required in paragraph MEDICAL STATUS and provide a statement from the examining physician indicating the name of each employee evaluated and any limitations which will preclude the employee from performing the work required. The statement shall include the date of the medical evaluation, the physician's name, signature, and telephone number. Medical records shall be maintained as required by 29 CFR 1910.20.

Waste Classification, Handling, and Disposal Plan; GA.

The Contractor is responsible for assuring the proper disposal of all hazardous and nonhazardous waste generated during the project. Therefore, the contractor shall develop a Waste Classification, Handling, and Disposal Plan for all job sites in accordance with the requirements of 40 CFR 261 and 40 CFR 262. In addition, the following provisions shall be included:

a. In the case of waste generated from abrasive blasting lead-containing paints with recyclable steel or iron abrasives, the spent abrasive shall be disposed of as a hazardous waste or shall be stabilized with proprietary blast additives regardless of the results of 40 CFR 261, App II, Mtd 1311. Where stabilization is preferred, the

contractor shall employ a proprietary blast additive during blasting operations.

b. Hazardous waste shall be placed in closed containers and shall be shielded adequately to prevent dispersion of the waste by wind or water. Any evidence of improper storage shall be cause for immediate shutdown of the project until corrective action is taken.

c. Nonhazardous waste shall be stored in closed containers separate from hazardous waste storage areas.

d. All hazardous waste shall be transported by a licensed transporter in accordance with 40 CFR 263 and 49 CFR 171, Subchapter C.

e. All nonhazardous waste shall be transported in accordance with local regulations regarding waste transportation.

f. In addition to the number of manifest copies required by 40 CFR 262.22, one copy of each manifest will be supplied to the Contracting Officer prior to transportation.

Containment Plan; GA.

For all job sites where lead is present, the Contractor shall develop a plan for containing all lead contaminated waste. The containment shall comply with the requirements of SSPC Guide 6. The plan shall include drawings, load-bearing capacity calculations, and wind load calculations. When the design is such that the spent abrasive is allowed to accumulate in quantities greater than 1,000 pounds, and/or impart a significant wind load on the structure, the contractor shall have the drawings approved by a registered structural engineer. The drawings and calculations shall be stamped with the engineer's seal. The contractor shall also identify the type and placement of water booms, methods for anchoring the booms, and the procedures for removing debris.

Visible Emissions Monitoring Plan; GA.

For all job sites where lead is present, a Visible Emissions Monitoring Plan is required for jobsites requiring moderate control on emissions. The Contractor shall develop a plan for monitoring the visible emissions from the project. The time of emissions shall be measured in accordance with 40 CFR 60, App A, Mtd 22. The plan shall also include the provisions for halting work and correcting the containment in the event unacceptable emissions are observed. General statements shall not be used; specific methods, procedures, and details are required. Random emissions from the containment shall not exceed 1 percent of the work day. The Contractor shall document each time that the work is halted due to a violation of the visible emissions criteria. Documentation shall include the cause for shutdown and the corrective action taken to resolve the problem.

Ambient Air Monitoring Plan; GA.

a. PM-10 Monitoring Plan - For all job sites where lead is present, the Contractor shall develop a plan for monitoring emissions of particulate matter 10 microns or less in size (PM-10). The plan shall comply with the requirements of EPA regulation 40 CFR 50.6 and shall include provisions for halting work and correcting the containment in the event unacceptable emissions occur. The positioning of air monitoring equipment shall be in accordance with 40 CFR 58, App E, Subpart (8).

In addition, a minimum of two PM-10 monitors shall be used at the project site, one down wind from the project and one in the area of greatest public access (e.g., playground, school yard, or homeowner's yard). When the project is in an area where there are critical receptors nearby, monitoring shall be conducted throughout the entire period that abrasive blasting and cleanup operations are performed. Otherwise, monitoring shall be performed 4 of the first 8 days and on a regular basis thereafter for a sum total of 25 percent of the time surface preparation and debris cleanup are performed. Failure to meet air quality regulatory limits shall require air monitoring to be repeated immediately after corrective actions have been taken. The Contractor shall also conduct preproject PM-10 monitoring. The preproject PM-10 monitoring shall be conducted a minimum of 2 weeks prior to the beginning of the project. The monitoring shall continue for a minimum of 3 days to establish background levels. A report of the results shall be submitted to the Contracting Officer within 48 hours and shall include:

(1) Name and location of jobsite.

(2) Date of monitoring.

(3) Time of monitoring (i.e., time monitoring begins and ends each day).

(4) Identification and serial number of monitoring units.

(5) Drawing showing specific location of monitoring units.

(6) Drawing showing specific location of paint removal operation and the method of removal or work activity being performed.

(7) Wind direction and velocity.

(8) A flow chart verifying the rate of air flow across the filter throughout the sampling period.

(9) Name and address of laboratory.

(10) Laboratory test procedure.

(11) Laboratory test results.

(12) Signatures of field and laboratory technicians conducting the work.

b. TSP Monitoring Plan - For all job sites where lead is present, the Contractor shall develop a plan for monitoring emissions of Total Suspended Particulates (TSP). The plan shall comply with the requirements of EPA regulation 40 CFR 50.12 and shall include provisions for halting work and correcting the containment in the event unacceptable emissions occur. The positioning of air monitoring equipment shall be in accordance with 40 CFR 58, App E, Subpart (8). In addition, a minimum of two TSP monitors shall be used at the project site, one down wind from the project and one in the area of greatest public access (e.g. playground, school yard, or homeowner's yard). TSP-lead monitoring shall be conducted in accordance with 40 CFR 50, App B. When the project is in an area where there are critical receptors nearby, monitoring shall be conducted throughout the entire

period that abrasive blasting and cleanup operations are performed. Otherwise, monitoring shall be performed 4 of the first 8 days and on a regular basis thereafter for a sum total of 25 percent of the time surface preparation and debris cleanup are performed. Failure to meet air quality regulatory limits shall require air monitoring to be repeated immediately after corrective actions have been taken. The Contractor shall also conduct preproject TSP monitoring. The preproject TSP monitoring shall be conducted a minimum of 2 weeks prior to the beginning of the project. The monitoring shall continue for a minimum of 3 days to establish background levels. A report of the results shall be submitted to the Contracting Officer within 48 hours and shall include:

(1) Name and location of jobsite.

(2) Date of monitoring.

(3) Time of monitoring (i.e., time monitoring begins and ends each day).

(4) Identification and serial number of monitoring units.

(5) Drawing showing specific location of monitoring units.

(6) Drawing showing specific location of paint removal operation and the method of removal or work activity being performed.

(7) Wind direction and velocity.

(8) A flow chart verifying the rate of air flow across the filter throughout the sampling period.

(9) Name and address of laboratory.

(10) Laboratory test procedure.

(11) Laboratory test results.

(12) Signatures of field and laboratory technicians conducting the work.

Water Quality Plan; GA.

For all job sites where lead is present, the Contractor shall develop a plan to ensure that no lead is released into bodies of water or storm sewers. Therefore, NPDES permits per EPA regulation 40 CFR 122 are not required for the project. The plan shall include provisions for halting work if spills or emissions are observed entering into bodies of water or found in areas where storm water runoff could carry the debris into bodies of water or storm sewers. The plan shall also address cleanup and reporting procedures. In the event that there are any releases of lead paint debris into the waterways, with reportable quantities of hazardous substances designated pursuant to Section 311 of the Clean Water Act, they shall be reported to the EPA in accordance with 40 CFR 117 and 40 CFR 355. Releases or spills that carry into waterways or storm sewers shall be thoroughly documented. The documentation shall include the time and location of the release, amount of material released, actions taken to clean up the debris, amount of debris recovered, and corrective action taken to avoid a reoccurrence. Releases shall also be reported to the

Coast Guard and other state and local authorities as appropriate. If the release is equivalent to 10 pounds or more of lead-containing material in a 24-hour period, it is considered to be a reportable quantity under CERCLA. The Contractor shall comply with 40 CFR 302.

Soil Quality Plan; GA.

For all job sites where lead is present, the Contractor shall develop a plan to establish and implement practices and procedures for preventing contamination of the soil from the lead removal operation. The plan shall include provisions for halting the work should soil contamination occur, correcting the deficiencies responsible for the contamination, and provide procedures for removing and replacing contaminated soil. Unless otherwise directed by the Contracting Officer, soil shall be considered to have been contaminated by the Contractor's operation if an increase in the total lead content of 100 PPM or greater over background levels occurs. Soil sampling and lead testing shall be conducted prior to the beginning of the project and after the project is completed. Interim testing may also be performed in the event the Contractor or Contracting Officer wants to confirm that the containment system and work practices continue to provide satisfactory protection of the soil. Unless otherwise directed by the Contracting Officer, the following minimum test locations shall be selected for soil analysis. Two locations shall be selected beneath or immediately adjacent to the structure being prepared, and additional samples shall be taken within 100 feet in each direction of the project (i.e., N, S, E, W) in which soil is present. The number of soil sample locations shall be sufficient to adequately characterize the soil lead levels within and around the project area. Three composite samples shall be collected at each location. Each of the three samples shall be comprised of five individual plugs of soil combined in a single bag. The composite samples at each location shall be collected using the following procedure:

a. Place a 1-square-foot template at each location.

b. Remove a sample of soil 3/4 inch in diameter and 1/2 inch in depth at the center of the template and at each of the four corners. Place the five soil plugs into a single bag. This represents one of the three samples to be removed at a given location.

c. Move the template 1 inch in any direction and repeat the process to collect the second sample. Place all plugs in a separate bag. Move the template 1 inch farther to collect the third sample.

d. Identify each sample bag with the date, specific location of the sample, name and signature of the sampling technician, and complete chain of custody records.

e. It is critical that the specific location of each sample be thoroughly measured and documented as the final project testing (and any interim testing) must be sampled in the precise locations.

One of the three samples collected at each location shall be analyzed for lead content. One of the remaining two samples shall be maintained by the Contractor for the duration of the project and the other by the Contracting Officer in the event a reanalysis is required. The samples shall be analyzed in accordance with EPA testing guidance as published in 40 CFR 261, App III, by a laboratory listed by the American Industrial Hygiene Association (AIHA) as being proficient in conducting the test. The Contractor shall note that if it is determined that contamination of the

soil has occurred as a result of the paint removal operations, TCLP testing will be employed to determine if the soil must be handled and disposed of as a hazardous waste. The initial sampling of the soil for total lead content does not establish whether the soil would be considered hazardous by TCLP testing. As a result, at the Contractor's option, additional prejob soil samples may be removed (minimum of 100 grams is required for a single test at each site) to conduct TCLP testing to establish whether the soil would be classified as hazardous prior to project startup. In the event that there is a release of lead paint debris onto the soil and if the release is 10 pounds or more of lead-containing material in a 24-hour period, it is considered to be a reportable quantity under CERCLA. The Contractor shall comply with 40 CFR 302. The Contractor shall thoroughly document the occurrence of any spills of lead debris into the soil. The documentation shall include the time and location of the release, amount of material released, actions taken to clean up the debris, amount of debris reclaimed, and corrective action taken to avoid a reoccurrence. The documentation shall be provided to the Contracting Officer and shall also include the results of laboratory testing.

SD-18 Records

Inspections and Operations; GA.

The Contractor shall document and submit records of inspections and operations performed. Submittals shall be made on a daily basis and shall include but are not limited to:

a. Inspections performed, including the area of the structure involved and the results of the inspection.

b. Surface preparation operations performed, including the area of the structure involved, the mode of preparation, the kinds of solvent, abrasive, or power tools employed, and whether contract requirements were met.

1.7 QUALIFICATIONS

1.7.1 Qualifications and Organization Report

The Contractor shall furnish a qualification and organization report. The report shall describe the qualifications of the qualified safety and health professional (QSHP), onsite safety and health supervisor (OSHS), labor staff and the independent risk assessor. The report shall include an organization chart showing the Contractor's personnel by name and title and project specific responsibilities and authorities. The report shall describe the qualifications of the laboratories selected for this project. The report shall be signed by the Contractor and the qualified safety and health professional to indicate that all personnel and laboratories comply with certification and experience requirements of this section and that project personnel have been given the authority to complete the tasks assigned to them.

1.7.2 Personnel and Subcontractor Responsibilities and Qualifications

1.7.2.1 Qualified Safety and Health Professional (QSHP)

The QSHP shall be responsible for development of project specific requirements in the Accident Prevention Plan (APP); supervise implementation of the APP requirements; visit the site as needed to verify

effectiveness of the APP and to coordinate resolution of unknown situations that may develop as the work progresses; be available to provide consultation to the Onsite Safety and Health Supervisor (OSHS); review sampling and analytical results to evaluate occupational exposure levels, verify effectiveness of controls and determine if clearance requirements have been met. The QSHP shall have demonstrable experience with the implementation of occupational safety and health regulations.

1.7.2.2 Onsite Safety and Health Supervisor (OSHS)

The Contractor shall provide a person who is qualified and competent as defined in Section 01 of EM 385-1-1, will develop the required safety and health submittal, and will be responsible for on-site safety and health during the contract period. The person shall be a Certified Industrial Hygienist (CIH), an Industrial Hygienist (IH), or a Certified Safety Professional (CSP) with a minimum of 3 years of demonstrated experience in similar related work. The Contractor shall certify that the Certified Industrial Hygienist (CIH) holds current and valid certification from the American Board of Industrial Hygiene (ABIH), that the IH is considered board eligible by written confirmation from the ABIH, or that the CSP holds current and valid certification from the American Board of Certified Safety Professionals. The CIH, IH, or CSP may utilize other qualified and competent persons, as defined in EM 385-1-1, to conduct on-site safety and health activities as long as these persons have a minimum of 3 years of demonstrated experience in similar related work and are under the direct supervision of the CIH, IH, or CSP. For lead containing jobsites, the competent and qualified person shall have successfully completed an EPA or state accredited lead-based paint abatement Supervisor course specific to the work to be performed and shall possess current and valid state and/or local government certification, as required.

1.7.2.3 Lead Hazard Control Workers

Lead Hazard Control workers shall be responsible for performing the labor necessary to complete the lead hazard control activities required in this contract.

1.7.2.4 Independent Certified Risk Assessor

The independent Certified Risk Assessor shall be a subcontractor to the prime Contractor on the project. The risk assessor shall be responsible to perform the sampling and evaluating the analytical data to verify clearance levels have been achieved. The independent risk assessor shall sign the clearance report indicating clearance requirements for the contract have been met.

1.7.2.5 Certified Testing Laboratories

The Contractor shall provide documentation which includes the name, address, and telephone number of the laboratories to be providing services. In addition, the documentation shall indicate that each laboratory is an EPA National Lead Laboratory Accreditation Program (NLLAP) accredited laboratory and that each is rated proficient in the NIOSH/EPA Environmental Lead Proficiency Analytical Testing Program (ELPAT)and will document the date of current accreditation. Certification shall include accreditation for heavy metal analysis, list of experience relevant to analysis of lead in air, and a Quality Assurance and Quality Control Program. The laboratory selected to perform analysis on worker exposure (industrial hygiene) samples shall be in the American Industrial Hygiene Association's

Industrial Hygiene Laboratory Accreditation Program (IHLAP.

1.7.2.6 Blood Lead Testing

The laboratory selected to perform analysis on worker blood samples shall be approved by OSHA and meet the requirements contained in http://www.osha-slc.gov/OCIS/toc_bloodlead.html.

1.7.2.7 Disposal Facility and Transporter

The Contractor shall furnish written evidence that the landfill to be used is approved for lead disposal by USEPA, state, and local requirements. Copies of any required signed agreements between the Contractor, including subcontractors and transporters, and the lead disposal facility shall be provided.

1.8 REGULATORY REQUIREMENTS

In addition to the detailed requirements of this specification, work shall be performed in accordance with requirements of EM 385-1-1 and applicable regulations including, but not limited to 29 CFR 1910, 29 CFR 1926, especially Section .62, and the accepted Accident Prevention Plan with Appendices. Matters of interpretation of the standards shall be resolved to the satisfaction of and with the concurrence of, the Contracting Officer before starting work. Where these requirements vary, the most stringent shall apply. Work shall also comply with all State and local statutes, regulations and requirements.

1.9 ACCIDENT PREVENTION PLAN (APP)

1.9.1 APP Content and Organization

The Contractor's Accident Prevention Plan shall be organized into 5 parts, consisting of the overall plan and 4 appendices. The overall plan shall address each element in Appendix A of EM 385-1-1 in project specific detail. The elements are: a. Signature Sheet, b. Background Information, c. Statement of Safety and Health Policy, d. Responsibilities and Lines of Authorities, e. Subcontractors and Suppliers, f. Training, g. Safety and Health Inspections, h. Safety and Health Expectations, Incentive Programs and Compliance, i. Accident Reporting, j. Medical Support, k. Corporate Plans and Programs required by this contract, (HAZCOM, Respiratory Protection).

1.9.1.1 Lead Hazard Control Plan Appendix

The Lead Hazard Control Appendix shall address occupational exposure issues and shall describe the procedures to be followed to protect employees from lead hazards while performing lead hazard control activities. Each of the following elements shall be addressed in the lead hazard control appendix:

a. The location and a brief description of each work activity that will emit lead into the workplace atmosphere. A description of any components containing lead shall be included and keyed to the project drawings.

b. Description of equipment and materials, controls, crew size, worker responsibilities, and operating and maintenance procedures.

c. Description and sketch of the Lead Hazard Control Areas, including

decontamination areas.

d. Description of the specific lead control methods and procedures to protect workers and other onsite contractors from lead exposure.

e. Technologic equipment used to keep occupational exposure below the Permissible Exposure Limit and minimize worker exposure to lead (i.e., HEPA-filtered vacuum equipment/cleaners, special negative air enclosure equipment and supplies, etc.).

f. Worker Exposure Assessment including methods and procedures to monitor and document worker exposure to lead. Worker exposure monitoring shall be broken into two parts in the plan. Part A: Initial Determination. The Contractor shall describe worker monitoring (if performed for the "initial determination" described in 29 CFR 1926 (.62) (d). Monitoring for the initial determination may be omitted from the plan if the Contractor has sufficient proof from previous operations as specified in 29 CFR 1926 (.62) (d)(3)(iii) and (iv) that workers will not be exposed over the action level. The Contractor shall substitute objective proof of action level compliance in Part A if "initial determination" monitoring is omitted. Part B: Continued Exposure Monitoring. Worker exposure monitoring after the initial lead exposure determination has been made.

g. Work Practices Program describing the protective clothing to be used to protect workers from lead exposure, house keeping procedures employed to minimize spread on lead contamination in the lead hazard control area, hygiene facilities and practices used to prevent workers from inadvertent ingestion of lead.

h. Administrative Control Procedures, to be used as a last resort, to limit worker exposure to lead. The worker rotation schedule to be employed, should engineering or personal protective equipment precautions fail to be effective, shall be described. This element of the plan shall be omitted if administrative controls will not be used.

i. Medical Surveillance practices and procedures used to monitor worker exposure to lead and to assure fitness for wearing respiratory protection devices.

j. Worker training meeting the requirements of 29 CFR 1926 Sections (.62) and (.59) to assure workers understand hazard associated with working with lead and how to protect themselves.

k. Security: Locked security area for each lead hazard control area. Persons entering control areas shall be trained, medically evaluated, and equipped with personal protective equipment required for the specific control area to be entered.

1.9.1.2 Activity Hazard Analyses Appendix

An Activity Hazard Analysis (AHA) shall be prepared for each work task data element specified on the individual work task data element sheets at the end of this section. The AHA shall be submitted to the Contracting Officer prior to beginning specified work. Format shall be in accordance with EM 385-1-1, figure 1-1. The AHA shall be continuously reviewed and modified, when appropriate, to address changing conditions or operations. Each

accepted AHA shall be appended to and become part of the APP.

1.9.1.3 Clearance Plan Appendix

The Contractor shall develop a Clearance Plan describing practices and procedures used to assure that lead hazard control activities are complete and that lead contamination within the lead hazard control area comply with final clearance levels or visual clearance criteria. Sampling and analysis procedures used to document project completion and clearance goals shall be explained in the Clearance Plan Appendix.

1.10 PRE-CONSTRUCTION SAFETY CONFERENCE

1.10.1 Conference General Requirements

The Contractor and the QSHP shall attend a pre-construction safety conference prior to starting work. Items required to be submitted shall be reviewed for completeness, and where specified, for acceptance. Details of the APP shall be revised to correct any deficiencies, and resubmitted for acceptance. Onsite work shall not begin until the APP has been accepted, unless otherwise authorized by the Contracting Officer. One copy of the APP shall be maintained in the Contractor's jobsite file, and a second copy shall be posted where it will be accessible to personnel on the site. As work proceeds, the APP shall be adapted to new situations and conditions. Changes to the APP shall be made by the QSHP with acceptance by the Contracting Officer. Should an unforeseen hazard become evident during performance of the work, the QSHP shall inform the Contracting Officer, both verbally and in writing, for immediate resolution. In the interim, the QSHP shall take necessary action to re-establish and maintain safe working conditions; and to safeguard onsite personnel, visitors, the public, and the environment. Disregard for provisions of this specification, or the accepted APP, shall be cause for stopping of work until the matter is rectified.

1.10.2 Preparatory Inspection Meeting

The Contractor shall arrange and hold a preparatory inspection meeting to review completeness and adequacy of the APP immediately prior to beginning each phase of work.

1.11 MEDICAL SURVEILLANCE REQUIREMENTS

The Contractor shall comply with the following medical surveillance requirements:

a. The Contractor shall make every attempt to keep occupational exposure to lead on this project below the action level of 30 micrograms/cubic meter defined in 29 CFR 1926 (.62). If it is not possible, and if occupational exposures could possibly exceed the action level for 30 or more days per year, the Contractor shall institute a medical surveillance program. The program shall meet the examination frequency and content requirements specified in paragraph (j)(1), (j)(2) and (j)(3) of 29 CFR 1926 (.62). Medical removal as specified in paragraph (k) of 29 CFR 1926 (.62), if necessary, shall be at the Contractor's expense.

b. Medical surveillance and biological monitoring shall be in compliance with 29 CFR 1926 (.62) (g) and (j). Initial biological monitoring shall be performed on lead hazard control workers prior

to assignment to the project. Workers shall not be assigned to the project if results indicate a need for restricted activities.

c. All lead hazard control workers shall pass the medical examinations necessary to be approved by the occupational physician to wear respiratory protection on this project. Occupational physician's approval shall be given prior to assignment to the project.

1.12 RESPIRATORY PROTECTION PROGRAM

The Contractor shall have a written respiratory protection program and shall be fully capable of implementing the requirement of the respiratory protection program on this project. The respiratory protection program shall meet the requirements of 29 CFR 1926 (.62) and 29 CFR 1910 (.134). Project specific respiratory protection requirements shall be included in the lead hazard control plan appendix of the Contractor's accident prevention plan.

1.13 LICENSES, PERMITS AND NOTIFICATIONS

The Contractor shall certify in writing to the Regional Office of the EPA state's environmental protection agency responsible for lead hazard activities and the Contracting Officer at least 10 days prior to the commencement of work that licenses, permits and notifications have been obtained. The Contractor is responsible for all associated fees or costs incurred in obtaining the licenses, permits and notifications.

1.14 TRAINING

1.14.1 OSHA Training Requirements

All Contractor personnel and/or subcontractors performing or responsible for onsite oversight of lead hazard control activities shall meet the following training requirements.

a. Content of 29 CFR 1926 (.62) and its appendices.

b. How operations could result in exposure over the action level.

c. Purpose, selection, fitting, use and limitations of respirators.

d. Purpose and description of the medical surveillance program.

e. Use of engineering controls and good work practices to limit occupational exposure to lead.

f. Implementation of the lead hazard control plan appendix of the accident prevention plan.

g. Medical supervision for the use of chelating agents.

h. Employee right of access to medical surveillance records as specified in 29 CFR 1910 (.20).

1.14.2 Qualified Safety and Health Professional

The qualified safety and health professional shall meet the training requirements in paragraph 1.12.1 and shall meet the training, experience

and authority requirements in 29 CFR 1926 (.62) to be a competent person and be trained and have the experience and education to meet 40 CFR 745 Subpart L requirements to carry the following certifications:

a. Certified Risk Assessor
b. Certified Project Designer
c. Certified Supervisor

1.14.3 Abatement Worker

Workers shall meet the OSHA Training Requirements specified above and the training requirements in 40 CFR 745 Subpart L to carry certification as a Certified Worker, if required.

1.14.4 Training Program Certification

Training to meet 40 CFR 745 Subpart L requirements shall be provided by an EPA accredited training provider and the Contractor shall provide proof in the Qualifications and Organization Report showing that personnel have passed certification examinations for their respective disciplines, that fees for certification have been paid to the EPA (or to the state for state-run programs) and that EPA has certified the QSHP, independent risk assessor, certified workers to perform their duties.

1.15 SAMPLING AND ANALYSIS

1.15.1 Sampling and Analytical Procedures

1.15.1.1 Sampling and Analysis Methods

Analysis shall conform to NIOSH Pub No. 84-100 Method 7082, Lead, for personal sampling required by 29 CFR 1926 (.62). Sampling shall conform to ASTM E 1553 or ASTM E 1741.

1.15.1.2 Soil Sampling and Analysis

Sampling shall conform to ASTM E 1727 or ASTM E 1726. Analysis shall conform to ASTM E 1613.

1.15.2 Occupational Exposure Assessment

Sampling and analytical procedures to determine compliance with the occupational exposure monitoring requirement of this section shall be described in the lead hazard control plan appendix of the Contractor's accident prevention plan. Monitoring for the initial determination may be omitted if the Contractor has sufficient proof from previous operations as specified in 29 CFR 1926 (.62) (d)(3)(iii) and (iv) that workers will not be exposed over the action level. The following occupational exposure monitoring requirements apply and shall be implemented if the requirements of 29 CFR 1926 (.62)(d)(3) (iii) and (iv) cannot be demonstrated.

a. During Initial Monitoring the Contractor shall representatively sample employees with the greatest potential for exposure to aerosolized lead.

b. Continued/Additional Monitoring shall meet applicable paragraphs in 29 CFR 1926 (.62)(d)(6), Frequency, after the initial determination has been made.

1.15.3 Lead Hazard Control Area/Containment Monitoring

The Contractor shall perform a visual inspection once per day outside the lead hazard control area to assure visual clearance criteria are maintained while lead hazard control activities are performed. The Contractor shall clean at its own expense, and to the Contracting Officer's satisfaction, all contaminated surfaces outside the lead hazard control area, if surfaces fail visual clearance criteria.

1.15.4 Clearance Monitoring

Sampling and analytical procedures to determine the clearance requirements of this section shall be described by the Contractor in the Clearance Plan Appendix of the Accident Prevention Plan. The Contractor shall perform the following sampling and analysis to verify that clearance requirements for the contract area have been met.

a. The Contractor shall take exterior bare soil samples inside the lead hazard control area after the final visual inspection in the quantities and at the locations specified.

1.15.5 Waste Disposal Sampling

The Contractor shall sample the following waste streams for TCLP analysis to determine waste disposal requirements.

a. The Contractor shall take 20 samples of paint chips.

b. The Contractor shall take 5 samples of soil.

c. The Contractor shall take 5 samples of settled dust in vacuum canisters.

1.15.6 Analytical Results

The Contractor shall develop and maintain during the course of the project a log of analytical results generated by the above sampling requirements. The log shall clearly describe the reason for which the sample was taken (worker exposure, migration control, clearance) the analytical result for each sample and evaluate if the analytical result passed or failed the action levels. At a minimum, the Contractor shall include analytical results for samples required to be taken in paragraphs Occupational Exposure Assessment, Lead Hazard Control Area/Containment Monitoring, Occupancy During Work, and Clearance Monitoring specified above.

1.16 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The Contractor shall describe the PPE to be used to protect workers from lead hazards in the Lead Hazard Control Plan Appendix of the Accident Prevention Plan. The Contractor shall furnish, at no cost to the workers, clothing for protection from lead-contaminated dust and debris. An adequate supply of these items shall be available for worker and Government personnel use. Protective clothing shall include:

a. Coveralls : Full-body breathable disposable or reusable cotton or cotton/polyester blend coveralls shall be provided to lead hazard control workers.

b. Boots: Boots and shoes shall be provided as required by EM 385-1-1 Section 05.A.08 for workers. Boot/shoe covers shall be provided to prevent contamination of boots and shoes.

c. Hand Protection: Gloves, etc., shall be provided as required by EM 385-1-1 Section 05.A.10 for workers.

d. Head Protection: Hard hats shall be provided as required by 29 CFR 1910 (.135) and EM 385-1-1 Section 05.D for workers and authorized visitors.

e. Eye and Face Protection: Eye and face protection shall be provided as required by 29 CFR 1910 (.133) and EM 385-1-1 Section 05.B for workers and authorized visitors.

f. Respirators: NIOSH certified air-purifying respirators or filtering face pieces shall be provided for use as respiratory protection for airborne lead and for other hazardous airborne contaminants that may be encountered; as determine by the on-site safety and health supervisor. At a minimum, respirators shall be furnished to each employee required to enter a lead hazard control area where an employee exposure assessment has not yet been performed, or where monitoring data establishes the need for respiratory protection, or if requested by the employee.

g. Respirator Cartridges/Filtering Face Pieces: Respirator cartridges shall be changed out/filtering face pieces properly disposed of when the they become sufficiently loaded with particulate matter that workers experience breathing resistance. Cartridges and filtering face pieces shall be N, R or P 100 rated to assure sufficient protection from lead exposure.

1.17 SAFETY AND HEALTH PROVISIONS

Paragraph SAFETY AND HEALTH PROVISIONS supplements the requirements of EM 385-1-1, paragraph (1). In any conflict between Section 01 of EM 385-1-1 and this paragraph, the provisions herein shall govern.

1.17.1 Abrasive Blasting

The Contractor shall comply with the requirements in Section 06.H of EM 385-1-1.

1.17.1.1 Hoses And Nozzles

In addition to the requirements in Section 20 of EM 385-1-1, hoses and hose connections of a type to prevent shock from static electricity shall be used. Hose lengths shall be joined together by approved couplings of a material and type designed to prevent erosion and weakening of the couplings. The couplings and nozzle attachments shall fit on the outside of the hose and shall be designed to prevent accidental disengagement.

1.17.1.2 Workers Other Than Blasters

Workers other than blasting operators working in close proximity to abrasive blasting operations shall be protected by utilizing MSHA/NIOSH-approved half-face or full-face air purifying respirators equipped with high-efficiency particulate air (HEPA) filters, eye protection meeting or exceeding ANSI Z87.1 and hearing protectors (ear

plugs and/or ear muffs) providing at least 20 dBA reduction in noise level.

1.18 MEDICAL STATUS

Prior to the start of work and annually thereafter, all Contractor employees working with or around paint systems, thinners, blast media, those required to wear respiratory protective equipment, and those who will be exposed to high noise levels shall be medically evaluated for the particular type of exposure they may encounter. The evaluation shall include:

a. Audiometric testing and evaluation of employees who will work in the noise environments.

b. Vision screening (employees who use full-facepiece respirators shall not wear contact lenses).

c. Medical evaluation shall include, but shall not be limited to, the following:

(1) Medical history including, but not limited to, alcohol use, with emphasis on liver, kidney, and pulmonary systems, and sensitivity to chemicals to be used on the job.

(2) General physical examination with emphasis on liver, kidney, and pulmonary system.

(3) Determination of the employee's physical and psychological ability to wear respiratory protective equipment and to perform job-related tasks.

(4) Determination of baseline values of biological indices for later comparison to changes associated with exposure to paint systems and thinners or blast media, which include: liver function tests to include SGOT, SGPT, GGPT, alkaline phosphates, bilirubin, complete urinalysis, EKG (employees over age 40), blood urea nitrogen (bun), serum creatinine, pulmonary function test, FVC, and FEV, chest x-ray (if medically indicated), blood lead (for individuals where it is known there will be an exposure to materials containing lead), other criteria that may be deemed necessary by the Contractor's physician, and Physician's statements for individual employees that medical status would permit specific task performance.

(5) For lead-based paint removal, the medical requirements of 29 CFR 1926.62 shall also be included.

1.19 CHANGE IN MEDICAL STATUS

Any employee whose medical status has changed negatively due to work related chemical and/or physical agent exposure while working with or around paint systems and thinners, blast media, or other chemicals shall be evaluated by a physician, and the Contractor shall obtain a physicians statement as described in paragraph MEDICAL STATUS prior to allowing the employee to return to those work tasks. The Contractor shall notify the Contracting Officer in writing of any negative changes in employee medical status and the results of the physicians reevaluation statement.

1.20 HYGIENE FACILITIES

The Contractor shall describe the personal hygiene facilities to be used by the workers in the Lead Hazard Control Plan Appendix of the Accident Prevention Plan. The Contractor shall provide hygiene facilities for lead hazard control workers. Hygiene facilities shall consist of the following:

1.20.1 Hand Wash Stations

The Contractor shall provide hand washing facilities for use by lead hazard control workers. Hand washing facilities shall comply with the requirements in 29 CFR 1926 (.51) (f). Faces and hands shall be washed when leaving the lead hazard control area and after each work-shift if showers are not provided.

1.20.2 Change Area

The Contractor shall provide a change area to workers. The change area shall be equipped so that contaminated work clothing and street clothes shall be stored separately to prevent cross contamination.

1.20.3 Showers

Showers shall be provided if feasible and if worker exposures exceed the PEL. When provided, showers facilities shall meet the requirements of 29 CFR 1926 (.51) (f).

1.20.4 Eating Area

The Contractor shall set aside an area or provide a room for taking breaks and eating lunch. This area shall be kept as free as practicable from lead contamination. Workers shall be required to follow the procedures in 29 CFR 1926 (.62) (i)(4) when using the room.

1.21 POSTED WARNINGS AND NOTICES

The following regulations, warnings, and notices shall be posted at the worksite in accordance with 29 CFR 1926 (.62).

1.21.1 Regulations

At least two copies of 29 CFR 1926 (.62) shall be made available for use by either the Contracting Officer or affected workers; and for the purpose of providing required information and training to the workers involved in the project. One copy shall be maintained in the Contractor's jobsite file, and a second copy shall be posted where it will be accessible to workers on the site.

1.21.2 Warning Signs and Labels

Warning signs shall be posted in each lead hazard control area where worker exposure to lead is undetermined or where the exposures are above the permissible exposure limit as defined in 29 CFR 1926 (.62). Signs shall be located to allow personnel to read the signs and take necessary precautions before entering the lead hazard control area.

1.21.2.1 Warning Signs

Warning signs shall be in English and Spanish be of sufficient size to be clearly legible, and display the following:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

1.21.2.2 Warning Labels

Warning labels shall be affixed to all lead waste disposal containers used to hold materials, debris and other products contaminated with lead hazards; warning labels shall be in English , and be of sufficient size to be clearly legible, and display the following:

CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY

BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN

ACCORDANCE WITH APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS.

1.21.3 Worker Information

Right-to-know notices shall be placed in clearly visible areas accessible to personnel on the site, to comply with Federal, state, and local regulations.

1.21.4 Air Monitoring Results

Air monitoring results shall be prepared so as to be easily understood by the workers. One copy shall be maintained in the Contractor's jobsite file, and a second copy shall be posted where it will be accessible to the workers as specified in 29 CFR 1926 (.62).

1.21.5 Emergency Telephone Numbers

A list of emergency telephone numbers shall be posted at the site. The list shall include numbers of the local hospital, emergency squad, police and fire departments, Government and Contractor representatives who can be reached 24 hours per day, and professional consultants directly involved in the project.

1.22 MATERIALS AND EQUIPMENT

Sufficient quantities of health and safety materials required by 29 CFR 1926 (.62), and other materials and equipment needed to complete the project, shall be available and kept on the site.

1.22.1 Abrasive Removal Equipment

The use of powered machine for vibrating, sanding, grinding, or abrasive blasting is prohibited unless equipped with local exhaust ventilation systems equipped with high efficiency particulate air (HEPA) filters.

1.22.2 Negative Air Pressure System

1.22.2.1 Minimum Requirements

Work shall not proceed in the area until containment is set up and HEPA filtration systems are in place. The negative air pressure system shall meet the requirements of ANSI Z9.2 including approved HEPA filters per UL

586. Negative air pressure equipment shall be equipped with new HEPA filters, and shall be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Negative air pressure system minimum requirements are listed below:

a. The unit shall be capable of delivering its rated volume of air with a clean first stage filter, an intermediate filter and a primary HEPA filter in place.

b. The HEPA filter shall be certified as being capable of trapping and retaining mono-dispersed particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.

c. The unit shall be capable of continuing to deliver no less than 70 percent of rated capacity when the HEPA filter is 70 percent full or measures 2.5 inches of water static pressure differential on a magnehelic gauge.

d. The unit shall be equipped with a manometer-type negative pressure differential monitor with minor scale division of 0.02 inch of water and accuracy within plus or minus 1.0 percent. The manometer shall be calibrated daily as recommended by the manufacturer.

e. The unit shall be equipped with a means for the operator to easily interpret the readings in terms of the volumetric flow rate of air per minute moving through the machine at any given moment.

f. The unit shall be equipped with an electronic mechanism that automatically shuts the machine off in the event of a filter breach or absence of a filter.

g. The unit shall be equipped with an audible horn that sounds an alarm when the machine has shut itself off.

h. The unit shall be equipped with an automatic safety mechanism that prevents a worker from improperly inserting the main HEPA filter.

1.22.2.2 Auxiliary Generator

An auxiliary generator shall be provided with capacity to power a minimum of 50 percent of the negative air machines at any time during the work. When power fails, the generator controls shall automatically start the generator and switch the negative air pressure system machines to generator power. The generator shall not present a carbon monoxide hazard to workers.

1.22.3 Vacuum Systems

Vacuum systems shall be suitably sized for the project, and filters shall be capable of trapping and retaining all mono-disperse particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent. Used filters that are being replaced shall be disposed in a proper manner.

1.22.4 Chemical Paint Strippers

Chemical paint strippers shall not contain methylene chloride and shall be formulated to prevent stain, discoloration, or raising of the substrate materials.

1.22.5 Chemical Paint Stripper Neutralizer

Neutralizers for paint strippers shall be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

1.23 EXPENDABLE SUPPLIES

1.23.1 Polyethylene Bags

Disposable bags shall be polyethylene plastic and shall be a minimum of 6 mils thick (4 mils thick if double bags are used) or any other thick plastic material shown to demonstrate at least equivalent performance; and shall be capable of being made leak-tight. Leak-tight means that solids, liquids or dust cannot escape or spill out.

1.23.2 Polyethylene Leak-tight Wrapping

Wrapping used to wrap lead contaminated debris shall be polyethylene plastic that is a minimum of 6 mils thick or any other thick plastic material shown to demonstrate at least equivalent performance.

1.23.3 Polyethylene Sheeting

Sheeting shall be polyethylene plastic with a minimum thickness of 6 mil, or any other thick plastic material shown to demonstrate at least equivalent performance; and shall be provided in the largest sheet size reasonably accommodated by the project to minimize the number of seams. Where the project location constitutes an out of the ordinary potential for fire, or where unusual fire hazards cannot be eliminated, flame-resistant polyethylene sheets which conform to the requirements of NFPA 701 shall be provided.

1.23.4 Tape and Adhesive Spray

Tape and adhesive shall be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive shall retain adhesion when exposed to wet conditions, including amended water. Tape shall be minimum 2 inches wide, industrial strength.

1.23.5 Containers

When used, containers shall be leak-tight and shall be labeled in accordance with EPA, DOT and OSHA standards, as specified in paragraph WARNING LABELS.

1.23.6 Chemicals

Chemicals, including caustics and paint strippers, shall be properly labeled, used in accordance with the manufacturers recommendations and stored in leak-tight containers. Material Safety Data Sheets (MSDSs) shall be provided and hazard communication procedures implemented in conformance with paragraph HAZARD COMMUNICATION PROGRAM.

1.24 STORAGE OF MATERIALS

Materials shall be stored protected from damage and contamination. During

periods of cold weather, plastic materials shall be protected from the cold. Flammable or hazardous materials shall not be stored inside a building. Materials shall be regularly inspected to identify damaged or deteriorating items. Damaged or deteriorated items shall not be used and shall be removed from the site as soon as they are discovered. Stored materials shall not present a hazard or an inconvenience to workers, visitors, and/or other occupants and employees of the facility in which they are located.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 WORK PROCEDURES

The Contractor shall perform work following practices and procedures described accident prevention plan.

3.1.1 Lead Hazard Control Areas, Equipment and Procedures

The Contractor shall set up lead hazard control areas and operate equipment within the lead hazard control area in a manner that will minimize migration of lead dust beyond the lead hazard control area boundaries and minimize exposure to workers.

3.1.2 Lead Hazard Control Areas

Access into lead hazard control areas by the general public shall be prohibited. Workers entering the lead hazard control area shall meet medical surveillance requirements of this contract and shall be required to understand and follow procedures described in the Contractor's accident prevention plan for reducing lead exposure. Lead hazard control area preparation and restriction requirements follow:

a. Containment features for exterior lead hazard control projects: Polyethylene sheeting sealed with spray adhesive and duct tape, Portable plastic partitions, and colored caution tape to designate the lead hazard control area. The floor in the lead hazard control area shall be covered with a minimum of two layers of polyethylene sheeting. The entry/exit shall be sealed with primitive air lock openings, such as HVAC supply and return air vents, into the lead hazard control area and shall be sealed with polyethylene sheeting and duct tape or with sealed rigid coverings.

3.1.3 Negative Air Pressure System Containment

a. The negative air pressure systems shall be operated to provide at least 10 air changes per hour inside the containment. The local exhaust unit equipment shall be operated continuously until the containment is removed. The negative air pressure system shall be smoke tested for leaks at the beginning of each shift. The OSHS is responsible to continuously monitor and keep a log of the pressure differential with an automatic manometric recording instrument. The Contracting Officer shall be notified immediately if the pressure differential falls below the prescribed minimum. The building ventilation system shall not be used as the local exhaust system for the lead hazard control area utilizing the negative air pressure system. The local exhaust system shall

terminate out of doors unless the Contracting Officer allows an alternate arrangement. All filters shall be new at the beginning of the project and shall be periodically changed as necessary to maintain specified pressure differential and shall be disposed of as lead contaminated waste.

b. Discontinuing Negative Air Pressure System. The negative air pressure system shall be operated continuously during lead hazard control work unless otherwise authorized by the Contracting Officer. At the completion of the project, units shall be run until full cleanup has been completed and final clearance testing requirements have been met. Dismantling of the negative air pressure systems shall conform to written decontamination procedures be approved by the Contracting Officer, and be as presented in the Lead Hazard Control Plan. The HEPA filter machine intakes shall be sealed with polyethylene to prevent environmental contamination.

3.2 USE OF HYGIENE FACILITIES

a. Personnel and equipment shall be decontaminated when exiting the lead hazard control area. The Contractor shall comply with the following personnel and equipment decontamination procedures:

(1) HEPA vacuum outer garments and equipment.
(2) Wet Wipe Equipment.
(3) Remover outer layer of garments.
(4) Thoroughly wash face and hands, if showering not required.
(5) Shower (if applicable).
(6) Remove Respirator (if applicable).
(7) Exit lead hazard control area.

b. The Contractor shall provide, and workers shall use, a change room to change into work clothing at the beginning of a work shift. At the end of the work shift workers shall change back into street clothing and leave contaminated work clothing at the site for disposal or laundering.

c. The Contractor shall provide an eating facility as free as practical from lead contamination. Workers shall be allowed usage of the eating facility for rest/lunch breaks.

3.3 WASTE DISPOSAL PROCEDURES

3.3.1 Construction Debris and/or Sanitary Landfill Waste

The Contractor shall dispose of the following waste streams in a construction debris landfill: Used Personal Protective Equipment and disposable material from containment structures.

3.3.2 Waste Stream Classification

The Contractor shall determine the RCRA waste classification for all waste streams generated by the lead hazard control project. The Contractor shall perform the sampling and analysis specified in paragraph WASTE DISPOSAL, evaluate analytical results and propose waste stream treatment and disposal requirements for the contract. The Contracting Officer will approve waste stream treatment and disposal requirements proposed by the Contractor.

3.3.3 RCRA Subtitle C Hazardous Waste

The Contractor shall dispose of the following waste streams at the RCRA subtitle C Treatment Storage and Disposal Facility or at the RCRA subtitle C hazardous wastes landfill: Dust and paint chips from HEPA vacuuming operations, Paint sludge and residue from chemical or heat stripping procedures, and Lead contaminated soil.

3.3.4 Hazardous Waste Transportation and Disposal

The Contractor shall transport, treat and dispose of hazardous waste in accordance with the requirements of Section 02120 TRANSPORATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.4 LEAD HAZARD CONTROL PROCEDURES, METHODS AND TECHNIQUES.

3.4.1 Paint Removal Methods

Prohibited paint removal methods shall include: open flame burning or torching, including the use of heat guns having operating temperatures greater than 1,100 degrees F; machine sanding or grinding without HEPA exhaust; non-contained hydro blasting or high-pressure water wash; abrasive blasting or sandblasting without HEPA exhaust; dry scraping, except near electrical outlets or when using a heat gun. Chemical paint removers containing methylene chloride are prohibited. Building components and structures adjacent to the removal process shall be appropriately protected from damage due to the removal process employed. Stripping shall be done according to manufacturer's recommendations. Stripped substrates shall be thoroughly washed and neutralized before applying a primer or sealing coat.

3.4.1.1 HEPA Vacuum Blasting

The blast head shall be shrouded under a vacuum and exhaust passed through a HEPA filter. The blast head shall remain in continuous contact with the surface to avoid dispersal of both the blast medium and particulate. The equipment shall be equipped with a device that separates the blast media from the material to be removed, effectively recycling the blast material and minimizing the amount of waste. Work shall be positioned to minimize the degree workers must reach above shoulder level, in order to minimize worker fatigue and loss of blast head contact with the surface.

3.4.1.2 HEPA Vacuum Needle Gun

The vacuum needle gun head shall be equipped with a vacuum shroud designed for the surface to be treated. The needle gun shall be operated to maximize surface contact of the vacuum shroud. Work shall be positioned to minimize the degree workers must reach above shoulder level, in order to minimize worker fatigue and loss of needle gun contact with the surface.

3.4.1.3 Offsite Paint Removal

Structural steel components to be stripped shall be removed using removal techniques that minimize the amount of airborne dust generated. The painted seams between walls and the components shall be cut with a utility razor knife to minimize wall damage. If more than one component is to be removed and stripped, the labeling of each component for eventual reinstallation shall utilize a punch system. The identifying punches shall be made in an obscure location on the component. Once removed, the component shall be wrapped and sealed as specified for transport. Stripped

components shall be thoroughly washed and neutralized after stripping. Stripped components shall be restored to structural soundness after stripping, if necessary; and shall be cleaned using standard HEPA vacuum/wet wash/HEPA vacuum cycle, dried, and pH neutralized before repainting.

3.4.1.4 Onsite Paint Removal

Paint remover shall be applied in accordance with the manufacturer's instructions. Outdoor application shall only be performed in weather conditions recommended by the manufacturer. The work area surrounding the application process shall be secured to prevent access by children and unauthorized personnel. Workers shall be provided with the appropriate personal protective clothing and equipment in accordance with manufacturer's recommendations and good industrial hygiene practice. A portable eyewash shall be provided whenever eye irritant strippers are used. An abundant source of running water shall be provided in the work area. The stripper shall be tested in a small area prior to full scale stripping. Caustic strippers shall not be used on aluminum or glass surfaces. Waste disposal shall be in accordance with paragraph WASTE DISPOSAL PROCEDURES. Stripped surfaces shall be neutralized and washed in accordance with manufacturer's instructions and paragraph CHEMICAL PAINT STRIPPER NEUTRALIZER. Stripped surfaces shall be completely dry before repainting, and shall be repainted only with paints proven compatible with the stripping techniques employed.

3.4.2 Removing Exterior Surface Lead-Contaminated Debris

Section 02220 DEMOLITION and 02120 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.5 CLEARANCE PROCEDURES

3.5.1 Visual Inspection

QSHP shall perform a visual inspection, using the form at the end of this section, for each lead hazard control area to assure that lead hazard control activities, identified in the individual work task data elements, have been properly completed. The QSHP shall visually verify that lead hazards have been removed, control technology has been appropriately applied/installed and that the lead hazard control area is free of dust and paint chips generated by lead hazard control activities.

3.6 EVALUATION OF SAMPLING AND MONITORING RESULTS

Analytical results from samples taken during lead hazard control activities shall be evaluated to determine compliance with occupational safety and health standards and project specific control efficiency and clearance/clean up levels.

3.6.1 Occupational Safety and Health

The QSHP shall review the analytical results from samples taken for the initial exposure assessment and continued occupational safety and health monitoring if required. Effectiveness and adequacy of personal protective equipment, respirators, work practices, hygiene facilities and personal decontamination procedures shall be evaluated and upgrades/downgrades in equipment and procedures made. After notifying the Contracting Officer the following shall be applied:

a. Exposures over the PEL (0.05 mg/cubic meter):

(1) Improve work practices to reduce exposures.

(2) Don respirators.

(3) Assure eating facilities and change rooms are clean and are free from settled dust.

(4) Shower as part of personal decontamination.

b. Exposures over the Action Level (0.03 mg/cubic meter):

(1) Assure exposed individuals enrolled in the medical surveillance program.

(2) Assure exposed individuals enrolled in and up to date with lead exposure training requirements.

3.6.2 Control Efficiency of Containment Features

The QSHP shall review and document results of the visual inspection determining visual clearance criteria are being met while lead hazard control activities are being performed. The QSHP shall review analytical results from samples taken to determine if lead is migrating outside lead hazard control areas at levels in excess of clearance criteria. The QSHP shall notify the Contracting Officer and apply the following actions if results exceed project specific clearance levels outside the lead hazard control area:

a. Require/improve containment.

b. Improve work practices to reduce lead aerosol generation.

3.6.3 Clearance

The QSHP shall review analytical results for the samples taken to determine compliance with project specific clearance requirements. The following actions apply and shall be performed at the Contractor's expense if project specific clearance levels are exceeded:

Reclean surfaces.
Retest to determine clearance.

3.6.4 Removal of Lead Hazard Control Area

Upon acceptance of the final clearance certification by the Contracting Officer, and when authorized, cleared Lead Hazard Control Area boundary controls and warning signs shall be removed.

3.7 CLEARANCE REPORT

The QSHP shall prepare a clearance report including the following information:

a. Start and completion dates of lead hazard control activities.

b. Type of lead hazard control activity performed (i.e., abatement,

interim control, renovation, remodeling), locations and lead hazards controlled or abated.

c. The name and address of each firm conducting lead hazard control activities and the name of each supervisor assigned to the project.

d. The name, address and signature of the QSHP or independent risk assessor to indicate clearance requirements have been met.

e. Certification of each Final Cleaning and Visual Inspection performed by the QSHP.

f. Analytical results from clearance sampling performed by the QSHP or independent risk assessor, the name of the laboratory that conducted the analysis. Results shall be provided in both the laboratory report and on the appropriate example forms provided at the end of this section.

g. A detailed written description of the lead hazard control activities performed, including hazard control methods used, locations of components where lead hazard control activities occurred, reason for selecting particular hazard control methods for each component, and any suggested monitoring of encapsulants or enclosures.

h. Hazardous waste disposal documentation.

i. Contractor provided installation/maintenance manuals.

3.8 TITLE TO MATERIALS

Materials resulting from demolition work, except as specified otherwise, shall be come the property of the Contractor, and shall be disposed of in accordance with Section 02220 DEMOLITION, except as specified.

3.9 PAYMENT FOR HAZARDOUS WASTE

Payment for disposal of hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials delivered is returned and a copy is furnished to the Government.

3.10 CERTIFICATION OF VISUAL INSPECTION

Certify that the lead hazard control area(s) for each individual work task data elements have passed visual clearance criteria and are ready for clearance sampling. To pass visual clearance, lead hazards have to be removed; control technology appropriately applied/installed; the lead hazard control area must be free from visible dust debris, paint chips or any other residue that may have been generated by the lead hazard control activities.

Signature by the QSHP indicates that the described lead hazard control area(s) have passed visual clearance criteria. Provide detailed description of each Lead Hazard Control Area.

_____

_____

_____

BY:_____
QSHP Date

Print name and title _____

CONTRACTING OFFICER ACCEPTANCE OR REJECTION

The Contracting Officer hereby determines that the Contractor has performed visual inspection of the lead hazard control area and by quality assurance inspection, finds the Contractor's work to be:

_____ Acceptable, ready for performance of clearance sampling

_____ Unacceptable, Contractor instructed to re-clean the lead hazard control area

BY: Contracting Officer's Representative

_____
Signature Date

Print name and title_____

Lead Hazard Control Clearance Sampling Certification Form

Date_____

Name of QSHP or Certified Risk Assessor_____

License No._____

Work Task Data Element _____

Clearance Levels_____
40 CFR 745 Clearance Levels
24 CFR 35 Clearance Levels

Sample quantity and location:
Windows _____
Floors _____
Exterior Soils _____

Date of sample collection_____Date Shipped to lab_____

Shipped by_____
Signature

I certify that the clearance samples taken meet the clearance sampling requirements of this contract.

By:_____ Date:_____
QSHP or independent risk assessor

Print name and Title:_____

CONTRACTING OFFICER ACCEPTANCE OR REJECTION

I have inspected sampling locations and procedures and have found them to be

_____Acceptable, meet contract requirements.

_____Unacceptable, do not meet contract requirements, Contractor is directed to resample.

By: Contracting Officer's Representative

Signature Date

Print Name and Title_____

-- End of Section --

SECTION 15014

OPERATING MACHINERY

PART 1 GENERAL

This section covers the furnishing, manufacture, fabrication, refurbishing, erection, installation, testing and placing into satisfactory service, the existing and new machinery for operation of the lift span, including motor and machinery brakes, gears and pinions, parallel differential gear reducers, shafts, machinery bearings, couplings, machinery frames, counterweight rope sheaves with ring gears, bearings, counterweight ropes (See Section 15015), span guide rollers, counterweight guides, span lock assemblies, machinery lubricating equipment, tools and tool cabinets, and all other associated machinery components, existing and new, necessary to have a complete operating system, all in accordance with the specifications and contract drawings or as directed by the Engineer. The following is a general description of the mechanical elements of the bridge.

The lift span and the two counterweights which balance it shall be suspended on forty-eight 2-1/8" diameter wire ropes passing over four existing 14'-0" pitch diameter sheaves, two at the top of each tower, each sheave carrying twelve ropes. Each sheave is mounted on a trunnion shaft and supported by two journal bearing pillow blocks.

The machinery for the operation of the lift span shall be located at the top of each tower, and enclosed in a weatherproof machinery house. In each tower top machinery room, one of two main drive motor transmits power through a parallel differential gear reducer, it's two output shafts, related floating shafts, couplings and open gearing, to two pinions which drive two existing ring gears, one on each existing counterweight sheave. The sheaves are rotated, thereby raising or lowering the lift span. A back-up drive motor shall be coupled to the other end of the input shaft of the differential reducer. Two motor brakes shall operate on the brakewheels on the two reducer input shafts. Two machinery brakes shall operate on brakewheels mounted inboard of the open gearing on each drive shaft connected to the floating shafts.

Each tower shall have two span lock mechanism assemblies, fixed to the top of each pier and engaging two locking plates extending downwards on the underside of the lift span end floor beams, to lock the span in the seated position. The lockbar actuators shall drive the existing lockbars into existing sockets, both mounted on new pedestals.

Roller-type span guides shall be located at the upper and lower corners of the lift span. The lower fixed end of the span shall be guided by two pairs of longitudinal and two transverse rollers located on the southern end. The span shall also be restrained by six transverse guide rollers, one at each remaining corner of the lift span.

Each counterweight shall be guided by four sets of three rollers to contain the counterweight in all directions. The rollers shall run on guide rails attached to the tower side struts and diagonals.

Where not otherwise specified herein, the design, workmanship, materials,

fabrication and erection of bridge operating machinery shall be in accordance with the requirements of AREMA Manual for Railway Engineering, Chapter 15, Part 6, "Movable Bridges".

For reference, the installation of electrical items, including main drive motors, auxiliary drive motors, emergency gearmotors, reducer differential lock-up gearmotors, tachometer- generators, other span control equipment, limit switches and resolvers are presented in Division 16 - Electrical.

1.1 DESCRIPTION OF WORK

Provide items and materials as indicated on the Contract Drawings and as specified herein.

Existing machinery and associated components to be reused are listed on Contract Drawing M-002. Upon removal, these parts shall be marked or tagged. Painted parts shall be blasted clean and repainted. New bushings and other refurbishing shall be as specified in the Contract Plans, or herein.

Items, material and methods included in this section are for the operating machinery of the entire bridge.

Work shall include furnishing, installing and adjusting bridge machinery, and making final adjustments to assure proper mechanical operation of the bridge. Items for the bridge operating machinery shall include the following:

a. Two tower-mounted main span drive systems comprised of all machinery from the main drive motor couplings through the differential reducers to the ring gears on the rope sheaves; including main pinions, secondary gearing, shafting, bearing assemblies, electro-hydraulic thrustor type motor and machinery brakes and their mounting frames, brakewheels, couplings, open gearing bearings, and open gearing.

b. Two span lock assemblies, engaging the undersides of the end floor beams in two places per end, approximately 11 feet-5in. from the span centerline including: pier-mounted electric actuators with motor brake, reducer, driveshaft, existing lockbars, lockbar guides, mounting pedestals, and emergency removable actuator handwheels.

c. Span guide roller assemblies providing transverse and longitudinal containment on the bottom corners of the fixed end, and transverse-only control on the other six corners of the lift span. The lower connections are on the end floor beams and the upper rollers are mounted to the top chords.

d. Counterweight guide roller assemblies, four per counterweight, each assembly consisting of 3 guide rollers.

e. Keys, bolts, nuts, screws, washers, dowels and shims required to assemble and connect the machinery to the supporting steel framing and provide proper alignment of machinery.

f. Machinery Room Hoist, trolleys, support beams, and accompanying accessories. One in each machinery room.

The Contractor shall:

Supply all apparatus, tools, devices, materials and labor to manufacture, paint, ship, install, erect, align, adjust, lubricate, and test the complete machinery for the lift bridge in an approved manner as provided herein. Any apparatus, tools, devices, materials and labor, not specifically stated or included, which may be necessary for the work, shall be furnished by the Contractor. The installation and adjustment of all machinery shall be by millwrights experienced in this class of work.

Furnish galvanized steel drip pans, adequately stiffened for rough handling, under each final drive pinion and sheave ring gear, and under any other component in the machinery room that could leak oil or grease onto the concrete floor.

Prepare lubrication charts of all machinery items which require lubrication and their recommended cycle for lubrication. The list shall contain the types of lubricant used and the date it was lubricated by the Contractor prior to the start-up and testing of the machinery. The lubrication charts shall be printed on heavy paper stock in non-fading inks and shall be framed, sealed and mounted in each Machinery House.

Prepare an Operation and Maintenance Manual for the entire bridge machinery system in accordance with SECTION 15016- OPERATING AND MAINTENANCE MANUALS.

Related Work presented elsewhere in this specification.

a. Wire ropes, sockets, rope castings, and balancing of the span: Refer to SECTION 15015- WIRE ROPES AND BALANCING OF LIFT SPAN.

b. Operating and Maintenance Manual: Refer also to SECTION 15016 - OPERATING AND MAINTENANCE MANUALS.

c. Maintenance lifts: Refer to SECTION 15017- MAINTENANCE LIFTS.

d. Electrical cable and conduit for power and control circuits. Refer to DIVISION 16 - ELECTRICAL.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The latest revisions only shall be used for all references.

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)

AGMA 2000-A88	(1988) Gear Classification and Inspection Handbook
AGMA 6010-F97	(1997) Standard for Spur, Helical, Herringbone, and Bevel Enclosed Drives

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B 1.1	Screw Threads
ANSI B 4.1	Preferred Limits and Fits for Cylindrical Parts
ANSI B 17.1	Keys and Keyseats
ANSI B 18.3	Socket, Cap, Shoulder and SetScrews (Inch Series)
ANSI B 46.1	Surface Texture
ANSI Z 53.1	Federal Safety Orange

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997ae1) Carbon Structural Steel
ASTM A 108	(1999) Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A 148	(1996) Steel Castings, High-Strength, for Structural Purposes
ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 291	(1999) Steel Forgings, Carbon and Alloy, for Pinions, Gears and Shafts for Reduction Gears
ASTM A 307	(1997) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(1997) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 449	(1993) Quenched and Tempered Steel Bolts and Studs
ASTM A 563	(1997) Carbon and Alloy Steel Nuts
ASTM A 572	(1992b) High-Strength Low-Alloy Columbian-Vanadium Steel of Structural Quality
ASTM A 574	(1998) Alloy Steel Socket Head Cap Screws

ASTM A 668	(1996) Steel Forgings, Carbon and Alloy, for General Industrial Use
ASTM A 781	(2000) Castings, Steel and Alloy, Common Requirements for General Use
ASTM F 436	(1993) Hardened Steel Washers
ASTM F 593	(1995) Stainless Steel Bolts, Hex Cap Screws, and Studs

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

NATIONAL ELECTRICAL MANUFACTURES ASSOCIATION (NEMA)

NEMA 250	(1991) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA MG 1	(1993; Rev 1; Rev 2; Rev 3) Motors and Generators

FEDERAL SPECIFICATIONS (Fed. Spec.)

Fed. Std. 595B	Federal Colors

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-13 Certificates

Standard Items; GA.

The Contractor shall submit copies of producer or manufacturer data according to the GENERAL REQUIREMENTS. These shall include specifications, tests and installation instructions for the following items, but not excluding other items or materials not specifically mentioned:

(1) Mill reports and physical tests of all metals.

(2) Bolts, nuts, washers, and other fasteners.

(3) Paint.

(4) Lubricants as endorsed by machinery manufacturers.

(5) Standard stocked items.

(6) The Contractor shall prepare a complete list of all machinery items which require lubrication. The list shall contain the type of lubricant used and the date it was installed and lubricated by the Contractor, and shall be given to the Engineer prior to start up and

testing of the machinery.

Installation, Operation, Maintenance and Lubrication Manuals; GA.

Refer also to SECTION 15016- OPERATING AND MAINTENANCE MANUALS.

a. The Contractor shall furnish six copies of the above manual which shall conform to the outline and requirements of SECTION 15016- OPERATING AND MAINTENANCE MANUALS. The manual shall be submitted prior to shipment of operating machinery material to the site.

b. If standard parts drawings are used, they shall be modified to be suitable, and irrelevant material shall be blacked out. All general information used as text shall be modified where necessary to show pertinence to the equipment furnished under this Contract, and irrelevant material shall be removed. The arrangement of the manual, method of binding, included material and text shall be submitted to the Engineer for approval.

SD-04 Drawings

Fabricated Items; GA.

The Contractor shall submit shop drawings to the Engineer for approval in accordance with the GENERAL REQUIREMENTS. These shall include complete details, classification of materials, schedules for fabrication and shop assembly, procedures and diagrams showing sequence and details for erection and approval.

Shop Drawings;GA.

Shop drawings shall be given a suitable title to describe the parts detailed thereon, and each drawing shall be identified by the complete project name and number. Shop drawings shall include the following information:

(1) Reference to the standard material specifications for each item.

(2) The surface finish of machined surfaces and tolerances for each dimension for which a specific fit is required. A general tolerance block shall be used to define the tolerances of all other dimensions. Fits and finishes shall be as defined in paragraph 6.5.1 of AREMA Manual for Railway Engineering, Chapter 15, Part 6, or as specified by the manufacturer, whichever is more rigorous.

(3) Quantity required. Note that quantities shall be for the entire bridge.

(4) Heat treatment or specific hardness requirements where applicable.

(5) All proprietary items shall be shown in outline on shop drawings which shall also indicate the method and sequence to be employed in assembly of bridge machinery and installation of necessary utilities support and service facilities. Shop drawings shall show all external dimensions and clearances necessary for installation and operation of each item of machinery in the bridge. For all items listed or described in this section, the Contractor shall furnish complete

assembly diagrams showing each part contained within the item and the manufacturer's part number assigned to each part. The diagrams shall be sufficient to enable complete disassembly and reassembly of the item covered. In the event that any part is modified in any manner from the way it is described or delivered by its original manufacturer, the Contractor shall deliver a drawing which details each modification and the part shall be assigned a unique part number to preclude the supply of replacement parts not modified in similar fashion. The assembly drawings of each item shall, in addition to identifying and describing each internal part, contain:

(a) dimensions of all principal elements within the item;

(b) certified external dimensions affecting interfaces or installations;

(c) gross weight;

d) capacity and normal operating ratings;

(e) method and recommended type of lubrication, including location and type of fittings and provisions for adding, draining and checking the level of each lubricant employed;

(f) inspection openings, seals, and vents; and

(g) details of all turned bolts used to mount the machinery to its supports.

(6) Machinery Data. The Contractor shall furnish complete data on the design and construction of any unit furnished as part of the machinery under this Contract, including material specifications, cross-section assembly drawings, detail drawings, and dimensions of principal elements.

(7) Shop Bills of Materials. Complete shop bills of materials shall be included for all machinery parts. If the bills are not shown on the shop drawings, prints of the bills shall be furnished for approval in the same manner as specified for the drawings. The computed weight of each piece of machinery shall be stated on the shop drawing upon which it is detailed.

Assembly and Erection Drawings;GA.

Complete assembly and erection drawings shall be furnished. These drawings shall give identifying marks and essential dimensions for locating each part of assembled unit with respect to the bridge or foundation.

Approval Process;GA.

Shop drawings which have not been approved or require correction shall be resubmitted until such time as they are acceptable to the Engineer, and such procedure shall not be considered a cause for delay. The Contractor shall bear all costs or damages which may result from the ordering or fabrication of any materials prior to the acceptance of the shop drawings. As a means of expediting delivery prior to acceptance of the shop drawings, the Contractor may request in writing from the Engineer approval to order

raw materials of the correct type for later fabrication from accepted shop drawings. Such approval by the Engineer shall be in writing. After acceptance of the shop drawings, the Contractor shall supply the Engineer with additional copies of the accepted drawings as may be required.

1.4 Quality Assurance

1.4.1 Source Quality Control

1.4.1.1 Inspection and Testing

Materials and fabrication procedures are subject to inspection and testing in the mill, shop and field by the Engineer. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1.4.1.2 Verification of Dimensions

All details shown on the Contract Drawings are typical and apply to similar conditions unless otherwise indicated. All dimensions and details shall be verified at the site before proceeding with any work and to avoid causing subsequent delay in work.

The Engineer shall be notified immediately for clarification whenever any portion of work is not clearly or accurately defined.

1.4.1.3 Certified Test Reports

As used herein, certified test reports refer to reports of tests conducted on previously manufactured materials or equipment identical to that proposed for use.

1.4.1.4 Factory Tests

As used herein, factory tests refer to tests required to be performed on the actual materials or equipment proposed for use. Results of the tests shall be submitted in accordance with the provisions of this Contract for laboratory test results.

1.4.1.5 Operating Parameters

The bridge machinery shall raise the vertical lift span 144 feet to "fully open" position in approximately 2.0 minutes and shall lower the vertical lift span 144 feet to the nearly seated position in the same time. In addition, the bridge machinery shall fully seat the lift span from the nearly seated position in approximately 0.1 minutes.

The bridge machinery shall meet the latest revision of AREMA Manual for Railway Engineering, Chapter 15, Part 6, Standard Specifications for Movable Bridges, paragraph 6.3.6, "Power Requirements and Machinery Design". Motors were proportioned for Condition B, 2.5 lb/sq.ft. vertical wind and 2.5 lb/sq.ft. ice loading.

The Bridge shall not be operated when wind velocity exceeds 46 mph. The Bridge shall be closed when wind velocity exceeds 65 mph.

1.5 DELIVERY, STORAGE and HANDLING.

1.5.1 Organization

All machinery items and material shall be delivered to the site in accordance with the approved schedule of work. Machinery items shall be properly protected until installation. Prior to shipment from the manufacturer's and/or fabricator's plant or plants, the Contractor shall prepare the various elements of the operating machinery for shipment. All large, bulky and/or heavy items shall be securely mounted on skids or pallets of ample size and strength to facilitate loading and unloading. All small parts shall be boxed in sturdy wood or heavy corrugated paperboard boxes. A packing list enclosed in a moisture-proof envelope and indicating the contents of each such box shall be securely attached to the outside of the container. The skid/pallet mounting and boxing shall be done in a manner which will prevent damage to the equipment during loading, shipment, unloading, storage and any associated and/or subsequent handling. Weatherproof covers shall be provided during shipment to protect any and all items shipped in open railway cars, trucks, or barges. Any eyebolts, special slings, strongbacks, skidding attachments or other devices used in loading the equipment at the manufacturer's and/or fabricator's plant or plants shall be furnished for unloading and handling at the destination.

1.5.2 Storage

Material shall be stored so as to permit easy access for inspection and identification. Materials and items shall be protected from the ground by the use of pallets, platforms or other means. Material shall not be stored in a manner that would cause distortion or damage.

1.5.3 Shipment

All machinery, materials and contingent items shall be properly protected for shipment and storage.

1.5.4 Painting

All finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion, shall be coated with a 1/32 inch minimum film thickness as soon as practicable after finishing with No-Ox-Id, A Special WW, as manufactured by San-Chem Company, Chicago, Illinois, or approved equal. This coating shall be removed from all surfaces prior to lubrication for operation and from all surfaces prior to painting after erection.

1.5.5 Assembled Units

Assembled units shall be mounted on skids or otherwise crated for protection from weather, dirt and all other injurious conditions during shipment and storage as directed by the manufacturer. The Contractor shall submit advance information as to methods and materials which will be used for protection for approval by the Engineer.

1.5.6 Provision for Lifting

All machinery units shall have lifting eye bolts or lifting holes properly sized for safe working loads and located to provide a balanced lift.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General

a. All materials shall be new and conform to standard ASTM and other specifications included previously and indicated on the drawings and herein, or as may be otherwise applicable.

b. Brinell hardness tests shall be made, and included on inspection reports, for castings and forgings for which hardness values are required on the drawings, and in the materials specifications or specified herein.

c. Steel for weldments and miscellaneous components shall be ASTM A 36/A 36M unless otherwise specified, and always weldable grades as designated by applicable ASTM standards. Welding materials and methods shall conform to the AWS Structural Welding Code AWS D1.1.

d. No item shall be fabricated, machined, welded, cast or forged without sufficient advance notification to the Engineer to permit scheduling of required inspection. The Contractor shall furnish all facilities and provide for the free access at the plant or shop for the inspection of material and workmanship. Inspection and testing shall conform to the following requirements:

(1) Inspection at the plant or shop will not relieve the Contractor from the responsibility of furnishing satisfactory materials and workmanship. Acceptance of a material or item shall not prevent subsequent rejection if material is found defective. The Contractor shall remedy defects due to workmanship, erection, materials or design for a period of one year after final tests and acceptance have been made, at his own expense. The Contractor shall furnish a satisfactory guarantee to ensure correction of defects. If necessary, such defects may be corrected by others at expense to the Contractor.

(2) The Contractor shall furnish the Engineer with the number of copies of purchase orders as may be required.

(3) Unless otherwise provided, the Contractor shall furnish without charge, test specimens required herein, and all labor, testing machines, tools and equipment necessary to prepare the specimens and to make the physical tests and analyses. Two copies of test reports and chemical analyses shall be furnished to the Engineer.

2.1.2 Standard Products

Materials and equipment shall be essentially the standard cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be the manufacturer's latest design that complies with the specification requirements. Materials and equipment shall essentially duplicate items that have been in satisfactory commercial or industrial use at least two years prior to bid opening. Where two units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. Each major component of equipment shall have the manufacturer's name and address and the model and

serial number on a nameplate, securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.

2.1.3 Manufacturer's Recommendations.

Where installation procedures or any part thereof are required to be in accordance with the recommendation of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

2.1.4 Carbon Steel Plate.

Carbon steel plate for machinery base weldments, unless otherwise noted on the plans: ASTM A 572 Grade 50, HSLA, fine grain practice mandatory.

2.1.5 Electrodes for Welding.

Electrodes for welding shall comply with AWS D1.1Code.

2.1.6 High Strength Bolts, Nuts and Washers.

Heavy hexagonal head structural bolts, heavy hexagonal nuts, and hardened washers complying with respectively ASTM A 325 Type 1, ASTM A 563,Grade C, and ASTM F 436

2.1.7 High Strength Turned Bolts.

Turned bolts shall be made from material equal to ASTM A 325 Type 1.

2.1.8 Hex Socket Head Cap Screws.

Alloy steel hex socket head cap screws shall comply with ASTM A 574. Stainless Steel hex socket head cap screws shall be Type 304 or 316, with a minimum tensile strength of 75,000 psi, and shall meet or exceed ASTM F 593 Alloy Group 1 or 2, Condition CW, unless otherwise specified. Dimensions shall conform to ANSI B 18.3.

2.1.9 Common Bolts

ASTM A 307 shall not be used for the installation of any machinery on this contract. Use ASTM A 325 Type 1, as the minimum strength fastener.

2.1.10 Stainless Steel

Stainless steel for fasteners, threaded rods, pins, and dowels where specified shall be Type 304 or 316 Stainless Steel, with a minimum tensile strength of 75,000 psi and shall meet or exceed ASTM F 593 Alloy Group 1 or 2, Condition CW, unless otherwise specified. Stainless steel for hex nuts shall be Type 304 or 316, with a minimum tensile strength of 75,000 psi and shall meet or exceed ASTM F 593 Alloy Group 1 or 2, Condition CW, unless otherwise specified. Stainless Steel washers where specified shall be Type 304 or 316.

2.1.11 Equipment Covers

Sheave covers shall be 12 gauge sheet steel, welded at corners and adequately stiffened and held rigidly in place. Covers shall be provided wherever necessary for safety and to protect components from the elements.

2.1.12 Steel Castings

Steel castings shall be ASTM A 148 Grade 80-50, unless otherwise specified. Steel castings of equal or greater strength and corrosion resistance can be proposed where steel weldments are specified, subject to approval by the Engineer.

2.1.13 Steel Weldments

Steel weldments for miscellaneous machinery supports and components shall be ASTM A 572 Grade 50, HSLA steel, unless otherwise specified. Steel weldments of equal or greater strength and corrosion resistance can be proposed where steel castings are specified, subject to approval by the Engineer.

2.1.14 Rolled Steel

Rolled steel for shafts shall be ASTM A 108 Grade 1141 Cold Finished Round, unless otherwise specified. Rolled steel of equal or greater strength, and of equal or better corrosion resistance can be proposed where steel forgings are specified, subject to the approval by the Engineer.

2.1.15 Pinion Gears

ASTM A 291 Class 6, quenched and tempered alloy steel forging, 310-350 BHN

2.2 DETAILS AND WORKMANSHIP

In general, the machinery shall be finished, assembled, and adjusted in an approved manner and according to the best machine shop practice. The limits of accuracy which are to be observed in machining the work, and the allowances for all metal fits shall be placed on the Contractor's working drawings. Fits and finishes of machinery parts shall be as called for on the contract drawings or as specified in the AREMA Manual, Chapter 15, Article 6.5.1.

Where surface finishes are indicated on the drawings or specified herein, the symbols used or finishes specified are in accordance with ANSI B 46.1 "Surface Texture". Values of roughness height are specified in micro-inches as an arithmetical average deviation from the mean line. Roughness specified is the maximum value, and any smoother finish will be satisfactory. Compliance with specified surface roughness will be determined by trained sense of feel and by visual inspection of the work compared to "Standard Roughness Comparisons" in accordance with the provisions of ANSI B 46.1. Values of roughness width and waviness are not specified, but shall be consistent with the general type of finish specified by the roughness height. Flaws such as scratches, ridges, holes, peaks, cracks or checks which will make the part unsuitable will be cause for rejection.

Where finish is not indicated or specified, the finish shall be that type which is most suitable for the application, and shall be consistent with the class of fit required. Parts of machinery in contact with other

machinery parts or with supports shall be machined so as to provide even, true bearing. Surfaces in rotating or sliding contact with other surfaces shall be finished true to dimensions given and highly polished. Surfaces to be machine-finished shall be indicated on shop drawings by symbols which conform to ANSI B 46.1.

So far as practicable, all work shall be laid out to secure proper matching of adjoining unfinished surfaces. Where there is a large discrepancy between adjoining unfinished surfaces, they shall be chipped and ground smooth, or machined, to secure proper alignment. Unfinished surfaces shall be true to the lines and dimensions shown on the shop drawings and shall be chipped or ground free of all projections and rough spots. Depressions or holes not affecting the strength or usefulness of the parts may be filled in a manner approved by the Engineer.

2.2.1 Shafting and Pins

Rounds and shafts shall be true, straight and free from flaws, piping, laps, seams, or cracks. All shafts shall have finished ends with a 60 degree lathe center with a clearance hole at the exact center of the shaft. Stepped shafts shall have fillets finished smoothly to adjacent surfaces without tool marks or scratches. Surface finish for fillets shall have a maximum roughness of 63 microinch according to ANSI B 46.1 unless a finer finish is required.

All forged shafts shall be reduced to size from a single bloom or ingot until perfect homogeneity is secured. The blooms or ingots, from which shafts or pins are to be made, shall have a cross-sectional area at least three times that required after finishing. No forging shall be done at less than red-heat. Forged rounds for shafts and pins shall be true, straight, and free from any defect.

All shafts and pins shall be accurately finished, round, smooth, and straight; and when turned to different diameters, they shall have rounded fillets at the shoulders. Each shaft or pin having a uniform diameter of 8 inches or more and each shaft or pin having several diameters, of which the smallest is 8 inches or more, shall be bored lengthwise through the center to a diameter approximately one fifth the smallest diameter. The wall of the center bore shall be examined for cracks and fissures. Shafts and pins exhibiting defects will not be accepted. Shafts that are bored with an inspection hole shall have the ends prepared for the attachment of a centering device equivalent to the lathe center. All such devices shall be furnished as part of the work.

2.2.2 Keys, Keyways, and Set Screws.

Keys and keyways shall conform to the dimensions and tolerances for square and flat keys of the ANSI B 17.1, "Keys and Keyseats," unless otherwise specified. Keys shall be machined for an FN2 side fit and an LC4 fit on top and bottom with keyways in shafts and hubs and a 63 microinch finish or better. Keyway corners shall be cut with fillet radii as specified by ANSI B 17.1. All keys shall be effectively held in place, preferably by setting them into closed-end keyways milled into the shaft. The ends of all such keys shall be rounded to a half circle equal to the width of the key. Keyways shall not extend into any bearing. If two keys are used, they shall be located 120 degrees apart.

Unless otherwise specified herein or on the drawings, keys shall be machined from cold-finished carbon steel squares or flats that meet the requirements ofASTM A 108, Grade 12L14, with a minimum tensile strength of 75,000 psi.

Set screws shall not be substituted for keys for transmitting torsion; they may be used only for holding keys or light parts in place. They shall be safety-type headless set screws with cup points set in counterbored seats. Unless otherwise ordered, they shall be secured in place by peening the threaded hole.

2.2.3 Bearings and Bushings

Existing double-bearing castings and liners shall be reused. New liners in some thicknesses may be necessary to obtain proper fit. New bushings shall be provided as shown on the plans.

Existing main sheave trunnion bearing bases, liners, and covers shall be reused. New bushings shall be provided in accordance with the plans.

2.2.4 Shaft Journals

All journal bearing areas on shafts and pins shall be accurately turned, ground, and polished with no trace of tool marks or scratches on the journal surface or adjoining shoulder fillets. The journal bearing area shall have a 8 microinch finish or better. Journal diameters shall be finished to the limits of an ANSI B 4.1 Class RC6 running fit, unless otherwise noted. Before erection, the journals shall be coated with graphite, thoroughly worked into the surface by hand.

2.2.5 Gears

Open spur gears shall have 20 degree involute, full depth, cut teeth in accordance with the proportions of the ANSI/AGMA 2000-A88, "Gear Classification and Inspection Handbook" unless otherwise specified herein or shown on the drawings.

Pinion gear teeth shall be 20 degree involute, full depth, cut teeth. They shall meet the material requirements of ASTM A 291 Class 6 forged alloy steel with 310-350 BHN.

The teeth of all gears shall be cut from solid rims or blanks. Pinions shall be integral with their respective shafts. The sides and peripheries of all gears and pinions shall be finished, and the pitch circle for the rack and pinion shall be scribed on both sides not less than 0.02 inches deep, with a V-pointed tool. The contact areas between the back of the ring gear segments and the mounting surfaces on the sheaves shall both be finished. The working surfaces of all gear teeth shall be true to the proper outline, accurately spaced on the true pitch circle, exceptionally smooth, and free from planing or milling-cutter ridges. Cutter burrs shall be removed from all edges of the teeth, and the top edges of all teeth shall be rounded to 1/32-inch radius.

Except as otherwise provided herein or on the drawings, all gears shall be

cut and mounted to meet requirements for accuracy of the ANSI/AGMA 2000-A88, Gear Classification and Inspection Handbook. The AGMA quality number shall be stated on the applicable shop drawings. Open gearing shall conform to minimum AGMA Quality No. 7. Gearing in enclosed gear reducers shall conform to AGMA Quality No. 9 or higher.

2.2.6 Hubs and Bores

The hubs of all gears and couplings shall be finished on both faces and polished where the hub face performs the function of a collar to prevent shaft movement. The hubs shall be bored concentric with the rims of gears or with the outside of couplings. All hubs shall have an ANSI B 4.1Class FN2 medium force fit on the shafts unless otherwise specified. The sheave hubs and trunnions shall have fits as specified on the drawings, and shall be doweled in place after assembly. Unless noted otherwise or otherwise recommended by the manufacturer, all other hubs shall have a 32 microinch finish or better for 2 inch or smaller bore, or a 63 microinch finish or better for a bore larger than 2 inches.

2.2.7 Shims

Where shown on the drawings, all machinery shims required for leveling and alignment of equipment shall be stainless steel, ASTM A 167 Type 302/304, neatly trimmed to the dimensions of the assembled parts and drilled for all bolts that pass through the shims. In general, total shim thickness available shall be no less than equal to twice the nominal thickness shown on the drawings, and sufficient varying thicknesses shall be furnished to secure 0.003-inch variations of the shim allowance including one shim equal to the full allowance. Shims shall be placed to provide full contact between machinery and machinery supports. Shims shall be shown in detail on the shop drawings.

2.2.8 Turned Bolts

The body of the turned bolts shall be finished to 63 microinches or better, as defined by AREMA Manual Chapter 15, Part 6, paragraph 6.8.14. Threads for the turned bolts and nuts shall conform to the Unified Thread Standards, coarse thread series with a Class 2A tolerance for bolts and Class 2B tolerance for nuts, in accordance with ANSI B 1.1 unless otherwise specified. Turned bolts are designated by their nominal thread size. The turned bolt body shall be 1/16th of an inch larger in diameter than the nominal size specified, and shall have an LC6 fit with reamed holes. Bolt head and nut bearing surfaces shall be flat and square with the axis of the bolt holes and shall be spot faced if necessary. Unless otherwise noted, bolt holes in machinery parts required for connecting to supporting steelwork may be sub-drilled (in the shop) smaller than the turned bolt diameter and shall be reamed together with supporting structural steel either during assembly or at erection, after the parts are correctly assembled and aligned. Positive type locking shall be provided. Double nuts are preferred. Where double nuts are used, heavy hex and jam nuts shall be used. Alternate locking methods shall be submitted to the Engineer for approval.

2.2.9 Castings.

All existing castings shall be cleaned free of all loose paint and scale. All castings shall then be thoroughly inspected and tested for internal defects using the applicable examination method prescribed under Supplementary Requirements of ASTM A 781.

2.2.10 Welding

Welding required herein or called for on the Contract drawings shall comply with AWS D1.1. Welded steel machinery parts shall be given a stress relief heat treatment prior to machining. The Contractor shall submit a schedule of the proposed stress relief heat treatment to the Engineer for approval. The schedule shall include a description of the part and an explanation of the proposed heat treatment, including the rate of heating, the soaking temperature, the time at the soaking temperature, the rate of cooling, and the temperature at which the part is to be withdrawn from the chamber. Soaking times of less than one hour will not be approved. Welds in all sheaves, sheave trunnion bearing pedestals, span lock guides and all machinery support mounting bracket weldments shall be 100% inspected by non-destructive methods. Acceptance criteria shall be that described in AWS D1.1 for tension welds in bridges.

2.2.11 Flexible Couplings

a. Gear-type, full-flexible (double engagement) couplings or semi-flexible (single engagement) couplings with floating shafts shall be used to connect all machinery components, except where other types of couplings are called for on the drawings. The couplings shall be made of forged steel, have exposed bolts, curved face teeth, and provide for at least a 3/4 degree misalignment per gear mesh.

b. Gear-type couplings shall be the standard product of an established manufacturer.

c. Special type couplings shall be as shown on the drawings.

d. Coupling hubs shall be bored by the coupling manufacturer to the required size and tolerances, including keyways, and each hub shipped to the proper location for installation on its shaft by the manufacturer of the connected component.

e. Flexible couplings for the floating shafts shall be Falk 1035 G52 single engagement gear couplings, with bores and keyways to match mating parts, or approved equal.

f. Flexible couplings for the main motor output shafts shall be Falk 1025 G20 double engagement gear couplings, with bores and keyways to match mating parts, or approved equal.

2.2.12 Span Drive Motors

Motors are covered in Division 16 - ELECTRICAL. The following motor discussion is for information only. Span drive motors shall consist of one main motor and one auxiliary drive motor in each tower. Each motor is coupled to opposite ends of the main differential reducer input shaft. Only one motor shall operate at a time. All the motors are 200 horsepower, 1170 RPM, A.C., with a 449T frame size. All motors shall have a rear shaft extension and a direct coupled face mounted tachometer. The motors shall be foot mounted and totally enclosed, non ventilated (TEFC), weatherproof construction, with sealed rolling element bearings. For specific electrical characteristics, see Division 16.

2.2.13 Span Drive Motor Brakes.

a. Span drive motor brakes shall be electro-hydraulic thrustor type, Mondel Hi-Tork 300M, Mill Duty series, 13" dia., Catalog # 13" MBT/E-ED 50/6 or approved equal. Each brake shall have a low force hand release lever that will permit release of the brake without energizing the thrustor motor. Brakes shall be adjustable to independently regulate the time for setting and releasing of the brake. One brake shall be provided for each drive motor. The motor brakes (total of four) shall be mounted between each motor and input shaft extension of the reducer. Each brake shall be factory set for 450 foot pounds of braking torque and automatically adjust for lining wear. The brakes shall be supplied with stainless steel pivot pins, anti-friction bearings at all main pivots, lube fittings, and any other optional features necessary for tropical and corrosion protection. The brakes shall be painted with a finish coat of Federal Safety Orange ANSI Z 53.1 prior to final assembly.

b. The motor brakes shall operate at 460 volts, 3 phase, 60 Hz. Each motor brake shall be equipped with three separate limit switches for interlocking span control supervision and indications. Two brake limit switches shall provide for sequence interlocking on span control operation and for indication of the set and released status of the brakes. The other brake limit switch shall provide for lock-out of the span control circuitry when any brake is hand released and for indication. Brake limit switches shall be furnished and mounted on each brake frame by the brake manufacturer.

c. Each motor brake shall operate on the symmetrical brakewheel mounted on the main differential reducer input shaft. The brakewheel shall be 13" diameter x 5.75" wide and shall be of proven, commercially available design and construction.

d. Braking delays shall initially be adjusted so that when the power is shut off, all motor brakes shall set within 2 seconds. This delay may be adjusted in the field at the discretion of the Engineer.

2.2.14 Machinery Brakes

a. The machinery brakes (two per tower, four total) shall be electro-hydraulic thrustor type, Mondel Hi-Tork 300M Mill Duty series, 19" dia., Catalog # 19" MBT/E-ED 201/6, or approved equal. Each brake shall have a low force hand release lever that will permit release of the brake without energizing the thrustor motor. Brakes shall be adjustable to independently regulate the time for setting and releasing of the brake. Each brake shall be factory set for 2300 foot pounds of braking torque and automatically adjust for lining wear. The brakes shall be supplied with stainless steel pivot pins, anti-friction bearings at all main pivots, lube fittings, and any other optional features necessary for tropical and corrosion protection. The brakes shall be painted with a finish coat of Federal Safety Orange ANSI Z 53.1prior to final assembly.

b. The machinery brakes shall operate at 460 volts, 3 phase, 60 Hz. Each machinery brake shall be equipped with three separate limit switches for interlocking span control supervision and

indications. Two brake limit switches shall provide for sequence interlocking on span control operation and for indication of the set and released status of the brakes. The other brake limit switch shall provide for lock-out of the span control circuitry when any brake is hand released and for indication. Brake limit switches shall be furnished and mounted on each brake frame by the brake manufacturer.

c. Each machinery brake shall be mounted at the inboard side of each main pinion shaft, and operate on a 19" dia. x 8.75" wide symmetrical hub brakewheel which is mounted and keyed to the inboard end of the P2 pinion shaft.

d. Braking delays shall initially be adjusted so that when the power is shut off, all machinery brakes will set within 3 seconds. This delay may be adjusted in the field at the discretion of the Engineer.

2.2.15 Main Drive Speed Reducers

a. Provide two Earle Gear, 7 DDC parallel shaft differential reducers, or approved equal, with 10.4 overall ratio, actuator operated differential lock-up, a 24.6" center distance between input and output shafts, and a 19" vertical distance from base to shaft centerlines. A right angle bevel gear input with 1:1 ratio shall be provided for the emergency gear motor.

b. The speed reducers for the main drive machinery shall be designed in accordance with the current AGMA 6010-F97Standards and with a 1.5 service-factor for normal and emergency inputs. The normal input shall be a 200 hp, 1170 RPM A.C. drive motor, driving from either end of the input shaft. The rated output torque shall be 168,000 lb.in. total to both output shafts. However, with the differential in locked mode, it is possible that 100 percent of the total torque may be transmitted to only one output shaft. Gear quality shall be class 9 or better. The reducers shall have welded steel housings with adequate inspection openings to permit easy inspection of all gears after installation. The internal and external surfaces of the gear box shall have an anti-corrosive finish. Inspection covers shall be attached with stainless steel hardware. The AGMA strength rating shall be based on an overload of 200 percent of the full load torque of the driving motor and shall be equal to the ratings described on the drawings. Each reducer shall have a hygroscopic/desiccant air breather with an adequate filter to prevent particulate matter from entering the housing. The hygroscopic/desiccant breather shall be mounted so as to prevent oil from leaking out during operation of the bridge. The shaft seals shall incorporate a two stage sealing arrangement. The housings shall be leak-proof and shall be tested in the shop for leakage.

c. The bearings required to support the speed reducing gears shall be rolling element type, selected to provide 40,000 hours of B-10 life while transmitting full rated motor horsepower. An oil drain shall be provided for each reducer with bronze or stainless steel drain cocks to permit easy withdrawal and replacement of oil. The proper oil level shall be maintained by checking the dipstick at the intervals specified in the lubrication schedule.

d. The ratio of the reducer shall be 10.4 to within plus or minus 4 percent and be suitable to accept 200 hp per input from either one of the two motors mounted on opposite ends of the main input shaft. Reducers shall have balanced design herringbone or double helical gears for the speed reducing gears, with double shaft extensions for both high speed and low speed shafts. The main reducer shall have an effective differential to balance the torque between the two output shafts when unlocked. The reducer differential shall be capable of being locked by means of an actuator rod extending from one side of the reducer, and below the output shaft, which operates the differential clutch. See Section 2.2.16 for the Lock-Up actuator.

e. Shaft Extensions and Couplings: The low and high speed shaft extensions on each side of the reducers shall be of such length and diameter that they may be turned and keyseated for the gear couplings. Coupling halves shall be shipped to the reducer manufacturer for assembly on the shaft extensions. The input shaft extensions of each reducer shall be of sufficient length to accept the motor brake wheel and motor coupling half.

f. Nameplate: Speed reducers shall be provided with a permanent AGMA nameplate stating the horsepower rating, speeds, ratio and thermal rating. Manufacturer's nameplate shall include manufacturer's name, address, model number, and serial number (nameplate of distributing agent will not be acceptable).

g. Prior to construction, the manufacturer shall supply to the Engineer for review, a complete set of calculations demonstrating adherence to design criteria presented herein including AGMA ratings.

h. Housings shall be sufficiently rigid so that deflection is negligible under full load and will maintain acceptable bearing running clearances and gear contact. Welded steel housing construction is acceptable, but must be stress relieved by heat prior to machining. A bracket mounted to the reducer cover shall be supplied to support the emergency drive gearmotor.

i. Reducers shall be the product of a manufacturer of established reputation who has had reducers of comparable size and construction in successful service for at least ten years.

2.2.16 Reducer Differential Lock-Up Actuator and Linkage

a. The main differential speed reducers shall each have a shifter rod protruding from the side, used to shift the internal clutch mechanism to lock or unlock the differential. Locking the differential makes it inoperable, making the reducer output shafts as one. Unlocking the differential allows the reducer to provide equal torque to both output shafts.

b. The shifter rod shall be operated, through a linkage, by a small 1/4 HP, 1750 RPM gearmotor, 480V, 3 phase with a motor brake and a 174:1 ratio SM-Cyclo reducer. The unit shall be foot mounted, and supplied by Sumitomo, Model CHHM-02-4105, or approved equal. The unit shall be supplied with a removable hand wheel for emergency manual operation. Attached and keyed to the gearmotor

output shaft shall be a plate with a pin at a 1.5" eccentric, giving the required 3" stroke in 1/2 revolution of the gearmotor output shaft. A 3/4" diameter threaded stainless steel connecting rod with self aligning rod ends (15" center to center +/-) shall drive the differential clutch shifter rod.The unit shall be attached to a bracket mounted to the side of the reducer bedplate. Power and control wiring shall be installed under "Bridge Electrical and Control System".

2.2.17 Emergency Drive Motor

An emergency drive gearmotor, 20 hp, 1750 RPM, 480V, 3 phase attached to an SM-Cyclo foot mounted reducer, with a 15:1 ratio, 117 RPM output, Model CHHM-20-4175YCB15 by Sumitomo, or approved equal, shall be required. The new gearmotor shall be mounted to a bracket on each main reducer bedplate (two total at one per tower). The gearmotor shall be rated at 17,800 lb-in output torque. The gearmotor output shaft shall be connected to the auxiliary right angle bevel gear input shaft of the differential reducer via a Falk 1020G72, or equal, clutch coupling with lever operated shift mechanism. The coupling shall be rated at 37,800 in-lb and have bores and keyways to match SM-Cyclo gearmotor and main differential reducer auxiliary bevel input shaft. Power wiring shall be installed under Pay Item "Bridge Electrical and Control System".

2.2.18 Span Locks

a. General. Provide four new span lock assemblies, including actuators, pier brackets, and associated parts as shown on the plans. Power and control wiring shall be installed under Pay Item "Bridge Electrical and Control System".

b. Lockbar Actuators. The electric lockbar actuator shall include the motor, operator unit gearing, limit switch gearing, limit switches, stem nut, declutch lever or knob, and an auxiliary removable handwheel as a self-contained unit. The actuator shall be a Pow-R-Jac lockbar actuator assembly LB-3 with 12 inch stroke, 8,800 lbs thrust, and a lockbar speed of 68 inches per minute, or approved equal.

(1) Enclosure: The lockbar actuator motor and all electrical enclosures shall be weather-proof, NEMA 250Type4, as a minimum. Mounting holes shall be supplied undersized for field drilling and reaming of 3/4" diameter turned bolts. Provide a full length bellows boot over the operating shaft in the extended position.

(2) Motor: The motor shall be designed for lockbar actuator service and shall be of high-torque, totally enclosed, non-ventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box. Motor insulation shall be NEMA MG 1Class B with a maximum continuous temperature rating of 120 degrees C (rise + ambient). The motor shall be capable of extending or retracting the lockbar against the maximum expected pressure at 10% above or below the nominal voltage. The motor duty rating shall be such that running a full cycle of the lockbar will not exceed the temperature rating. All bearings in the motor shall be anti-friction and the motor shall be pre-lubricated. The motor shall include an

electrical cut-out switch for manual operation, and an enclosed disc brake with manual release. Power and control wiring shall be installed under Pay Item "Bridge Electrical and Control System".

(3) Operating Unit Gearing: The actuator shall be a double reduction unit with the capability of quickly changing the output speed with a simple gear set change. The power gearing shall consist of generated spur or helical gears of heat-treated steel. All power gearing shall be grease-lubricated. Ball or roller bearings shall be used throughout.

(4) Limit Switch and Limit Switch Gearing: Limit switches and associated gearing shall be an integral part of the actuator. Limit switch gearing shall be of the intermittent type, totally enclosed in its own gear case to prevent dirt and foreign matter from entering the gear train, grease-lubricated, and shall be made of bronze or stainless steel. Limit switches shall be of the adjustable type capable of being set to trip at any point of travel between fully open and fully closed, and not be subject to breakage or slippage due to over-travel. Limit switches shall be of the heavy duty, open contact type with rotary wiping action. Microswitches or similar switch configurations are not acceptable.

(5) Each actuator shall have a minimum of two rotor-type switch assemblies and a minimum of eight heavy duty contacts.

(6) Stem Nut: The actuator shall have a stem nut of high tensile bronze or similar material. The nut arrangement shall be of the two-piece type to simplify field replacement.

(7) Manual Operation: A handwheel shaft shall be supplied with the actuator to allow for manual operation. This shaft shall have a cover that will activate an interlock switch that allows motor operation when it is in place. Removing the cover disconnects the motor control circuit preventing the motor from operating when the handwheel is attached and allowing for safe manual operation.

(8) Overload Protection: A spring compensation device (Belleville springs) shall be used in both directions of travel to absorb, without damage to any part of the actuator, the highest inertial loads capable of being produced by the actuator.

c. Span lock mounting support bases, shall be weldments of ASTM A 572 Grade 50 steel. They shall be stress relieved by heat prior to finish machining.

2.2.19 Sheaves, Trunnions, and Trunnion Bearings

a. Sheaves. Existing sheaves and ring gears shall be reused. Prior inspection and testing of the trunnion journals indicates that one new trunnion is required for the southwest sheave. The northeast trunnion shall be repaired as stated below.

b. Bearings. Existing sheave bearing castings and caps shall be reused. New lower bronze bushings and cap bolts shall be provided as shown on the drawings.

c. Sheave Trunnion Shafts. The new sheave trunnion shaft shall be provided of forged steel, ASTM A 668 class M and conform to the

dimensional parameters presented on the drawings. The journal ends of each trunnion shall be turned with extreme care to realize the fit shown on the drawings with the new lower bushings.

d. Sheave-Trunnion Assembly. The new southwest trunnion shall be fit into the sheave hub with a shrink fit as specified on the contract drawings. The trunnion shall be centered on the sheave hub and then drilled and doweled in place using high strength (100,000 psi minimum shear strength) steel dowels. The dowel holes are to be peened after assembly. Use of "Vent type" dowels is advisable.

e. Northeast Sheave-Trunnion Assembly. The northeast sheave trunnion contains voids which need repair. One void is at the sheave hub, at the inboard trunnion shoulder. The other is a destructive pitting area on the inboard journal, in line with the preceding shoulder void. Reconditioning of both areas is required. The Contractor shall submit to the Engineer for approval a detailed procedure on this repair, prior to the work being completed.

f. Erection. The sheave-trunnion assemblies and trunnion bearings shall be installed so that both sheaves in each tower are accurately aligned. The Contractor shall submit a detailed assembly and alignment procedure for installation of the sheave/trunnion assemblies to the Engineer for approval. Bolts connecting the sheave bearings to the tower structure shall be equivalent to ASTM A 325, Type 1, turned bolts in reamed holes.

2.2.20 Span Guide Roller Bushings

The Contractor shall provide new span guide roller bushings as shown on the Contract Drawings for all longitudinal and transverse guide roller assemblies.

2.2.21 Span Height Control Drive

a. One end of one sheave trunnion shaft in each tower shall have attached to it a small stub shaft that drives through flexible couplings and gear boxes the electrical limit switch and resolver units.

b. To support the electrical limit switch and resolver units, support bases in each machinery room shall be attached to the concrete floor using 3/4" anchor bolts.

2.2.22 Pinions

a. New main drive pinions and other open gearing shall be provided as shown on the contract drawings.

b. Erection. After installation of the existing sheaves with existing ring gears, the open gearing is aligned relative to the ring gears for proper backlash, and tooth mesh contact.

(1) Ring Gear/ Pinion Backlash shall be equal to 0.110" to 0.120". The new pinion's tooth thickness shall be based on measurements of existing ring gear teeth to be reused.

(2) Tooth Contact area shall be a minimum of 70% of face width; 35% of tooth depth under a no load condition.

2.2.23 Machinery Room Hoist.

The machinery room hoist, one in each tower, shall be a manually operated, two-ton capacity chain hoist with a lift height of approximately 10 feet, to lift equipment or replacement components into position from the machinery room floor as shown on the contract drawings. The crane beam also has a telescoping capability, to enable the hoist to protrude through the doors on the sheave hood wall of the machinery room. Refer to the contract plans for hoist details.

2.2.24 Inspection and Testing

2.2.24.1 Main Power Train

(Span Motors, Main Drive Gear Reducers, Brakes, Bearings, Shafts, Couplings, etc). The Contracting Officer shall be given at least two weeks notification prior to all testing.

a. After alignment and bolting into place in the shop, each gear reducer shall then be spin tested in place for a minimum of two hours (one hour each direction) during which all bearings shall be monitored for noise temperature, and lubrication. Temperature rise of any component shall not exceed 100 degrees F over ambient.

b. After completion of the spin test, one output shaft shall be held and input speed reduced to 50 percent of normal to check for proper operation of the unlocked differential. This condition shall be held for ten minutes in one direction of rotation and ten minutes in the opposite direction of rotation. The opposite shaft shall then be held, and testing repeated. Apparent noise levels shall be assessed and actual bearing temperatures shall be recorded. Operational spin testing of the unlocked differential shall be performed for both gear reducers.

c. One of the gear boxes shall be chosen by the Contracting Officer for a full load test (10,800 lb-in total for either input shaft extension). Blueing shall be applied to all gear sets to demonstrate contact percentage and pattern. The manufacturer shall set up the test rig in such a manner that load sharing of the differential can be verified. Load variation of output shafts shall not exceed 5 percent of each other. Housing deflection under load shall also be measured with dial indicators at each bearing location. Testing duration shall be 30 minutes in each direction of rotation. After load testing, all inspection ports shall be removed and visual inspection of all gear sets shall be performed. Contact patterns from blueing shall be photographed and logged for proper identification. The no-load tests described in paragraphs (a) and (b) above shall be performed again on this reducer.

d. During final assembly in the shop, each main drive gear reducer shall be mounted to the reducer bedplate, and assembled with the motor brakes, brakewheels, motor couplings and main drive motors. Also

mounted to the bedplate is the emergency gearmotor and shifting coupling, and the differential lock-up gearmotor actuator and linkage. All components shall be properly aligned using full size stainless steel shims. After assembly of all components to the bedplate, each of the main motors shall be test run in place for 15 minutes in each direction. The reducer housings shall be checked for leaks at bearing covers, seals, inspection covers, oil drains, bolts and welds. The 20 HP emergency gearmotor clutch coupling shall then be engaged, and the test repeated as per the main motor drive procedure.

2.2.24.2 Span Lock Assembly

a. Each span lock assembly, consisting of motor and operator, shall be factory operated and certified before delivery. Each lock assembly shall be factory operated through not less than 15 cycles or operated not less than 0.1 hours, whichever is greater and shall function without overheating or other evident deficiency.

b. After mounting and adjusting, each lock assembly shall be field tested by operating through not less than 3 cycles while the span is in the closed position.

c. Each span lock shall be manually extended and retracted with the handwheel at least three times, with all components assembled in place on the bridge.

d. The span lock assemblies shall also be operated during the electrical sequence testing performed under Division 16 - ELECTRICAL.

2.2.25 Spare Parts

Furnish and store the following spare parts as directed by the Engineer without additional cost.

a. Drive:
1 - Thruster assembly for the motor brakes.
1 - Thruster assembly for the machinery brakes.
2 - Pair of brake shoes for the motor brakes.
1 - Pair of brake shoes for the machinery brakes.
1 - 1/4 hp gearmotor for main reducer differential lock-up.
1 - 20 hp emergency gearmotor.
1 - Set of seals and gaskets for main differential reducer.
2 - Sets of seals and gaskets for each size shaft gear couplings

b. Span Locks:
1- Complete Span Lockbar Actuator (Motor/reducer)

c. Span and Counterweight Guide Wheels
2- Counterweight Guide Wheels, each size, complete with bushings.

2.2.26 Lubrication

a. The Contractor shall furnish a lubrication plan for all machinery for approval. The plan shall be developed from recommended practice of the machinery manufacturers. The Contractor shall coordinate the lubrication plans for the various machinery elements and minimize the number of different

lubricants. The Contractor shall furnish copies of letters from the various machinery manufacturers endorsing the lubricants which have been finally selected. Lubricants shall be selected for year round exposure at the bridge.

b. The Contractor shall provide two lever type lubrication guns with three foot hoses. Fittings shall be located in a protected and convenient position for use and shall be connected to the points requiring lubrication by pipe extensions where necessary. These pipe extensions shall be kept as short as practical and shall be rigidly supported at the fittings and at intermediate points. Fittings on proprietary parts shall be replaced if necessary with fittings that have been selected as standard for the bridge.

c. The Contractor shall furnish a lubrication diagram which shall show all points requiring lubrications, the type of lubricant to be used at each point and the frequency of lubrication. The diagram shall be submitted to the Engineer for approval and the approved diagram shall be mounted in the operator's house and in each tower top machinery room with a suitable and approved frame and glass cover.

d. A copy of the Lubrication Diagram shall be included in the Operating and Maintenance Manuals., see SECTION 15016 - OPERATING AND MAINTENANCE MANUALS.

2.2.27 Lubrication Schedule.

a. The Contractor shall prepare and furnish a lubrication schedule to include the following items, categorized and listed as shown below.

b. The following legend shall apply to the lubrication schedule: DA denotes Direct Application, PLF denotes Pressure Lube Fitting, LPG denotes Low Pressure Grease Gun (for couplings both pipe plugs must be removed first, replenish grease, then reinstall both pipe plugs)

c. Types of Lubricants. Lubricant compounds furnished shall be as recommended and certified by their manufacturer for the use and requirements called for. Lubricants must be recommended for use year round with consideration to ambient temperature ranges that will be experienced by the various components. Synthetic lubricants may be proposed, but must be compatible with all seals and sealing compounds that may be exposed to the lubricant. Contractor shall furnish the Engineer a copy of the certification.

(1) Lubricant A - Stiff, high-pressure grease, with best weathering, lubricating and corrosion preventive properties.

(2) Lubricant B - Best rope dressing for wire rope exposed to weather.

(3) Lubricant C - Best extreme pressure grease for gear and anti-friction bearing lubrication, with some moisture present.

(4) Lubricant D - Gear Coupling grease approved by coupling

manufacturer.

(5) Lubricant E - Heavy weight gear oil with best weathering, lubricating and corrosion preventive properties.

(6) The foregoing lubricants shall be listed on the lubrication charts herein before specified. All lubricants that will be listed on the lubrication charts shall be approved for use in each proprietary unit by the manufacturer thereof.

2.2.28 Operating and Maintenance Manuals

The operating and maintenance manuals for the entire bridge machinery system shall be prepared according to SECTION 15016 OPERATING AND MAINTENANCE MANUALS.

2.2.29 Tools and Equipment

Each tower top machinery house shall be equipped with the following tools and lubrication equipment. The set of tools, plus grease guns, shall be mounted in a sufficiently sized 1/8-inch thick steel cabinet provided with hinged doors and locks. The cabinet shall be welded steel construction, with all outside welds continuous and ground smooth. Suitable clips shall be installed in the cabinet for holding each tool in place. The space of each wrench shall be labeled with the wrench opening, and the spaces for other tools shall be labeled with the tool name. A cabinet shall be placed in each tower top machinery house. The Contractor shall also furnish for each tower top machinery room a suitable work bench, machinist's vise, and two portable steel tool boxes. The tool boxes shall be approximately 8-1/2" by 9" by 30".

a. 2 each Box and open-end combination wrenches made of high-grade, drop-forged steel, with chrome-plating over nickel finish, to fit bolt heads, nuts, and cap screws from 1/4 to 1-1/4 inches, inclusive.

b. 2 each Single-end, angle wrenches of high-grade, drop-forged steel to fit all bolt heads and nuts larger than 1-1/4-inch size actually used in the job.

c. 1 set Socket wrenches, as required, to supplement the wrenches in Items (a) and (b) for dismantling flexible couplings.

d. 1 each 12-inch adjustable wrench.

e. 1 set Alloy-steel hex wrenches for all socket-head screws.

f. 1 each 8-inch and 10-inch screwdrivers with solid, hardened steel; square shanks; and insulated composition handles.

g. 1 each 2-pound ball-peen hammer.

h. 2 each Hand lubrication guns, screw type, 12-ounce capacity, for each size lube fitting used.

i. 1 each Load pump for 25-pound capacity pail for each type gun furnished.

j. 1 each Grease transfer pump, complete with hose and fittings for 120-pound drum.

PART 3 EXECUTION

3.1 SHOP ASSEMBLY AND OPERATION.

All machinery components shall be temporarily shop assembled to verify their correct fit prior to shipment. Components not mounted on a common base shall then be disassembled for shipment. Any components requiring selective assembly shall be match-marked for future assembly.

After the span operating machinery has been erected in the shop, the entire gear train shall be driven under power forward and backward sufficiently to demonstrate that all shafts run freely. Parts shall have the minimum amount of play consistent with their free operation where not otherwise specified.

The various parts of units or groups, such as gear reducers, shaft couplings, and bearings, before leaving the shop shall be marked according to mating, location and correct relation to facilitate reassembling at the bridge site. Stamp markings shall be made in areas of the part or assembly which are not subjected to significant stress during operation.

3.2 PROTECTION FOR SHIPMENT

All machinery parts shall be cleaned of dirt, chips, grit, and all other injurious material prior to shipping and shall be given a coat of corrosion-inhibiting preservative.

All finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion shall be coated as soon as practicable after finishing with a rust-inhibiting preservative. This coating shall be removed from all surfaces prior to lubrication for operation and from all surfaces prior to painting after erection.

If the anti-rust coating on any machinery part shall become broken or removed accidentally, or otherwise, it shall be restored immediately.

All machinery parts shall be completely protected from weather, dirt, and all other injurious conditions during manufacture, shipment, and while awaiting erection.

All shaft journals that are shipped disassembled from their bearings shall be protected during shipment and before erection by a packing of oil-soaked waste secured in place by burlap and covered with heavy metal thimbles or heavy timber lagging securely attached; an alternate method may be submitted for approval. Every precaution shall be taken to ensure that the bearing surfaces will not be damaged and that all parts shall arrive at their destination in satisfactory condition.

Assembled units shall be mounted on skids or otherwise crated for protection during handling and shipment.

3.3 ERECTION

All parts of machinery shall be erected in accordance with erection marks and match-marks. When the final position of the machinery will change upon application of the full dead load, the final adjustments shall be made

after dead load is fully applied. Before final drilling or reaming, all parts shall be adjusted to exact alignment by means of shims furnished for each part. After final alignment and bolting, all parts shall operate smoothly.

Before erection, all finished surfaces which were coated by a rust-inhibiting coating shall have the coating removed with gasoline, benzene, or other approved solvent. While machinery parts are being erected, they shall be covered by a sound tarpaulin or other durable waterproof covering when work on them is interrupted.

Bolt holes in structural steel for connecting machinery with turned bolts shall, in general, be drilled from the solid after final alignment of the machinery. Sufficient erection holes, subdrilled 1/8 to 1/4 of an inch undersize for temporary bolts, may be used for erection and alignment of the machinery. When the machinery is aligned in its final position, full-size holes for the permanent turned bolts shall be subdrilled and reamed; full-size bolts installed; and the temporary bolts removed.

ASTM A 449 bolts shall be torqued to the same tension required for ASTM A 325 bolts.

Torques for other grades of bolts shall be proportioned to their strength and shall be indicated on the erection drawings.

The machinery: motors, reducers, brakes, bolsters, shafting, couplings, sheaves, ring gears, pinions, trunnion bearings, bearing bolsters, and the like shall be erected and adjusted by competent mechanics and millwrights skilled in the type of work involved. They shall be provided with all necessary precision measuring and leveling instruments as may be required. The machinery shall be erected with exactness so the various parts are truly aligned in their proper positions and, when entirely assembled, will operate smoothly without binding or undue looseness of the parts.

The sheave trunnion bearings shall be carefully located and adjusted so that when the full dead load of the lift span and counterweights is carried by the sheaves/trunnions, the axes of the two sheave trunnions of each tower will be as near to a straight line as possible, with a tolerance of 1/16" total offset in any direction. Final adjustment of the ring gears/pinions mesh shall occur only after the sheaves are under the full dead load of the span and counterweights.

Throughout the installation, bolts and nuts shall be adjusted or tightened only with wrenches that fit; tightening with chisels and hammers will not be permitted.

Installation and alignment of all mechanically connected machinery and electrical equipment shall be conducted under supervision of the machinery manufacturer's field engineer.

The machinery and all machine-like elements or parts, especially all sheave/trunnion assemblies and their bearings, shall be assembled, erected, aligned, and adjusted at the bridge site under the direct and continuous supervision of the Engineer to whom the Contractor shall afford every opportunity and facility to satisfy himself that the work is being done in accordance with the plans and specifications.

Alignment of all machinery is to be rechecked after all connections and drives have been installed and in operation for a minimum of 10

openings/closings.

3.4 PAINTING

Cleaning and painting of machinery surfaces shall generally conform to the GENERAL REQUIREMENTS for painting and shall be included on the shop drawings. Factory painted machinery items shall be hand tool or solvent cleaned and repainted with the designated paint system for movable and stationary components.

Machinery surfaces shall be given one prime coat in the shop, a second prime coat and one intermediate coat after machinery and equipment have been installed and a final high gloss finish coat after completion of operating tests. Color for the final coat will be Federal Safety Orange ANSI Z 53.1 for all moving parts including shafts, couplings, sides of pinion and rack, gears, and brake wheels. Bearing and lubricated surfaces shall not be painted. Color for the final coat of stationary parts shall conform to Fed. Std. 595B #24449.

Before application of paint in the shop, surfaces which require painting shall be cleaned of all chips, burrs, dirt, rust scale, sand, grease, and other extraneous materials by employing methods such as chipping, grinding, wire brushing, solvents, compressed air, and sandblasting. After cleaning, surfaces requiring paint shall be painted with one prime coat and the other bearing or sliding surfaces will be coated with protective lubricants as required above and approved by the Engineer. Nameplates shall be clean and free of paint.

After the machinery items have been installed in final position on the bridge, all surfaces which require paint shall be cleaned of grease, oil, and loose materials by the use of solvents and compressed air, and all damaged shop prime coated surfaces shall be touched up with the same paint coating. The Contractor shall take special care to avoid painting of machinery bearing and sliding surfaces and to mask and protect from paint all nameplates, legend plates, and escutcheons mounted on machinery.

After completion of the operating tests and acceptance of the machinery, all oil, grease, dirt, and other foreign matter shall again be cleaned from exposed machinery surfaces. The exposed surfaces shall then be given a third field coat, which shall color-code the machinery to identify fixed and moving parts as indicated above.

Paint for the final field coat shall be brush applied and shall be compatible with the previous coat and shall be a high-gloss machinery enamel, resistant to weathering and abrasion, conforming to the requirements of the Safety Color Code for Marking Physical Hazards, ANSI Z 53.1. The machinery enamel shall be a tested product equal to Rust-Oleum Federal Safety Coating. The brand and colors shall be submitted to the Engineer for approval. The Contractor shall place a cautionary sign in the Operator's House and at the entrance to the machinery area of each tower which shall explain the color code. Details of the sign including text, dimensions, mounting locations, and materials shall be submitted to the Engineer for approval.

3.5 LUBRICATION

During installation, the Contractor shall lubricate all rotating and sliding parts of the machinery, and fill all gear reducers, pillow block housings and flexible couplings with lubricants indicated on the approved

charts. All lubricants that will be listed on the lubrication charts shall be approved for use in each proprietary unit by the manufacturer thereof. The Contractor shall furnish an additional supply for future maintenance use to include 25 pounds of each type of grease and 15 gallons of each type of oil.

After erection is complete, the Contractor shall make a thorough inspection to ensure that all gears are clean and free of obstruction, that all parts are aligned as closely as practicable without actual operation, and that all bolts are properly tightened. All gear housings shall be filled to the proper level, and all rotating and sliding parts shall be supplied with lubricants.

3.6 CONTRACTOR SUPERVISED LIFT SPAN OPERATION AND TRAINING

Provide a minimum of two men to supervise the operation of the bridge for a period of 14 calendar days (24 hours a day) after the lift span is completely operable; and for an additional 14-day period (24 hours a day), provide one man. These men shall be able to operate the bridge, to supervise its operation, and to make any adjustments or corrections that may be required in the mechanical or electrical equipment of the bridge. They shall instruct and qualify the employees of the City of Philadelphia in the operation and maintenance of the bridge. Any adjustments or corrections required during the two 14-day periods shall be at no additional cost.

SECTION 15015

WIRE ROPES AND SPAN BALANCING

PART 1 GENERAL

This section covers the furnishing, manufacture, fabrication, erection, installation, testing and placing into satisfactory operating condition, the main counterweight ropes, the auxiliary counterweights and ropes and balancing necessary for operation of the lift span.

The current American Railway Engineering and Maintenance-of-Way Association (AREMA Manual) "Manual for Railway Engineering", Chapter 15, Part 6, "Movable Bridges" applies, except as modified by the specifications or contract drawings.

The lift span and the two new main counterweights which balance it shall be suspended on 48 2-1/8" diameter wire ropes passing over four 14'-0" pitch diameter sheaves, two at the top of each tower, each sheave carrying 12 ropes. Each sheave shall be mounted on a trunnion shaft and supported by two plain journal bearing pillow blocks. The unbalance due to the main counterweight rope length is approximately balanced by four new auxiliary counterweights and eight new 3/4" diameter auxiliary counterweight galvanized wire ropes passing over four existing 4'-0" pitch diameter auxiliary counterweight sheaves with new bushings and new support shafts.

1.1 DESCRIPTION OF WORK

Provide items and materials as indicated on the drawings and as specified herein.

Items, material and methods included in this section are for the entire bridge wire ropes, sockets, rope castings, splay plates, fill plates, spacers, shims, and all necessary hardware of a tower drive vertical lift bridge.

Work shall include the furnishing, installation, adjustment and balancing for the proper operation of the vertical lift span. Items for the above shall include the following:

a. New main and auxiliary counterweight ropes and rope sockets.
b. Existing rope anchor castings on main counterweights.
c. High strength turned bolts, nuts, and hardened washers.
d. Existing splay castings at main counterweights and span lifting girders.
e. Existing take-up rods and nuts at auxiliary counterweights and span lifting girders.
f. Wire rope dressing.
g. Necessary shims, filler plates, keeper plates, and other miscellaneous hardware.
h. Equipment necessary for proper tensioning of the ropes.
i. Equipment and materials necessary for balancing of the lift span.

The Contractor shall supply all apparatus, tools, devices, materials and

labor to manufacture, paint, ship, install, erect, align, adjust, lubricate, test the wire ropes and balance the lift bridge in an approved manner as provided herein. Any apparatus, tools, devices, materials and labor, not specifically stated or included, which may be necessary for the work, shall be furnished by the Contractor. The installation and adjustment shall be by millwrights experienced in this class of work.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The latest revisions only shall be used for all references.

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997ae1) Carbon Structural Steel
ASTM A 325	(1997) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 563	(1997) Carbon and Alloy Steel Nuts
ASTM A 668	(1996) Steel Forgings, Carbon and Alloy, for General Industrial Use
ASTM A 781	(2000) Castings, Steel and Alloy, Common Requirements for General Use
ASTM A 802	(1996) Steel Castings, Surface Acceptance Standards, Visual Examination
ASTM E 446	(1993) Radiographs for Steel Casting up to 2 in. (51 mm) in Thickness
ASTM F 436	(1993) Hardened Steel Washers

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

FEDERAL SPECIFICATIONS (Fed. Spec.)

RR-W-410D	Wire Rope and Strand

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

1.3.1. Standard Items.

SD-13 Certificates

Standard Items; GA.

The Contractor shall submit copies of producer or manufacturer data according to the GENERAL REQUIREMENTS. These shall include specifications, tests and installation instructions for the following items, but not excluding other items or materials not specifically mentioned:

(1) Mill reports and physical tests of all metals.

(2) Bolts, nuts, washers, and other fasteners.

(3) Paint.

(4) Lubricants as endorsed by machinery manufacturers.

(5) Standard stocked items.

Installation, Operation, Maintenance and Lubrication Manuals; GA.

Refer also to SECTION 15016- OPERATING AND MAINTENANCE MANUALS.

a. The Contractor shall furnish six copies of the above manual which shall conform to the outline and requirements of SECTION 15016- OPERATING AND MAINTENANCE MANUALS. The manual shall be submitted prior to shipment of operating machinery material to the site.

b. If standard parts drawings are used, they shall be modified to be suitable, and irrelevant material shall be blacked out. All general information used as text shall be modified where necessary to show pertinence to the equipment furnished under this Contract, and irrelevant material shall be removed. The arrangement of the manual, method of binding, included material and text shall be submitted to the Engineer for approval.

SD-04 Drawings

Fabricated Items; GA.

The Contractor shall submit shop drawings to the Engineer for approval in accordance with the GENERAL REQUIREMENTS. These shall include complete details, classification of materials, schedules for fabrication and shop assembly, procedures and diagrams showing sequence and details for erection and approval.

Shop Drawings;GA.

Shop drawings shall be given a suitable title to describe the parts

detailed thereon, and each drawing shall be identified by the complete project name and number. Shop drawings shall include the following information:

(1) Reference to the standard material specifications for each item.

(2) The surface finish of machined surfaces and tolerances for each dimension for which a specific fit is required. A general tolerance block shall be used to define the tolerances of all other dimensions. Fits and finishes shall be as defined in paragraph 6.5.1 of AREMA Manual for Railway Engineering, Chapter 15, Part 6, or as specified by the manufacturer, whichever is more rigorous.

(3) Quantity required. Note that quantities shall be for the entire bridge.

(4) Heat treatment or specific hardness requirements where applicable.

(5) All proprietary items shall be shown in outline on shop drawings which shall also indicate the method and sequence to be employed in assembly of bridge machinery and installation of necessary utilities support and service facilities. Shop drawings shall show all external dimensions and clearances necessary for installation and operation of each item of machinery in the bridge. For all items listed or described in this section, the Contractor shall furnish complete assembly diagrams showing each part contained within the item and the manufacturer's part number assigned to each part. The diagrams shall be sufficient to enable complete disassembly and reassembly of the item covered. In the event that any part is modified in any manner from the way it is described or delivered by its original manufacturer, the Contractor shall deliver a drawing which details each modification and the part shall be assigned a unique part number to preclude the supply of replacement parts not modified in similar fashion. The assembly drawings of each item shall, in addition to identifying and describing each internal part, contain:

(a) dimensions of all principal elements within the item;

(b) certified external dimensions affecting interfaces or installations;

(c) gross weight;

d) capacity and normal operating ratings;

(e) details of all turned bolts used to mount the machinery to its supports.

(6) Machinery Data. The Contractor shall furnish complete data on the design and construction of any unit furnished as part of the machinery under this Contract, including material specifications, cross-section assembly drawings, detail drawings, and dimensions of principal elements.

(7) Shop Bills of Materials. Complete shop bills of materials shall be included for all machinery parts. If the bills are not shown on the

shop drawings, prints of the bills shall be furnished for approval in the same manner as specified for the drawings. The computed weight of each piece of machinery shall be stated on the shop drawing upon which it is detailed.

Assembly and Erection Drawings;GA.

Complete assembly and erection drawings shall be furnished. These drawings shall give identifying marks and essential dimensions for locating each part of assembled unit with respect to the bridge or foundation.

Approval Process;GA.

Shop drawings which have not been approved or require correction shall be resubmitted until such time as they are acceptable to the Engineer, and such procedure shall not be considered a cause for delay. The Contractor shall bear all costs or damages which may result from the ordering or fabrication of any materials prior to the acceptance of the shop drawings. As a means of expediting delivery prior to acceptance of the shop drawings, the Contractor may request in writing from the Engineer approval to order raw materials of the correct type for later fabrication from accepted shop drawings. Such approval by the Engineer shall be in writing. After acceptance of the shop drawings, the Contractor shall supply the Engineer with additional copies of the accepted drawings as may be required.

1.4 QUALITY CONTROL

1.4.1 Source Quality Control

1.4.1.1 Inspection and Testing

Materials and fabrication procedures are subject to inspection and testing in the mill, shop and field by the Engineer. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1.4.1.2 Verification of Dimensions

All details shown on the Contract Drawings are typical and apply to similar conditions unless otherwise indicated. All dimensions and details shall be verified at the site before proceeding with any work and to avoid causing subsequent delay in work.

The Engineer shall be notified immediately for clarification whenever any portion of work is not clearly or accurately defined.

1.4.1.3 Certified Test Reports

As used herein, certified test reports refer to reports of tests conducted on previously manufactured materials or equipment identical to that proposed for use.

1.4.1.4 Factory Tests

As used herein, factory tests refer to tests required to be performed on

the actual materials or equipment proposed for use. Results of the tests shall be submitted in accordance with the provisions of this Contract for laboratory test results.

1.5 DELIVERY, STORAGE and HANDLING.

1.5.1 Organization

All machinery items and material shall be delivered to the site in accordance with the approved schedule of work. Machinery items shall be properly protected until installation. Prior to shipment from the manufacturer's and/or fabricator's plant or plants, the Contractor shall prepare the various elements of the operating machinery for shipment. All large, bulky and/or heavy items shall be securely mounted on skids or pallets of ample size and strength to facilitate loading and unloading. All small parts shall be boxed in sturdy wood or heavy corrugated paperboard boxes. A packing list enclosed in a moisture-proof envelope and indicating the contents of each such box shall be securely attached to the outside of the container. The skid/pallet mounting and boxing shall be done in a manner which will prevent damage to the equipment during loading, shipment, unloading, storage and any associated and/or subsequent handling. Weatherproof covers shall be provided during shipment to protect any and all items shipped in open railway cars, trucks, or barges. Any eyebolts, special slings, strongbacks, skidding attachments or other devices used in loading the equipment at the manufacturer's and/or fabricator's plant or plants shall be furnished for unloading and handling at the destination.

1.5.2 Storage

Material shall be stored so as to permit easy access for inspection and identification. Materials and items shall be protected from the ground by the use of pallets, platforms or other means. Material shall not be stored in a manner that would cause distortion or damage.

1.5.3 Shipment

All machinery, materials and contingent items shall be properly protected for shipment and storage.

1.5.4 Painting

All finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion, shall be coated with a 1/32 inch minimum film thickness as soon as practicable after finishing with No-Ox-Id, A Special WW, as manufactured by San-Chem Company, Chicago, Illinois, or approved equal. This coating shall be removed from all surfaces prior to lubrication for operation and from all surfaces prior to painting after erection.

1.5.5 Assembled Units

Assembled units shall be mounted on skids or otherwise crated for protection from weather, dirt and all other injurious conditions during shipment and storage as directed by the manufacturer. The Contractor shall submit advance information as to methods and materials which will be used for protection for approval by the Engineer.

1.5.6 Provision for Lifting

All machinery units shall have lifting eye bolts or lifting holes properly sized for safe working loads and located to provide a balanced lift.

1.5.7 Wire Rope Shipment

All wire ropes shall be shipped on reels, the diameter of which is not less than 25 times the diameter of the ropes.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General

a. All materials shall be new and conform to standard ASTM and other specifications included previously and indicated on the drawings and herein, or as may be otherwise applicable.

b. Brinell hardness tests shall be made, and included on inspection reports, for castings and forgings for which hardness values are required on the drawings, and in the materials specifications or specified herein.

c. Steel for weldments and miscellaneous components shall be ASTM A 36/A 36M unless otherwise specified, and always weldable grades as designated by applicable ASTM standards. Welding materials and methods shall conform to the AWS Structural Welding Code AWS D1.1

d. No item shall be fabricated, machined, welded, cast or forged without sufficient advance notification to the Engineer to permit scheduling of required inspection. The Contractor shall furnish all facilities and provide for the free access at the plant or shop for the inspection of material and workmanship. Inspection and testing shall conform to the following requirements:

(1) Inspection at the plant or shop will not relieve the Contractor from the responsibility of furnishing satisfactory materials and workmanship. Acceptance of a material or item shall not prevent subsequent rejection if material is found defective. The Contractor shall remedy defects due to workmanship, erection, materials or design for a period of one year after final tests and acceptance have been made, at his own expense. The Contractor shall furnish a satisfactory guarantee to ensure correction of defects. If necessary, such defects may be corrected by others at expense to the Contractor.

(2) The Contractor shall furnish the Engineer with the number of copies of purchase orders as may be required.

(3) Unless otherwise provided, the Contractor shall furnish without charge, test specimens required herein, and all labor, testing machines, tools and equipment necessary to prepare the specimens and to make the physical tests and analyses. Two copies of test reports and chemical analyses shall be furnished to the

Engineer.

2.1.2 Standard Products

Materials and equipment shall be essentially the standard cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be the manufacturer's latest design that complies with the specification requirements. Materials and equipment shall essentially duplicate items that have been in satisfactory commercial or industrial use at least two years prior to bid opening. Where two units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. Each major component of equipment shall have the manufacturer's name and address and the model and serial number on a nameplate, securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.

2.1.3 Manufacturer's Recommendations.

Where installation procedures or any part thereof are required to be in accordance with the recommendation of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

2.1.4 High Strength Bolts, Nuts and Washers.

Heavy hexagonal head structural bolts, heavy hexagonal nuts, and hardened washers complying with respectively ASTM A 325 Type 1, ASTM A 563,Grade C, and ASTM F 436

2.1.5 High Strength Turned Bolts.

Turned bolts shall be made from material equal to ASTM A 325 Type 1.

2.1.6 New Main Counterweight Wire Ropes

Counterweight wire ropes shall comply with Federal Specification RR-W-410D latest revision, Type 1, Class 2, Construction 4 (Filler Wire) with fiber core. Fiber core shall be Polypropylene. Manufacture ropes of Extra Improved Plow Steel Uncoated (Bright) with an minimum breaking strength of 384,000 pounds. All ropes shall be right regular lay. Wire rope shall be manufactured in accordance with the requirements of AREMA Manual Chapter 15, Part 6.

2.1.7 New Auxiliary Counterweight Wire Ropes

Auxiliary counterweight wire ropes shall comply with Federal Specification RR-W-410D latest revision, Type 1, Class 2, Construction 4 (Filler Wire) with fiber core. Fiber core shall be Polypropylene. Manufacture ropes of Extra Improved Plow Steel and galvanized with an minimum breaking strength of 46,000 pounds. All ropes shall be right regular lay. Wire rope shall be manufactured in accordance with the requirements of AREMA Manual Chapter

15, Part 6.

2.1.8 New Rope Sockets

Rope Sockets shall be manufactured open spelter sockets made from forged alloy steel, ASTM A 668 Class G, Normalized and Tempered. Magnetic particle inspect and ultrasonic inspect each socket. Sockets shall be selected at random for testing, which shall be in accordance with the provisions of this specification, and in accordance with AREMA Manual Article 15.6.6.11. Assemble in accordance with provisions in AREMA Manual.

2.1.9 Existing Anchor and Splay Rope Castings.

Rope castings shall be tested for internal defects using the applicable examination method prescribed under Supplementary Requirements of ASTM A 781 Inspection of each rope casting is also covered below.

2.2 DETAILS AND WORKMANSHIP

2.2.1 Wire Ropes.

All wire ropes shall be made of Extra Improved Plow Steel and shall be 6 x 25 filler wire construction with polypropylene core. The wire ropes shall be preformed. Each strand shall consist of 19 main wires and 6 filler wires fabricated in one operation, with all wires interlocking. There shall be four sizes of wire in each strand, 12 outer wires of one size, 6 filler wires of one size, 6 inner wires of one size, and a core wire.

Wire rope shall be made by one manufacturer whose facilities and experience have been approved by the Engineer. Ropes shall be laid in accordance with the best practice. Every effort shall be made to obtain ropes of uniform physical properties. The ropes shall be fabricated in the greatest length practicable, and shall be cut from ropes manufactured with one setting of one stranding machine, and one setting of one closing machine. The wire ropes shall be manufactured by Paulsen Wire Rope, or approved alternate.

The actual diameter of the wire rope shall be defined as the diameter of the circumscribed circle. The actual diameter of the rope, measured with the rope under a tension equal to 12.5 percent of its ultimate tensile strength, shall not be less than its nominal diameter, and not more than 1/8" in excess of its nominal diameter.

a. Lay. All wire ropes shall be right regular lay. The maximum length of the rope lay shall not exceed 7-1/2 times the nominal rope diameter.

b. Lubrication During Fabrication. The polypropylene cores shall be pre-lubricated by the cordage manufacturer. All portions of the wire rope shall be lubricated during fabrication with a lubricant containing a rust inhibitor.

c. Splices. NO splicing of the ropes or individual strands will be permitted.

d. Wire- Physical Properties. The wire from which the wire ropes are to be made shall be tested in the presence of an inspector designated by the Engineer. Excepting that the filler wires may be made to the

manufacturer's standards, the physical properties of the uncoated individual wires before fabricating into the rope shall be as follows:

(1) The ultimate tensile strength shall not be less than the following:

Wire Diameter (d) - Inches	Tensile Strength (Min) psi.
0.031-0.060	262,000
0.061-0.100	253,000
0.101-0.140	248,000
0.141-0.190	240,000

(2) Torsion Test: The test specimens of the wire shall be subjected to a torsion test in which the distance between the jaws of the testing machine is 8". The number of complete successive turns of 360 degrees in one direction through which the 8" wire can be twisted around its longitudinal axis without breaking or showing any signs of splitting or other defects, shall not be less than the following:

Wire Diameter (d) - Inches	Number of Turns (8" length)
0.031-0.079	(27.5 - 25 x d) x 0.08/d
0.080-0.190	(24.0 - 25 x d) x 0.08/d

In all the torsion tests, one end of the wire shall be rotated with respect to the other end of the wire at a continuous rate until breakage occurs. During the test, the applied tension shall be sufficient to keep the wire straight. The speed of rotation shall not exceed 60 twists per minute. Such tests shall be carried out by a mechanically driven device, such as a gearmotor or belt drive, in order to secure a constant uniform speed.

All the tests specified above (in (1) and (2)) shall be made upon fair samples taken from either end of any coil of wire, and such samples shall be taken from not less than ten percent of the total number of coils.

(3) Tolerance Limits: The tolerance limits on diameters of like position wires in the strands of the wire rope shall not exceed the following values:

Wire Diameter - Inches	Allowable Diameter Variation-Inches
0.031-0.060	0.002
0.061-0.100	0.0025
0.101-0.140	0.003
0.141-0.190	0.0035

2.2.2 Wire Rope Testing

(1) The wire rope used in making up the main and auxiliary counterweight suspending rope assemblies, including their sockets, shall be tested prior to fabricating the individual rope assemblies. Rope test pieces shall be of sufficient length to measure at least 5 feet between sockets, and shall consist of one test piece of rope from each end of each reel, or more from each

reel if necessary to make up at least 6 test pieces for the main counterweight ropes and 3 test pieces for the auxiliary counterweight ropes. The sockets for the test pieces shall be selected at random from those which are to be used for filling the order. With sockets attached to each end, the test pieces shall be tested to destruction in a suitable testing machine running at its lowest speed. A small zinc collar shall be cast around the rope against the end of the sockets so that any movement of the socket will be readily apparent. The sockets used for these tests shall not be reused in the final rope assemblies.

(2) If the physical properties of the rope or of its individual wires fall below those specified, the entire length from which the test pieces were taken shall be replaced by the manufacturer with a new length, the physical quantities of which conform to those specified.

(3) Each New Main Counterweight rope shall be pre-stretched as follows:

(a) Tension the rope to 154,000 pounds and hold that load for 5 minutes.
(b) Reduce the load to 19,000 pounds.
(c) Repeat the load-unload cycle two more times.
(d) Release the load completely.

(4) Each New Auxiliary Counterweight rope shall be pre-stretched as follows:

(a) Tension the rope to 18,400 pounds and hold that load for 5 minutes.
(b) Reduce the load to 2,300 pounds.
(c) Repeat the load-unload cycle two more times.
(d) Release the load completely.

(5) The length of each rope between bearing faces of the socket pins shall be measured while the rope is twisted to the correct lay, and supported throughout its length in a straight line and under a tension equal to its approximate dead load in service, which corresponds to 12.5 percent of its specified minimum ultimate strength. The method of measurement shall be such to guarantee measurement of all ropes under identical conditions, and shall be satisfactory to the Engineer.

(6) When each rope assembly is under tension for measurement, it shall be marked with a longitudinal streak of brightly colored paint or other marking so as to determine the exact relation of rope strands and sockets with each other, and when erected, care shall be taken to see that the rope has no twist, but that it occupy exactly the same relation to each other which existed when the rope was measured. Each rope shall be suitably marked or tagged for identification and erection.

2.2.3 Rope Sockets.

a. All rope sockets shall be fabricated from normalized alloy steel forgings. They shall be forged without welds from solid steel conforming to ASTM A668, Class G. Sockets shall be neatly finished to the exact outside and inside dimensions shown on the drawings.

b. All sockets shall be attached to the ropes by approved methods using zinc filling, which must entirely fill the cavity to their extreme ends and in a manner to prevent any backward slipping of the ropes.

c. The slipping of the sockets under load shall not exceed 1/6 of the rope diameter when stressed to 80 percent of the specified minimum ultimate rope strength. If any slipping in sockets should occur during the measuring of the rope herein specified, the sockets shall be removed and reconnected. If the socket should break during the testing of the ropes to destruction, two other sockets shall be selected and attached to another piece of rope and then the test repeated. This process shall be continued until the inspector is satisfied that all sockets are reliable. Sockets shall be stronger than the rope with which they are used. If 10 percent or more of the sockets tested break at a load less than the specified ultimate strength of the rope, the entire lot of sockets shall be rejected.

d. Sockets shall be shop galvanized in accordance with ASTM A153.

2.2.4 Facilities for Testing

The manufacturer shall provide facilities for making the tests, and shall make, at his own expense, the tests required. Tests shall be made in the presence of an inspector representing the Engineer. The manufacturer shall make those tests normally made by the manufacturer and shall provide all necessary and proper facilities and shall otherwise cooperate as necessary in the making of tests which are to be in the presence of an inspector.

2.2.5 Testing of Existing Rope Castings

The Contractor shall provide facilities for making the tests, and shall make, at his own expense, the tests required. Tests shall be made in the presence of an inspector representing the Engineer. The Contractor shall make those tests normally made by the manufacturer of new castings and shall provide all necessary and proper facilities and shall otherwise cooperate as necessary in the making of tests which are to be in the presence of an inspector. The integrity of the existing counterweight rope splay and anchoring castings is extremely important to the proper anchoring of the new counterweight ropes. Each individual casting is to be thoroughly inspected for flaws, cracks, and other casting defects. Inspection of each casting shall be both visually as per ASTM A 802 and by magnetic particle to locate surface flaws, and by radiography as per ASTM E 446 to check for internal defects.

PART 3 EXECUTION

3.1 INSTALLATION OF MAIN AND AUXILIARY COUNTERWEIGHT ROPES.

All counterweight ropes shall be new, and erected with the shop assembled length.

All counterweight ropes shall be carefully removed from reels or coils by revolving them and shall be erected as to avoid any kinks or bends. The ropes shall not be pulled through dirt or water. The stripe painted on each rope in the shop shall be straight after the rope is installed. The contractor shall show the erection procedure for the counterweight ropes on

the shop drawings.

3.1.1 Main counterweights

The main counterweights shall be erected on tower links to permit the installation of the main counterweight wire ropes. The lift span is floated into place and the counterweight ropes attached to the lifting girders.

3.1.2 Auxiliary Counterweights

The four new auxiliary counterweights and eight new auxiliary counterweight ropes shall be installed as shown on the contract plans. Each new auxiliary counterweights shall contain 24 cast iron blocks for a total of 96. 80 of the blocks are existing and 16 are new.

3.1.3 Lubrication

Lubrication of the ropes after erection: After the lift span is in operating condition, the Contractor shall properly clean all ropes of all foreign material and shall furnish and apply hot, in an approved manner, and when weather conditions are suitably dry and warm, one coat of the lubricant applied during rope fabrication.

3.2 LIFT SPAN BALANCING

3.2.1 Procedure

After full transfer of the counterweight load to the counterweight ropes, the lift span corners shall each be weighed using calibrated jacks with a maximum capacity of 5 tons each. Both corners of each end of the lift span shall be weighed simultaneously, with the drive train disengaged. Jack the span a minimum of 1/16", but not more than 1/4" off the bearings. The span reaction at each corner, with the lift span in the down position shall be approximately 5000 pounds per corner, and shall conform to the loading shown in the Balance Table on the Contract drawings. The addition or removal of balance blocks from each counterweight shall be used to correct the deviation from the desired load.

Once the lift span load is obtained, the safety devices may be removed to allow for movement of the span.

3.2.2 Alternate Methods

The above procedure assumes erection of both counterweights in the up position and a move-in of the lift span in the down position. The Contractor may propose another method of the lift span move-in and counterweight construction, and may also propose another method for span balancing. However, any deviation from the above procedure shall be submitted for approval, in writing, a minimum of one month prior to the proposed starting date.

3.2.3 Requirements

The Contractor shall be responsible for all labor and material necessary to produce acceptable balance as directed by the Engineer within four hours of receiving weight adjustment values and locations. If weight changes are

required, a new series of tests shall be performed on the span and the above process repeated until the balance condition is acceptable. All testing, data analysis, and weight adjustments shall be carefully documented and formally submitted.

3.2.4 Adjustment

The Contractor shall make final adjustment of all elements of the spans to ensure that they function as described in the drawings and specifications. All adjustments shall be made at a time when temperature of the structure is uniform and the wind is calm. With all permanent items installed on the lift span, withdraw span locks in preparation to raise the bridge. Observe any discrepancies in elevation over the total bridge. Operate span sufficiently to determine how to place shims in order to eliminate discrepancy.

3.2.5 Final Balance

The final balance condition of the span shall be determined by the Engineer using the strain gage method. Strain gages shall be mounted on the floating shafts that are coupled to the pinion shafts. The gages shall be installed and wired to cancel the effects of bending and produce strain readings due purely to torsion. Prior to testing, all torque in the instrumented shafts shall be relieved to provide a true zero benchmark. Permanent recordings shall be made of the strain output versus height of span opening for a minimum of three complete opening and closing cycles for each of the instrumented shafts. Data analysis including existing balance condition of the span and required weight adjustments, if any, shall be provided within eight hours of running the tests. The Contractor shall be responsible for all labor and material necessary to produce acceptable balance as directed by the Engineer within four hours of receiving weight adjustment values and locations. If weight changes are required, a new series of tests shall be performed on the span and the above process repeated until the balance condition is acceptable. All testing, data analysis, and weight adjustments shall be carefully documented and formally submitted.

3.2.6 Tolerance

Acceptable tolerance on the balance condition shall be defined as follows:

> Downward reaction at each corner lift span bearing shall be between 4750 and 5250 pounds with the span in the fully closed position.

SECTION 15016

OPERATING AND MAINTENANCE MANUALS

PART 1 GENERAL

Provide preliminary and final versions of operating and maintenance manuals for those systems, equipment, and materials as required by their respective specification sections15014, 15015, and 15017.

PART 2 MATERIALS

2.1 Manuals

Manuals. Binders shall be hardback vinyl three ring loose leaf-type of one solid color. All binders for each discipline shall be the same color. Binder spine and front shall display labels containing the name of the bridge location, the name of the contractor and dates of the work.

The binder holes shall be reinforced for all contents. The paper and ink shall resist smearing, fading and deterioration from age.

2.2 Format

Three separate volumes are required for each set of manuals for a particular bridge.

1. One volume for Architectural Equipment.
2. One volume for Mechanical Equipment.
3. One volume for Electrical Equipment.

Each volume shall have a similar format and will be divided into chapters as follows:

A. Chapter 1 will be designated for general information and safety precautions. Information from the department's safety manual shall be included as applicable.

B. Chapter 2 shall contain the operational description of the particular system or piece of equipment or material where applicable.

C. Chapter 3 shall cover the functional description, including: block diagrams; schematic layout of the entire system; description of subsystem; functional relationship between systems and subsystems.

D. Chapter 4 shall cover scheduled maintenance, where applicable. This chapter shall provide all preventive maintenance procedures to the lowest repairable unit level and any checks, tests and measurements required on a periodic routine basis. Preventive maintenance indexes (PMI's) shall be provided in this section and shall be organized in tabular format to provide quick, easy reference to each preventive maintenance action performed according to the prescribed maintenance interval, as well as applicable preventive maintenance procedures contained within the manual.

E. Chapter 5 shall consist of troubleshooting diagrams (fault isolation trees) to be used by maintenance personnel for isolating fault to the lowest repairable limit level.

F. Chapter 6 shall cover all corrective maintenance procedures that are required to repair a particular system, piece of equipment or material back into satisfactory operating condition. This chapter shall provide step-by-step procedures for the replacement of defective parts. Reference shall be made according to the applicable test procedures established in Chapter 4. Warnings or precautions to be observed during maintenance shall be listed.

G. Chapter 7 shall provide step-by-step installation procedures to the lowest repairable limit level for a particular system, piece of equipment, or material.

H. Chapter 8 shall consist of complete parts lists to the lowest repairable limit level for each system, piece of equipment, or material. Parts lists shall include exploded views of assemblies as required. The local representative of the parts supplier shall be listed.

I. Chapter 9 shall include the duration and contents of all guarantees and warranties.

J. Chapter 10 shall include half-size prints of approved shop drawings on mylar, diazo prints are not acceptable. The prints shall be folded to fit into the manual.

The vendor shall recommend, in writing, for the engineer's approval, all lowest repairable units for each system, piece of equipment, or material. A lowest repairable unit shall be defined as that equipment which cannot be economically repaired, or which requires skills and equipment beyond those available by the department's maintenance personnel. The lowest repairable unit concept shall be used to prepare all written maintenance, repair, inspection, testing, replacement, and installation procedures for the mechanical, electrical and architectural maintenance manuals covered herein.

Parts lists shall be in tabular form and shall include each part name, description, name of manufacturer's order/part number and shop drawings reference. Parts lists shall be supported by adequately labeled exploded views or pictorial views where applicable. All special tools, jigs, fixtures, test and calibration equipment used in any maintenance, inspection repair or adjustments shall be included.

With the exception of shop drawings, all illustrations (block diagrams, schematic diagrams, exploded views, pictorial views printed circuit board layouts, etc.) shall be single line artwork. All lettering on illustrations shall be by lettering guide or equivalent to illustrate call-outs. All lettering shall be clear and legible in final form.

All written test and descriptive material shall be written to a 9th grade level.

Paragraph numbering will be sequential and indicate chapter location. Roman numerals shall not be used.

Front matter shall include a cover page with descriptive title, project, contractor and engineer. A table of contents shall be provided to indicate

each chapter and paragraph subtitles, numbering and page locations.

Safety warnings or cautions shall be visibly highlighted within each maintenance procedure. Use of such highlights shall be limited only to critical items and shall not be used in excessive manner which would reduce their effectiveness

2.3 Content Requirements

Vendors and suppliers listing to include names, addresses and telephone numbers.

Neatly typewritten index near the front of the manual, furnishing immediate information as to location in the manual of all emergency data regarding the installation.

Complete instructions regarding operating, lubricating, adjusting and maintenance of all equipment involved.

Where the contents of the manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete all manufacturer's data with which this installation is not concerned.

All material within the manuals shall be new. Copies used for prior submittals or used in construction of the project are not acceptable.

Manuals shall have index tabs for fast and easy reference to equipment and material. Tabs shall index each piece of equipment and system.

2.4 Construction

Make preliminary manual submittal of three copies to the engineer for review and approval; make submittal of final manuals in five copies to the engineer.

Submittal of preliminary and final manual editions shall be furnished to the engineer according to the approved official progress schedule.

Preliminary manual editions shall present all technical material for the mechanical, electrical, and architectural volumes to the greatest extent possible with respect to text, tabular matter, and illustrations. Preliminary manual editions shall be single column, double-spaced, and typewritten. Illustrations shall preferably consist of line drawings. (Sketches or photographs may be used if final line drawings are unavailable at the time of submittal.) All applicable shop drawings shall be included.

Preliminary manual editions for both mechanical and electrical sections shall be as technically complete as the final manual edition. All illustrations shall be in final form. Reduced size shop drawings, as specified in paragraph J of Section 2.2 "Format", shall be included.

Final manual editions shall be technically accurate and complete and shall represent the "as-built" system, piece of equipment, or material given final acceptance by the engineer. All illustrations, text, and tabular material shall be in final form; all shop drawings shall be included, as specified in paragraph J of Section 2.2 "Format" shall be included.

2.5 Recommended Format

Information, as required under paragraph J of Section 2.2 "Format" above, shall be furnished for the following items of electrical and mechanical equipment.

Architectural Equipment (Volume One):

1. Unit Air Conditioners - Generator and Electrical Equipment Rooms.

   A. Air conditioner.

   B. Thermostat.

2. Water cooler unit.

3. Exhaust fans and louvers - Machinery House and Electrical Equipment Room.

   A. Exhaust fan.

   B. Exhaust louvers.

   C. Intake louver.

4. Heat Pump System - Operators House.

5. Fire extinguishers.

6. Lubrication schedule and diagram.

7. Reduced size "as-built" drawings.

Mechanical Equipment (Volume Two):

1. Main differential gear reducer.

2. Brakes: Drive Motor and Machinery.

3. Standard operating instructions and emergency operation instructions. (Two separate sets of directions.)

4. Span locks.

5. Span and Counterweight guides.

6. Flexible couplings.

7. Bearings and bushings.

8. Shafts.

9. As is available, copies of existing material for existing machinery to remain in service.

10. Machinery room hoist, end trucks, and trolleys.

11. Open gearing: pinions, ring gears, and other open pinions and gears.

12. Sheaves and wire ropes. Main and Auxiliary.

13. Emergency gearmotor and shift coupling.

14. Main reducer differential lock-up gearmotor and mechanism.

15. Maintenance Lift: guides and drive gearing.

16. Lubrication schedule and diagram.

17. Reduced size "as-built" contract drawings.

Electrical Equipment (Volume Three):

1. Flux Vector Drive Units.

2. Wires, cables, and conduits.

   A. Single conductor cable.

   B. Multiple conductor cables.

   C. High voltage power cable.

   D. Flexible cables, such as tower to span loop.

   E. Loop cables (messenger supported).

   F. Rigid Steel Conduit.

   G. Flexible Steel Conduit.

   H. Fiber Optic Cables.

   I. Cable Trays

3. Ground rods cables and clamps.

4. Power and lighting transformers.

5. Molded case circuit breakers.

6. Terminal Cabinets.

7. Panelboards.

8. Safety switches.

9. Main disconnect.

10. Lighting fixtures, switches, and receptacles.

11. Siren.

12. Main and Service engine-generator sets.

   A. Engine-generators.

   B. Transfer switches.

C. Fuel storage and piping.

D. Coolant schedule.

13. Bridge control system and motor control centers.

A. Control console.

B. "As-built" circuitry and control logic.

C. Pilot and control lights, switches, pushbuttons, message displays, and meters.

D. Relays; general purpose.

E. Relays; time delay.

F. Relays; bus monitor and motor overcurrent.

G. Resolvers.

H. DC Tachometer - Generators.

I. Motor control center.

J. Programmable controllers.

K. Input/Output PLC modules.

L. Uninterruptible Power System (UPS).

M. Contactors.

N. PLC Cabinets.

O. Relay cabinets.

P. Limit switches.

P.1) Span control - rotary cam.

P.2) Motor brakes.

P.3) Span locks.

P.4) Span seating - Lever.

P.5) Span full open - Lever.

P.6) Span overtravel- Lever.

P.7) Differential Clutch - Lever.

Q. Lubrication schedule and diagram.

14. Security System.

15. Fire alarm system.

16. PA System.

17. Thyristor controller and test modules.

18. Barrier gates, warning lights and gongs.

19. Fender and span navigation lights.

20. Aerial Beacons- steady and flashing.

21. Traffic Signals.

22. Traffic Signal poles.

23. Roadway luminaires.

24. Lighting contactors and photoelectric controls.

25. Lighting contactor cabinet.

26. Search Light.

27. Maintenance Lift controls.

28. Sequence of operation of electro-mechanical equipment for opening and closing the span.

29. Reduced size "as-built" contract drawings.

PART 3 EXECUTION

This part not required.

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 15017

MAINTENANCE LIFTS

PART 1 GENERAL

The work covered by this section consists of obtaining all required permits, furnishing, fabricating, shop assembling, transportation, erection of the guide rail tower (mast) and maintenance lift system, erection of the landings, and final testing and adjustment of all electrical and mechanical systems for two maintenance lifts (one per tower).

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The latest revisions only shall be used for all references.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123	(1997ae1) Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A 17.1	Safety Code for Elevators and Escalators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electrical Code

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section01330SUBMITTAL PROCEDURES:

SD-08 Statements

Licenses and Permits; GA.

All appropriate licenses and permits shall be submitted.

SD-04 Drawings

Shop Drawings; GA.

Shop drawings shall be submitted for approval in accordance with the GENERAL REQUIREMENT. Drawings shall include all shop and erection details. Additionally, members and connections for any portion of the maintenance

lift, mast, or mast supports not shown on the contract drawings shall be detailed by the Contractor and indicated on the shop drawings. All welds shall be indicated by standard welding symbols of the AWS. The Contractor shall indicate on each shop drawing that coordination between various subcontractors has taken place at interface locations between various subcontractors.

SD-09 Reports

Calculations; GA.

Calculations for wind loading shall be submitted. The loads on each guide rail tower tie shall be included on the drawings.

PART 2 PRODUCTS AND COMPONENTS

2.1 Description

Each maintenance lift system shall consist of a pinion drive mounted on the car, a vertically mounted machined steel rack bolted to a vertical mast, a maintenance lift car with controls, doors, and safety enclosures at the landings. The car shall be controlled by automatic controls for two landings. For inspection, a separate control station shall be furnished on top of the car. Access to this platform shall be through an electrically interlocked hatch door in the car roof. In case of power failure, a brake release handle shall be located in the car for lowering the car by gravity. The car shall also be equipped with an overspeed safety brake that automatically trips if the speed of the car exceeds a preset value setting the brake and disconnecting power to the drive motor.

Technical data for the maintenance lifts are as follows:

Model -	Champion Elevators Model US-900-B
Capacity (Max.) -	1000 lbs. (4 Persons)
CarSize(Inside)-	2'-9" x 4'-6" x 7'-0" high
Speed -	120 fpm
Vertical Travel -	140'-4"+/-

The above data is based on a Champion Elevator.,an approved equal may be chosen..

2.2 Components

2.2.1 Mast

The guide rail mast tower shall be fabricated of 10 feet long sections consisting of two vertical channel guides and cross bracing welded together, and a rack securely attached by bolts. The guide rail and rack shall be supplied for full length of travel plus the required length above top landing, and attach to the roof beams of the machinery house at the top of the tower. The mast sections shall be hot dipped galvanized in accordance with the requirements of ASTM A 123 The mast sections are attached to the tower via mast ties spaced every 10 feet. The mast ties

shall also be hot dipped galvanized.

2.2.2 Car.

2.2.2.1 Guides

The car shall be suspended to the mast with guide rollers that glide on the guide rails. Safety is assured by safety hooks on the back of the car to secure the car to the mast in the event of a roller failure.

2.2.2.2 Construction

The car shall be made of all steel welded construction, fully enclosed, with a safety treadplate floor. The car frame, roof and floor shall be hot dipped galvanized in accordance with the requirements of ASTM A 123 The car skins shall be stainless steel, and equipped with one stainless steel, manually operated, vertically bi-parting gate, which shall be both mechanically and electrically interlocked.

2.2.2.3 Escape Hatch

The roof of the car shall be equipped with a hinged escape hatch door fitted with an electrical interlock switch to prevent the car from being operated with the hatch open.

2.2.2.4 Operator Controls

The operator controls shall consist of LANDING pushbuttons, and STOP and ALARM pushbuttons, and a LIGHT switch.

2.2.2.5 Battery

A battery operated emergency light shall be located in the car to provide illumination in case of a power failure. The battery shall be maintained in full charge by a battery charger. This battery system shall operate the alarm which is mounted near the bottom landing.

2.2.2.6 Drive Unit

The complete drive shall consist of one 15 hp motor, reduction gearbox, one hardened steel alloy drive pinion, and one over-speed safety pinion with centrifugal spring mass system/disc brake per maintenance lift. The drive motor includes a spring set, electrically released 75 lb.-ft. disc brake. The drive electrical system shall be 460V, 60 Hz, 3 Phase.

2.2.2.7 Safety Device

A combined over-speed governor/disc brake safety device shall be in constant engagement with the rack via a safety pinion. In the event of over-speed, the governor shall actuate the safety device brake to disconnect the drive motor and bring the car to a smooth but immediate stop.

2.2.2.8 Motor Brakes

For safe control of descending speed of car by gravity in case of power failure, the drive motor brake shall be provided with a manual brake release lever in the car to allow for a safe decent to the lower landing.

2.3 Landing Enclosures

The three landing enclosures per maintenance lift shall be at the elevations shown on the Contract Plans. The base landing enclosure shall enclose the car and the pit area containing the base plate and buffer springs. The upper landing enclosure shall enclose the car.

2.4 Landing Doors

On one side of the enclosure there shall be a vertically bi-parting landing gate which shall be mechanically and electrically interlocked. The mechanical interlock shall prevent opening the landing gate unless the car is at that landing and the electrical interlock shall prevent the car from operating if the gate is open. The landing gates shall be hot dipped galvanized in accordance with the requirements of ASTM A 123.

2.5 Buffer Springs

Two buffer springs per maintenance lift shall be supplied. These springs shall be capable of a force of 12,500 lbs. per spring. The buffer springs shall be located inside of the space below the bottom landing that acts as a safety space.

2.6 Cable-Guiding Device

Power feed and control connections to the car are by means of one trailing multiple conductor cable. The cable shall be supported by one bracket on the car and one of the guide rail frame at the midpoint of travel and kept in tension by a traveling wheel device centered beneath the car and guided on the face of the mast.

2.7 Electrical Equipment

Electrical Equipment. Incoming electric power shall be connected to an auxiliary panel at the ground level. This panel shall be equipped with a main contactor which will open the power lines when any landing door is opened. The trailing cable and the fixed cable in conduit to half height shall transfer the power from the auxiliary panel to the main control panel on top of the maintenance lift car. All electric devices on the car shall be connected to the main control panel. The control circuits shall be fed from the main power supply via a control transformer. The car shall be provided with limit switches for the gate(s), trapdoor, and normal up and down terminal limits. The final limit switch also mounted on the car shall act directly on the power supply and cuts it out in the event of over travel.

2.8 Control System

The maintenance lifts shall be furnished with a "single automatic" control

as defined in ANSI A 17.1This control shall provide for the use by a single user until finished; no provision shall be made to accumulate or store calls. Acceleration and deceleration of the lift shall be controlled by means of a Variable Frequency Motor Drive. The car shall stop at the landing level within +/- 1/4".

2.8.1 Car

The car controller shall contain all the equipment for controlling the elevator drive as well as the programmable control to handle all the logic for the single automatic control. The car operating panel shall contain heavy duty pushbuttons labeled to correspond to the landings. The car shall also have an emergency STOP button and an ALARM button to sound an alarm near the lower landing. The car control panel shall be mounted through the car wall to allow service from within the car.

2.8.2 Landing

Each landing shall be equipped with a call station containing a single heavy duty lighted pushbutton which illuminates to indicate a call has been registered.

2.8.3 Inspection and Testing

The area above the car top shall be equipped with inspection and test controls. This station shall contain UP, DOWN, STOP, and TEST switches and shall be furnished with a portable cord to allow tests to be conducted from the base.

2.9 Codes

The maintenance lifts shall comply with the safety requirements of ANSI A 17.1 Safety Code for Elevators and Escalators as they apply to Special Purpose Elevators in Part XV of that code. Wiring shall be installed in accordance with the requirements of NFPA 70 National Electrical Code.

PART 3 EXECUTION

This section not required.

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 16100

BRIDGE CONTROL SYSTEM

PART 1 GENERAL

1.1 SCOPE

This section consists of the installation of materials and equipment for a completely new bridge control system, as indicated.

NOTE: See mandated contractor and control system vendor qualifications in paragraph QUALIFICATION.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 709	(1992; R 1997) Laminated Thermosetting Materials

UNDERWRITERS LABORATORIES (UL)

UL 20	(2000) General-Use Snap Switches

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Shop Drawing and Manufacturer's Catalog; GA

Data shall be composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents of all electrical materials, equipment and devices proposed for the project.

SD-04 Drawings

Detailed Layout Drawings; GA

Layout drawings shall include the detailed layout and geographic wiring diagrams for the following equipment:

a. Control console

b. Programmable controller cabinets

c. Motor control center

d. Motor drive cabinets

e. Terminal cabinets

Shop Drawings; GA

Detail drawings consist of equipment drawings, illustrations, schedules, instructions, diagrams, ratings, specifications, and other information necessary to define the equipment and installation. Detail drawings shall show the rating of items and systems and how the components of an item and a system function, are assembled and installed on the project. Data and drawings of an item or system shall be coordinated and submitted as a unit in a single submission. Multiple submissions for the same equipment or system will not be acceptable, except where prior approval has been obtained from the Contracting Officer. Detail drawings shall show physical arrangements, construction details, connections, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Optional items shall be clearly identified as included or excluded. Detail drawings shall also be submitted when the installation and mounting details of equipment, system, fixtures and devices are different from or not specifically detailed on the contract drawings. Shop drawings for all equipment and system shall be submitted for review and approval by the Contracting Officer prior to ordering or commencing any work.

Shop drawings which have not been approved or require correction shall be resubmitted until such time as they are acceptable to the Contracting Officer, and such procedures shall not be considered as a cause for delay or an additional cost to the Government.

Working Drawings; GA

Detail drawings shall illustrate the Contractor's proposed method of accomplishing the required work prior to commencing construction. The drawings shall consist of equipment drawings, illustrations, schedules, diagrams, ratings and other information necessary to define the installation. Such required working drawings shall include, but need not be limited to, the following:

a. Single-line and three-line diagrams, schematics or elementary power and control diagrams of each electrical system.

b. Grounding and bonding diagrams.

c. Conduit, cable and wire routing.

d. Wire connection diagrams that show the termination of wiring routed between separate items and equipment.

e. Enclosure details of the control console, motor control center, programmable controller and motor drives.

f. Electrical apparatus certified dimension data.

g. Layout arrangement of electrical/mechanical equipment connection data.

As-Built Drawings; FIO.

The as-built drawings shall be a record of the construction as installed and shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be full-sized set of prints marked to reflect all deviations, changes, and modifications. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full-sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor. Following the project completion and turnover, within 30 days, the Contractor shall furnish two sets of final as-built drawings to the Contracting Officer.

SD-08 Statements

Contractor Experience; GA

The Contractor shall submit a tabulation of experience and qualifications in the installation and rehabilitation of movable bridge electrical systems.

The requirements of the control system vendor shall be as stated in subparagraph CONTROL SYSTEM VENDOR REQUIREMENTS. The list of the experience of the control system vendor shall be submitted to the Contracting Officer.

SD-14 Samples

Samples; GA

If requested by the Contracting Officer, the Contractor shall submit for inspection, samples of any proposed electrical items at no cost to the Government. All support data shall be submitted in quintuplicate for checking. The Government will not be liable for any materials purchased or work done or any delay incurred prior to their review. Failure of the Contracting Officer to note unsatisfactory materials as received will not relieve the Contractor from responsibility. Only materials or items of such size as could be sent through U.S. Postal Service would be considered.

SD-19 Operation and Maintenance Manuals

Operation and maintenance manual; FIO

The Contractor shall submit five copies of operation and maintenance manual, bound in three-ring or screw-post binders, for the Bridge Control System and any other related electrical equipment indicated in this technical section. The Contractor shall furnish one complete manual prior

to performance of systems or equipment tests, and the remaining manuals prior to the contract completion. The manual shall be inscribed with the following identification on the cover: the words "ELECTRICAL OPERATION AND MAINTENANCE MANUAL", the name and location of the system, equipment, name of the Contractor and contract number, included the names, addresses, and telephone numbers of each subcontractor or vendor installing or furnishing the system or equipment. The manual shall have a table of contents, and shall be assembled to conform to the table of contents, with the tab sheets placed before instructions covering the subjects. The instructions shall be legible and easily read, with large sheets of drawings folded in.

The manual shall include the following:

a. Internal and interconnecting wiring, control diagrams, and ladder logic diagrams of the programmable controller with data to explain detailed operation and control of the system or equipment.

b. A control sequence describing startup, operation, and shutdown, followed by:

- Sequential step. Each step or function for the bridge operation, which fully described on a separate page dedicated solely to that sequential step or function. For example. UNLOCK UPPER SPAN LOCKS, RELEASE MOTOR BRAKE, ENGAGE LOWER SPAN LOCKS, etc. shall be considered separate steps and shall be described on separate pages.

- Page or description format. The page or description format shall contain a pictorial illustration or diagram placed in the upper portion of the page for those steps involving switches, buttons, meters, etc.. The first line of the printed text shall be the name of the sequence step or function; for example, FUNCTION: SPAN LOCKS DRIVEN, then the location of the device stated as: LOCATION: SELECTOR SWITCH ON CONTROL CONSOLE. The description shall include the procedure for the operator to perform the step or function with a brief explanation of how the function is performed, the sequential step or function performed immediately prior to the function being discussed, and the circuit reference number where the logic of that function or step is executed.

- Operating Sequence. Each step in the operating sequence shall be consecutively numbered and presented in the chronological order, such as: R1, R2, R3, etc. for the RAISE sequence, and L1, L2, L3, etc. for the LOWER sequence. Other functions not normally executed, such as the STOP, EMERGENCY STOP, BRAKE TEST, etc. shall be left un-numbered, and shall be described after all the numbered functions.

- Review. The control sequence description shall be prepared for the Contracting Officer's review at the time of the shop acceptance test of the control circuit.

c. Description of the function of each principal item of the equipment.

d. Installation and maintenance instructions.

e. Safety precautions.

f. Diagrams and illustrations.

g. Testing methods.

h. Performance data.

i. Lubrication schedule. The lubrication schedule shall include the type, grade, temperature range, and frequency for all new items requiring lubrication.

j. Part list. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.

k. Appendix. The appendix shall list all qualified and permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

Posted operating instructions; FIO

The Contractor shall furnish approved and simple operating instructions for the bridge control system to be posted as indicated for use by operation and maintenance personnel. The instructions shall include safety precautions and emergency shutdown procedures, shall be printed or engraved, and framed under glass or in approved laminated plastic. Where exposed to the weather, operating instructions shall be of the weather-resistant material or enclosed in weather-proof enclosures. The instructions shall not fade when exposed to sun light and shall be secured to prevent easy removal or peeling.

Instructions and training to personnel; FIO

The Contractor shall provide the services of competent instructors to give full training and instruction to Government personnel in the operation, adjustment, and maintenance of the bridge control system and equipment, including pertinent safety requirements as required. Each instructor shall be thoroughly familiar with all aspects of the installation and shall be trained in operating theory as well as practical operation and maintenance work of the Programmable Controller, the AC Flux Vector Drive, the control system and control components. The instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. Five eight-hour man-days of instruction shall be furnished within a period of ten consecutive regular work days. Each eight-hour day shall consist of four hours of non-repetitive classroom instruction, followed by four hours of hands-on instruction at the equipment. The specific schedule will be determined by the Contracting Officer.

1.4 APPLICATION

1.4.1 General

The Contractor shall furnish all materials and equipment to install, adjust, test, and complete a permanent and trouble-free bridge control system and power distribution system for the operation of the entire lift bridge, including new main drive motors, AC Flux Vector drives, programmable controllers, motor control center, controls, interlocking, sequencing, cables and conduit, lighting, panelboards, related appurtenances and all other incidentals shown and described on the contract plans or specified elsewhere in these contract documents.

1.4.2 Summary

This work, in general, shall include, but not be limited to, the furnishing and installation of the following principals items of work shown and specified:

a. A new and complete complement of power and control equipment, including the programmable controllers mounted in dedicated enclosures, floor-mounted motor control centers, and separate additional similar cabinets, as required.

b. Separate floor-mounted special cabinets housing the AC Flux Vector drives supplied by the control system manufacturer with compatible AC motors, motor brakes and encoders for the bridge main drive systems.

c. Free-standing Operator's control console with programmable controllers I/O's, span control devices including selector switches, pushbuttons, by-pass switches, indicators, selsysn indicators, meters, tachometer and digital message display.

d. All span control equipment and devices, such as rotary cam limit switches, limit switches, span position transmitters, optical encoders, and other related appurtenances, including mounting brackets and fabricated supports.

e. Cables, cable trays, aerial cables, conduit and wiring to accommodate the new power and control systems.

f. FAA approved aerial beacons.

g. Signal horns.

h. Navigation lights

i. Roadway and outdoor lighting.

j. Additional detailing as required to complete the work intended by these drawings and specifications.

k. All manufacturer tests specified elsewhere herein.

l. All field performance tests specified elsewhere herein.

m. All adjustments and corrective measures required to properly complete all systems.

n. Clean-up, restoration, and painting, as required by the Contracting Officer.

o. Acquisition packaging, and delivery of specified spare parts (with inventory list).

p. Supervision and operational adjustments of bridge control system after acceptance for a specified period.

q. Preparation and delivery of as-built drawings and operation and maintenance manual, and a comprehensive training program for Government personnel in the operation and maintenance of the bridge power and control

systems and equipment.

1.5 QUALIFICATION

1.5.1 Required Contractor Electrical Experience

The Contractor shall submit a tabulation of previous experience with the installation and rehabilitation of movable bridge electrical systems.

The supervisory personnel for the electrical installation, replacement, and rehabilitation activities shall each have a minimum of five years of experience in the installation and repair of industrial electrical distribution and automation controls. The list of experience of the supervisory personnel shall be submitted to the Contracting Officer for approval.

1.5.2 Control System Vendor Requirements

The Control System Vendor must be able to demonstrate experience in movable bridge control systems by having completed five previous successful movable bridge control systems, at least one of which shall have incorporated a PLC-based control circuit interfaced with AC flux vector drives. The Control System Vendor's assigned project manager, as an individual, shall meet the same requirements as set forth above for the Control System Vendor.

Equipment required to be furnished as part of the integrated system by the Control System Vendor shall include, but not necessarily be limited to, the PLC system, the bridge position indicator system, the motor control center(s), all encoders and/or resolvers, the bridge position limit switches, all limit switches not considered an integral component of another piece of equipment, the bridge drive motors, the AC flux vector drives and skew control components, and the bridge control console. Additional equipment and components may be added to this list at the discretion of the Contractor.

PART 2 PRODUCTS

2.1 BRIDGE CONTROL SYSTEM

2.1.1 General

The Bridge Control System shall be furnished with all necessary control logic, relays, programmable controllers (PLC), limit switches, control switches, control console, AC flux vector motor drives, motor control center, motor controls, main and emergency drive motors, PLC peripherals, instruments and other control equipment and devices as required to provide the modes of control as shown on the drawings and specified elsewhere herein. All equipment shall be supplied with vibration-proof hardware.

2.1.2 Industrial Control Relays

General purpose, industrial Control Relays, when installed as discrete components, shall be multiple pole, field reversible contacts, electrically-held, rated 10 amps continuous at 120 volts AC, with 120 volt coils. Each control relay shall be supplied with one normally-open and one normally-closed spare contact in addition to those necessary for immediate use. Relays shall be Square-D, type X, or an approved equal.

2.1.3 Timing Relays

Timing Relays, when installed as discrete components, shall be adjustable, electro-pneumatic type, 120 volts AC operating voltage, with large, high resolution, accurately calibrated adjustment. Relays shall be Agastat Series 7000, or an approved equal.

2.1.4 Contactors

Contactors shall be multiple-pole, electrically-held, 120 volt AC coil, contacts rated as shown on the drawings or otherwise required. Auxiliary contacts shall be provided as required. All contactors with a coil inrush of 8 amps or more shall utilize pilot relays and line-powered, fused control transformers.

2.1.5 Metering

Ammeters and KW meters shall utilize true-RMS transducers to provide accurate readings, in spite of waveform distortion, of the motor amps (measured at the outputs of the drives) and main power bus kilowatts (measured on the main power bus ahead of all connected loads).

2.1.6 Bus Monitor

The Bus Monitor Relay shall monitor all three line-to line voltages of the 480 volt three-phase bus. As long as correct phase sequence and phase voltage are maintained, an internal relay is energized and the output contact is closed, enabling the bridge control. Incorrect phase sequence, or over voltage or under voltage exceeding 12 percent of the adjustable set value shall cause drop out of relay, resulting in opening of the output contact and cutting-out the bridge control. Contacts shall be rated 3 amps at 120 volts AC. The relay shall be provided with adjustable time delay of 1 to 20 seconds, and preset at 5 seconds. The relay shall be Diversified Electronics, Series SLD, or an approved equal.

2.1.7 Rotating Cam Limit Switch

a. The rotating cam limit switch shall be used for redundant bridge span height supervision, and shall be Magnetek, Gemco Electric 1980, or an approved equal.

b. Each rotating cam limit switch shall consist of six double-pole, double-throw, snap-action, precision switches, each driven by an independently adjustable two-piece plastic cam. All cams shall be mounted on a common, heavy-duty 3/4-inch shaft, mounted in sealed bearings. The limit switch shall be housed in a NEMA 12 enclosure.

c. The cams shall directly actuate the snap switch plungers with simple harmonic motion. Contact settings shall be continuously adjustable from approximately 4 degrees to 356 degrees. Adjustments shall be made without loosening bolts or screws, and without removing or relocating the switches or cams.

d. Each plastic cam shall consist of an assembly of two overlapping cam discs. Each of the two cam discs shall be provided with a separate reduction drive with an outer pinion band or adjusting disc. One revolution of the adjusting disc shall then result in 10 degrees of adjustment to the respective cam disc, thereby altering both the dwell and timing of the cam assembly.

e. Snap switch contacts shall be rated 120 volts AC, 10 amps continuous. The operating plunger shall be molded nylon with a roller follower which rides the cam. Each snap switch shall be mounted via two machine screws and be readily removable without loosening or removing other snap switches.

f. A straight drive gear reducer box shall be included to provided a shaft turn of less than 360 degrees relative to 144 foot travel of the lift span. Shaft extension and necessary coupling shall be provided for connection of the programmable limit switch as shown on plans.

2.1.8 Programmable Logic Controller (PLC) and Peripheral Devices

a. The bridge control system logic functions is based on the Allen-Bradley PLC-5 programmable controller. An equivalent PLC by Modicon or Siemens may also be used. The PLC processor shall utilize ladder-logic, SFC, and structured text programming, with an advanced instruction set including: file handling, sequencing, diagnostics, shift register(s), immediate I/O, program control instructions, and mathematical functions. Processor memory shall be 32K or larger, battery backed static RAM with EEPROM program backup. Processor shall be capable of interfacing with up to 1024 I/O channels, with a scan time of 10 milliseconds or faster. PLC shall include any communication capabilities necessary for proper system operation.

b. In general, except for specific exceptions, as may be granted by the Contracting Officer, all control logic, timing, counting, and other control functions shall be performed by the PLC. All necessary modules, interfaces and accessories shall be included to provide the complete working system. Remote I/O's shall be provided in the control console, the north machinery room and the south machinery room, multiplexed as required to minimize interconnecting wires to the main PLC. Random access memory shall be 32 K word.

c. One complete and functional PLC shall be installed. Wiring and rack provisions shall be provided for a future backup PLC. Only one shall be on-line and active at a time. A selector switch shall be provided on the control console to select which PLC is performing as the active unit, and which PLC is the unpowered backup. The backup unit, via the selector switch and relays if necessary, shall be completely disconnected from all external power conductors and communication wiring.

d. The PLC and all local and remote I/O's shall each be protected by a high-quality, off-line, power conditioning and regulating uninterruptible power system (UPS). The UPS shall be rated 2 kVA minimum, 120 volts AC, capable of powering the PLC or remote I/O and all connected modules, peripherals and devices for at least 30 minutes at half load rating. The UPS shall be rated for a transfer time of 1 millisecond. The output voltage regulation of normal power shall be -5% to +5% of nominal 120 volts for input variations of -20% to +20%.

e. Input/output modules shall be provided with LED indicating lights for each input or output on the module as follows:

(1.) Input - Lights when field power is applied to input terminal.

(2.) Output - Lights when the processor issues command to energize the output terminal.

(3.) Blown fuse - Lights when the individual output fuse is blown.

f. All conductors connecting to the PLC and remote I/O points shall be isolated from external circuits via "ice cube" type relays with built-in indicator lights, or shall be first landed on surge suppression terminal blocks in the same cabinet as the respective I/O module.

g. All conductors connecting to PLC communication ports, including remote rack wiring, shall be landed on low voltage surge suppression terminations specifically designed for low voltage data and communication wiring.

h. Each chassis of the PLC system shall have a self-contained power supply unit, furnished with connecting cable and quick-disconnect connectors. Each power supply shall operate at an input voltage of 120 volts AC with off-line back-up from the UPS to provide low voltage DC for the PLC, and shall have an input power not less than 90 VA, providing sufficient power for the connected loads on each chassis. Local/remote interfaces, analog I/O, remote I/O, multiplexed BCD, high-speed counter modules and other modules shall be used as required.

i. A PLC programmer shall be provided, consisting of a properly equipped laptop or notebook computer. The computer shall be directly connectable to and fully compatible with the PLC's. As minimum requirements, the portable computer shall incorporate a 12-inch color display screen, a full keyboard, a built-in 3.5-inch diskette drive, a built-in 16X CD-ROM diskette drive, a built-in 56k bps modem, a 20 GB hard drive and at least 128 megabyte internal memory that allows off-line program development. The computer shall be by Gateway, Compaq, or Dell. A compatible modem shall be included, mounted in the PLC cabinet, providing for data transmission over telephone lines, furnished with status indicators, and shall be by USRobotics, Motorola, or Practical Peripherals, or equal as approved by the Engineer.

j. Documentation software and any other accessories shall be included which allows for hard copies of programs on a printer (not included), complete with I/O labels and comments. Comments and cross-referencing of locations of all contact and locations shall be provided as part of the required hard copy (printed) of the operating ladder-diagram program.

k. The PLC and remote I/O rack cabinet doors shall incorporate full length plexiglass windows to provide clear observation of all status indicators on all PLC's, I/O cards, and all other related peripherals. The PLC cabinet in the electrical equipment room shall have similar height and depth as the motor control center cabinets.

l. The programmable logic controller shall be programmed to display the following messages on the digital display for the specific faults or conditions:

(1.) Normal Operating Conditions. First line display to read "SPAN HEIGHT XX FEET", and second line to read "SKEW XX INCHES" where the X characters are message variables within the message that will be continuously updated by the PLC. Occurrence of any of the listed abnormal conditions will result in the appropriate warning or fault message. Warning or fault messages will blink slowly, at approximately 60 cycles per minute, with longer "on" than "off" cycles.

(2.) Overspeed. "OVERSPEED SHUTDOWN - X", where X will be RUN

SPEED for an overspeed at running speed, or JOG SPEED for an overspeed occurrence in the jog (slow) speed mode.

(3.) Overload. "OVERLOAD - X" where X will be DRIVE MOTORS, BRAKES, LOCKS, or CLUTCHES for the appropriate condition, will be displayed.

(4.) Skew. "EXCESS SKEW SHUTDOWN" when the maximum allowed skew is exceeded. In this case, the bottom line indicating the actual skew will be retained.

(5.) Excess time. First line display to read "EXCESS TIME SHUTDOWN" and "SETTING - XXX SECONDS" on the second line, where the X characters are the variable message to indicate the actual timer setting.

(6.) The bridge control system vendor shall program additional warning or fault messages as may be directed by the Contracting Officer.

m. Surge Suppression

(1.) General Control Circuit Protection. The branch circuit(s) supplying the bridge control system shall be provided with surge suppression protection, connected directly to the respective branch circuit conductors on the load side of the branch circuit breaker, either at the panelboard or in each PLC and remote I/O cabinet ahead of the uninterruptible power supply. Surge suppression device(s) shall be MAINS-MODUTRAB by Phoenix Contact, Inc., Harrisburg, Pennsylvania, or equal.

(2.) PLC I/O Protection. All conductors run to the I/O modules from outside the PLC or remote I/O cabinet shall be landed on surge suppression terminal blocks, TERMITRAB-UK 5 or TERMITRAB-URTK/S by Phoenix Contact, Inc., or equal, mounted in the PLC or remote I/O cabinet. PLC output circuits which utilize an interposing relay within the PLC or I/O cabinet, external to the PLC I/O modules, need not utilize the surge suppression terminal blocks. Suppressor voltage ratings shall be selected as close as practicable to the particular I/O device voltage actually used in order to provide maximum protection.

(3.) Resolver/Encoder Protection. Surge suppression shall be accomplished for each resolve/encoder, and any associated decoder modules, by terminating all resolver/encoder and decoder conductors entering the PLC cabinet on surge suppression terminal blocks, such as TERMITRAB-UK 5 by Phoenix Contact, Inc. The specific suppression device voltage rating shall be coordinated with the voltages of the resolver/encoder and decoder actually used.

2.1.9 Bridge Operation

The bridge control system, furnished with programmable logic controllers, motor control center, AC flux vector drives, all necessary control relays, limit switches, encoders, control switches, indicating lights, control console, and all other control devices required to provide the modes and sequence of control, as shown on the plans and as described herein. The control system manufacturer shall develop and provide the control logic

software for the bridge PLC control system to include all required steps, functions, modes and sequence of bridge operation based on the control concept shown in the control circuits on plans and as described herein.

2.1.9.1 Control sequence for raising

The "control power" key switch on the control console must be turned to the "on" position before any bridge operation can be initiated. The bridge Operator must verify that it is safe to raise the span, and initiate the following steps on the control console:

a. Select the control mode to operate the bridge by turning the "control mode" switch to "auto" or "manual".

b. Turn the "drive selector" switch to the drive system selected for the operation.

c. Select the motor speed by turning the "speed" switch to "run".

d. Turn the "traffic signal" switch to "red". The "traffic signals red" indicator light will be on.

e. Press and hold the "north barrier gate" and "south barrier gate" pushbuttons in the "down position until each gate is lowered. The "north barrier gate lowered" and "south barrier gate lowered" indicator lights will be on.

f. Sound signal horn

g. Automatic control mode

With the "control mode" switch in the "auto" position, depress the foot switch and momentarily place the "master raise-lower" selector switch in the "raise" position, the "raise"indicator will be on. The PLC system will automatically proceed through the following steps to fully raise the lift span:

(1.) Pull span locks and release machinery brakes. Respective "locks pulled" and "brake released" indicators will be on.

(2.) Release motor brakes upon torque confirmation from AC flux vector drives. Respective "brake released" indicators will be on.

(3.) Activate the AC flux vector drives and the drive motors in the raising direction which begin ramped acceleration from fully closed position to running speed.

(4.) At nearly open position, the AC flux vector drives begin ramped deceleration down to slow speed, approximately 10% of motor base speed. The "near open" indicator will be on.

(5.) The bridge drive motors run at slow speed until fully open position is reached. The "full open" indicator will be on.

(6.) At fully open position the bridge drive motors shut-off and the brakes set. Respective "brake set" indicators will be on.

h. Manual control mode

With the "control mode" switch in the "manual" position, the bridge is in the manual control mode. The Operator must perform the following steps:

(1.) Pull span locks by turning and holding on the "pull locks" selector switch until all span locks are fully pulled with the "locks pulled" indicator on.

(2.) Raise the lift span by depressing the foot switch and holding the "master raise-lower" selector switch in the "raise" position. The PLC system will automatically proceed through all steps as described above under Automatic Control Mode for the raising sequence, from paragraph g, steps 1 through 6, with the exception of the pull span locks, to fully raise the span. At fully open position, the bridge drive motors shut-off and the brakes set. Respective "brake set" indicators will be on.

2.1.9.2 Control sequence for lowering

a. The "control power" key switch on the control console must be turned to the "on" position before any bridge operation can be initiated. The bridge Operator must verify that it is safe to lower the span, and initiate the following steps on the control console:

b. Select the control mode to operate the bridge by turning the "control mode" switch to "auto" or "manual".

c. Turn the "drive selector" switch to the drive system selected for the operation.

d. Select the motor speed by turning the "speed" switch to "run".

e. Sound signal horn.

f. Automatic control mode.

With the "control mode" switch in the "auto" position, depress the foot switch and momentarily press the "lower" pushbutton, the "lower"indicator will be on. The PLC system will automatically proceed through the following steps to fully lower the lift span:

(1.) Release machinery brakes. Respective "brake released" indicators will be on.

(2.) Release motor brakes upon torque confirmation from AC flux vector drives. Respective "brake released" indicators will be on.

(3.) Activate the AC flux vector drives and the drive motors in the lowering direction which begin ramped acceleration from full open position to running speed.

(4.) At nearly closed position, the AC flux vector drives begin ramped deceleration down to slow speed, approximately 10% of motor base speed. The "near closed" indicator will be on.

(5.) At approximately 24 inches above fully seated position of

span, activate the motor drive reduce torque limiting (current limiting) from the normal run setting to a lower adjustable value, set to approximately 75 percent. At approximately 12 inches above fully seated position, cut-out the skew control of the master and follower drives, and when any one or more fully seated limit switches are tripped at span seating, disengage the differential clutches to allow proper span seating at all four corners.

(6.) As span achieves fully seated, drive motors stall, and remain stalled at reduced torque to eliminate any tendency of span bouncing. Brakes set when all four seating limit switches are tripped. The "full closed" indicator will be on.

(7.) Drive span locks. Span motors de-energize when all lower span locks are fully driven. The "locks driven" indicator will be on.

(8.) Railroad signal interlocking is performed to permit railroad traffic on the bridge.

g. Manual control mode

With the "control mode" switch in the "manual" position, the bridge is in the manual control mode. The Operator must perform the following steps:

(1.) Lower the lift span by depressing the foot switch and holding the "master raise-lower" selector switch in the "lower" position. The PLC system will automatically proceed through all steps as described above under Automatic Control Mode from paragraph (1) through (6) to fully close the span.

(2.) When the span is fully seated, drive lower span locks by turning and holding on the "drive locks" selector switch until all locks are fully driven. When all span locks are fully driven, all brakes set and span motors de-energize. The "locks driven" and respective brakes set indicators will be on.

h. Press and hold the "north barrier gate" and "south barrier gate" pushbuttons in the "up" position or press and hold barrier gate master raise pushbutton until each gate is lowered. The "north barrier gate raised" and "south barrier gate raised" indicator lights will be on.

i. Turn the "traffic signal" switch to "off". The "traffic signals green" indicator light will be on.

j. Railroad signal interlocking is performed to permit railroad traffic on the bridge.

2.1.9.3 Stopping

The span shall be able to be stopped at any point during its lowering or raising sequence by momentarily pressing on the "stop" push-button. Activation of this normal stop function will result in a 5-second deceleration of the drive motor, followed by shutoff of the drive motors and setting all brakes, and de-energizing all lowering and raising control circuits. Lowering or raising sequence can be restarted, after the span has completely stopped with all "Brake Set" indicators lit, by operating the master raise lower switch.

2.1.9.4 Emergency Stop

"Emergency Stop" shall be energized by maintained push-pull, lighted mushroom head, push-button switch. When pushed in, all control power is cut-off, except indicating lights, resulting in shutting-off the drive motors and immediately setting all brakes. This switch shall directly interrupt power to all motors and brake contactors. Note: this switch results in higher than normal mechanical shock loads to the drive train and should not be used except for emergencies. To restore control power, the mushroom head pushbutton shall be pulled back out to the normal "on" position and control power must be reset using the control power switch.

2.1.9.5 Key Switches

By-pass key switches shall allow operation to skip the sequential step, as labeled on the switch, in the opening or closing control sequence. Before energizing by-passing, the by-passed equipment shall be verified to be in its correct status or position, and it is ready to be by-passed for the next sequential step of the control sequence. After completion of the bridge operating sequence, the PLC logic shall prohibit further operation of the bridge until the By-pass switch is returned to the non-bypassed position.

2.1.9.6 Slow Function

The jog function shall provide operation of the lift span at creep speed (slow speed). The "speed" selector switch must be set to "slow", the "control mode" selector switch to "manual", and the "master raise-lower" selector switch maintained to operate. Releasing the selector switch shall stop the bridge.

2.1.9.7 Skew Control

Skew control shall be accomplished using a syncho lock drive controller. The controller shall receive an analog reference voltage from the drive system which is controlling the "master" motor. This reference signal is passed on to the "slave" drive to achieve analog synchronization. In addition quadrature signals from both the "master" and "slave" motor encoders shall provide pulses into a differential counter in the controller. The controller shall use the differential counter to generate a correction voltage which shall supplement the reference voltage to the "slave" drive, forcing the "slave" drive to a zero pulse differential. The controller shall have a typical response time of 150 microseconds, and shall have an analog resolution of 12 bits, 4096 steps.

2.1.9.8 Skew Detection (PLC-based)

The skew detection system shall consist of a multiturn brushless non-optical absolute resolver located in each machinery house. Each resolver shall be capable of 64 turns. The resolver shall be housed in a NEMA 13 enclosure, and shall be provided with a plug in connector. The resolver shall be suitable for both clockwise and counter-clockwise rotations.

Each resolver shall be connected to an input module which shall be rack compatible with the programmable logic controller (PLC). The input module shall be provide 6 digit resolution with 1000 counts per turn of resolver shaft. The input module shall provide decoded digital position information to the PLC which shall compare the position information from each resolver

and calculate a skew differential. The PLC shall communicate the skew level to the control console indicator and shall also suspend the automatic operation of the bridge when the skew exceeds a programmed limit which shall be determined in the field.

2.1.9.9 Brake Test Function

The brake test function shall allow the bridge Operator to test the proper operation of each machinery brake and each motor brake individually from the control console before operating the lift span. The Operator must select the desired brake to be tested in the north or south tower by means of the "brake test selector" switch and press the "brake test" push-button to energize the selected brake.

2.1.9.10 Signal Horn

The signal horn shall be operated by a pushbutton located on the control console.

2.1.10 Control Console

a. The control console shall be constructed as shown on the plans and in accordance with the AASHTO Standard Specifications for Movable Highway Bridges, section 2.10., Control Console.

b. The console top (bridge control panel) shall be No. 10 gage stainless steel, with non-reflecting (brushed) satin finish.

c. Indicating lights, selector switches and pushbuttons shall be heavy-duty, oil-tight type, of the style and size shown on the plans.

d. The console shall be of the bolted construction, as necessary, to permit knockdown. Dimensions of the operator's house doors or stairways will not permit passage of the fully assembled console.

e. The lower interior portion of the console shall be illuminated by one or more fluorescent strip lights, mounted high and provided with shield as necessary to reduce direct glare when the front doors are open. The lights shall be activated by interlock switches on the front doors.

2.1.11 Cable Trays

NEMA VE 1 cable trays shall form a wireway system, and shall be of nominal 6-inch depth, standard ladder type. Cable trays shall be constructed of 316 stainless steel, and shall include splices, end plates, drop outs and all necessary miscellaneous hardware. All hardware shall be stainless steel. Edges, fittings, and hardware shall be finished free from burrs and sharp edges. Fittings shall have not less than the load-carrying ability of straight tray sections and shall have manufacturer's minimum standard radius. Cable trays shall be of nominal 18 inch, 24 inch, or 30 inch width as indicated on plans, and rung spacing shall be on 9 inch maximum centers.

2.1.12 Terminal Blocks

Unless otherwise indicated, the terminal blocks shall be U.L. listed, heavy-duty, 600 volt, clamp screw type, provided with pressure-sensitive marking tape.

2.1.13 Digital Message Display

a. The message display shall have vacuum fluorescent characters, 2-line display with 20 characters (numeric and alphabetical) per line, and 30K bytes of battery-backed Random Access Memory (RAM) for message storage.

b. The message display shall be provided with IBM compatible software for off-line programming, and have input and output serial interface (RS-232/422) suitable for the PLC installed for the bridge. The unit shall operate at 120 volts AC, shall be panel-mounted on the bridge control panel of the control console. The message display shall be type DL20 Dataliner by Allen-Bradley, or an approved equal.

2.1.14 Lever Arm Limit Switches

a. Lever arm limit switches shall be heavy duty, provided for use at locations as shown on drawings, type IC9445 by General Electric, or an approved equal.

b. Limit switches shall be heavy duty, of the slow-make, slow-break, spring return type. Contacts shall be double-pole, rated 20 amps, continuous current, at 120 volts AC, and shall consist of one normally closed and one normally open contact. All contacts and switch mechanism shall be enclosed in a cast aluminum NEMA 4 enclosure.

c. The lever arm shall be provided with appropriate arm length to accommodate with the installation of the limit switch trip plate, as shown on drawings. The lever shall be furnished with meshing teeth for engagement with the meshing teeth on the switch operating shaft, and may be set in any position in a 360 degree circle in 24 steps of 15 degrees each. A steel roller shall provided at the trip end of the lever.

d. The ambient temperature range shall be from -40 degrees C to 90 degrees C. All fabricated trip plates, mounting supports, brackets and hardware shall be included with the limit switches.

2.1.15 Nameplates

2.1.15.1 Identification Nameplates

All major items of electrical equipment and major components shall be permanently marked with an identification name to identify the equipment by type or function and specific unit number as indicated. Designation of motors shall coincide with their designation in the motor control center or panel. Unless otherwise specified, identification nameplates shall be made of laminated plastic in accordance with ASTM D 709 with black outer layers and a white core. Edges shall be chamfered. Plates shall be fastened with black-finished round-head drive screws, or other approved nonadhesive metal fasteners. When the nameplate is to be installed on an irregular-shaped object, the Contractor shall devise an approved support suitable for the application and ensure the proper installation of the supports and nameplates. In all instances, the nameplate shall be installed in a conspicuous location. At the option of the Contractor, and with prior approval from the Engineer, the equipment manufacturer's standard embossed nameplate material with black paint-filled letters may be furnished in lieu of laminated plastic. The front of each panelboard, motor control center, switchgear, and switchboard shall have a nameplate to indicate the phase letter, corresponding color and arrangement of the phase conductors. The following equipment, as a minimum, shall be provided with identification nameplates:

Minimum 1/4 inch High Letters	Minimum 1/8 inch High Letters
Panelboards	Control Power Transformers
Starters	Control Devices
Safety Switches	Instrument Transformers
Motor Control Centers	
Transformers	
Equipment Enclosures	
Switchgear	
Switchboards	
Motors	

Each panel, section, or unit in motor control centers, switchgear or similar assemblies shall be provided with a nameplate in addition to nameplates listed above, which shall be provided for individual compartments in the respective assembly, including nameplates which identify "future," "spare," and "dedicated" or "equipped spaces." Identification nameplates shall conform to the requirements as stated under Section 16415, Electrical Work, Interior.

2.1.16 Signal horn

The signal horn shall be U.L. listed, electronic resonating type rated 105 dB at 10 feet, and shall operate at 120 volts AC. The horn shall be constructed of a cast aluminum housing with a brass projector. The horn shall be rated for NEMA 4 applications and shall have a finish suitable for outdoor use. The housing shall be tapped for 1/2 inch conduit. A swivel bracket shall be provided with each horn.

2.1.17 AC Flux Vector Drives

The AC flux vector drives and the AC drive motors shall be provided by the drive manufacturer as a coordinated drive package. The system design presented on the contract drawings and described in these specifications is based on the use of a model VF61C-16044 AC flux vector drive, as manufactured by Drivecon Corporation, Libertyville, IL.

The AC flux vector drives for controlling the speed and torque of the bridge drive motors shall be microprocessor-based digital drives, with dynamic braking modules and resistors to provide the braking capacity, each rated for 200 horsepower motors, and suitable for operation from a 480 volt AC three-phase supply.

The drives shall be capable of driving the AC motors at 150% rated torque for 60 seconds, and 200 % rated torque for 10 seconds.

The four digital flux vector drives shall be configured in master-slave configuration, with the master drives powering AC motors in the north tower, and slave drives powering AC motors in the south tower. An SLDC skew controller shall be provided with the system and is described elsewhere in this section.

The Ac flux vector drives shall be shipped to the Control System Vendor's shop for coordination and interfacing with the PLC control system, and for inclusion in the control system shop test prior to shipment to the site.

2.1.18 AC Drive Motors

The AC motors shall be 200 horsepower, 1200 RPM, totally enclosed non-ventilated, crane and hoist duty, with a service factor of 1.15.

Motors shall be furnished with internal heaters, double shafts and encoders.

Motors shall be designed, manufactured, and tested in accordance with the applicable requirements of NEMA Standards Publication No. MG 1, Motors and Generators.

2.1.19 AC Motors

Motors with horse-power rating of 500 Hp or smaller shall conform to NEMA MG 1 and UL 1004. AC motors shall be polyphase induction motors.

2.2 Electrical Power Distribution System

2.2.1 General

The electrical power distribution system shall consist of circuit breakers, motor control centers, disconnect switches, panelboards, lighting and other equipment and devices necessary to provide a complete power system.

2.2.2 Circuit Breakers

Molded case circuit breakers in enclosures or panelboards shall be sized as indicated on drawings, shall be UL-listed and meet NEMA Standard No. AB1, where applicable. Circuit breakers shall have frame size rating larger than their trip rating.

Circuit breakers shall have toggle-type operating mechanisms, with quick-make, quick-break action and positive handle indication. Circuit breaker operating handles shall assume a center position when tripped. Two-pole and three-pole breakers shall be common-trip. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.

Circuit breakers shall be suitable for mounting and operating in any position. Connections to bus shall be bolt-on.

Lugs shall be copper, UL-listed for copper conductors. Circuit breakers shall be U.L. listed for installation of mechanical screw-type lugs.

Individually enclosed circuit breakers shall be in Nema 12 enclosures, provided with operating mechanism and handle for external operation, and padlock provisions

2.2.3 Motor Control Center

a. The motor control center (MCC) shall be rated as shown on plans, Bulletin 2100, Centerline by Allen-Bradley, or Model 6 by Square-D, or an approved equal.

b. The motor control center assemblies shall be NEMA 12 construction. Motor starter units shall be of the combination type with molded case circuit breaker (Motor circuit protector). Wiring shall be NEMA class II, type C with master terminal board. Each motor control cabinet shall be of dead-front construction and shall incorporate vertical busses connected to the horizontal bus, when required.

c. The motor control center shall consist of vertical sections bolted together with a common frame to form a rigid, free-standing assembly. The MCC shall be suitable for operation on the 480 volt, 3 phase service. The control voltage shall be 120 volts AC, at 60 Hz.

d. Removable structure steel lifting angles shall be provided on the top sections. Each vertical section shall be approximately 90 inches high, excluding lifting angles and mounting channels, and not less than 15 inches deep by 20 inches wide.

e. The vertical sections shall be divided into suitable space factors. Size 1 and size 2 across-the -line, non-reversing combination starter units shall fit into one space factor. In such cases, each space factor shall be covered by an individual door, as described in the paragraph below.

f. End vertical section shall have end closing plates providing access to horizontal wireways and the horizontal bus. The top plate shall be of removable one-piece construction. Removable blank doors shall cover all un-used unit spaces, and shall be provided with 1/4 turn pawl-type latches.

g. Horizontal wireways shall be provided both top and bottom. The wireways shall be completely isolated from the horizontal and vertical busses. A full height vertical wireway shall be provided in each standard vertical section, completely isolated from the horizontal and vertical busses. A separately removable hinged door with 1/4 turn pawl-type latches shall cover the vertical wireway. Wire ties shall be furnished in the vertical wire trough to group and securely hold wires in place.

h. The main horizontal bus bar shall be copper, tin-plated, and rated not less than 800 amps. The bus shall be one-continuous piece and extend the full length of the assembly, except where split for shipment, in which case, the bus shall be continuous in each shipping block with a splice kit supplied as required to interconnect the busses in the field.

i. The vertical bus shall be copper, tin-plated, rated not less than 400 amps.

j. Both the horizontal and vertical busses shall be supported and braced to withstand 42,000 RMS symmetrical amps.

k. The horizontal ground bus shall be copper, 1/4 inch thick by 2 inches wide, and located in the top and bottom horizontal wireways. Ground lugs shall be provided as standard.

l. Unit connections shall be bolt-on type, or plug-in type, high quality, two-point connection for each phase, designed to tighten during heavy current surge. The plug-in fingers shall be tin-plated to yield a low resistance connection, and shall be backed by spring steel clips to provide high-pressure connection points. Each plug-in unit shall be held in place by one or more latches, located at the front of the unit. Latches shall provide maximum front accessibility and installation convenience. All contactors shall be electrically held type. The following types and sizes of starters shall be provided:

- Reversing starter with circuit breaker
- Non-reversing starter with circuit breaker.

m. The primary power circuit to each motor will be via a molded case circuit breaker (motor circuit protector) combination starter. Overloads relays for the main drive motors, brakes, locks and clutches shall be adjustable solid state current monitors as described elsewhere herein.

n. In lieu of full front doors, each unit may be provided with a removable door mounted on removable pin-type hinges which will allow the door to swing open at least 110 degrees without disturbing any other doors. The unit door shall be fastened to the stationary structure so that it can be closed to cover the unit space when the insert has been removed. The unit doors shall be held closed with 1/4 turn pawl-type latches, designed to resist forces during fault conditions. Each unit door shall be provided with external overload reset buttons where applicable.

o. All un-painted parts, unit support pans, horizontal wireway barriers, door hardware, unit latches, and assembly hardware shall be chromate-plated or stainless steel for resistance to corrosion in a salt water atmosphere.

p. An industrial handle mechanism shall be supplied for the control of each circuit breaker or disconnect switch. This mechanism shall be engaged with the circuit breaker at all times, regardless of unit door position. It shall be possible to lock this handle in both the off and on position with a shackle pad-lock.

r. Each unit shall have its own identification nameplate indicating either a catalog number description or a serial number description, which shall be fastened to the insert near the upper identification nameplate, indicating serial number, bus ratings and vertical section reference numbering. The nameplate shall be mounted on the vertical door of each section.

s. In addition, each individual combination starter or circuit breaker shall have attached an engraved plastic nameplate bearing the name of the equipment which it serves.

t. The manufacturer shall provide nameplates stating rated ampacity, voltage and manufacturer's name or trade mark. Nameplates shall be installed so that they are visible after installation.

2.2.4 Transformers

2.2.4.1 Three phase transformers

Three phase transformers shall be general purpose, U.L. listed, dry type, sized as shown on plans. All transformer shall be 3-wire 480 volt delta primary, and 4-wire 120/208 volt wye secondary. Transformers shall have a minimum temperature rise of 115 degrees C.

2.2.4.2 Single phase transformers

Single phase transformers shall be general purpose, U.L. listed, dry type, sized as shown on plans. All transformer shall be 2-wire 480 volt primary, and 3-wire 120/240 volt secondary. Transformers shall have a minimum temperature rise of 115 degrees C.

2.2.5 Panelboards

Circuit breaker panelboards shall be Nema 12 surface-mounted for indoor use, and rated for three-phase, four-wire service or single phase, three

wire service, with current and voltage ratings as shown on drawings.

Panelboards shall be equipped with thermal-magnetic molded case circuit breakers, conforming to the requirements of Section 2.2.2, with ratings as shown on the drawings. Circuit breaker connections to the copper bus shall be bolt-on with vibration-proof hardware.

Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type. Three-phase, four-wire bussing shall be such that only three adjacent single-pole breakers are individually connected to each of the three different phases in such a manner that two- or three-pole breakers can be installed at any location. All current-carrying parts of the buss assembly shall be copper tin-plated. Bus ratings shall be as shown on the drawings.

Terminals for conductors to the panelboard mains and branch circuit wiring, both breaker and neutral, shall be UL-listed as suitable for the type and size of conductor specified.

Panelboard circuit numbering shall be such that starting at the top, odd numbers shall be used in sequence down the left-hand side and even numbers shall be used in sequence down the right-hand side.

The panelboard copper bus assembly shall be enclosed in a steel cabinet. The size of the wiring gutters and gauge of steel shall be in accordance with NEMA Standards, Publication No. PB1-1977 and UL Standards No. 67 for panelboards. The box shall be fabricated from minimum number 14 gauge, galvanized steel or equivalent rust-resistant steel, conforming to UL standards, UL 50.

The front panel shall include a door and have flush, stainless steel, cylinder tumbler-type lock with catch and spring-loaded door pull. The flush lock shall not protrude beyond the front of the door. All panelboard locks shall be keyed alike.

The removable, front panel shall have adjustable, interior trim clamps, which shall be completely concealed when the door is closed. The door shall be mounted by completely concealed stainless steel hinges. The front shall not be removable with the door in the locked position.

A circuit directory frame of brass and a card with a clear plastic covering shall be provided on the inside of the door. The directory card shall provide a space at least 1/4-inch high by 3-inch long or equivalent for each circuit. The directory shall be type-written to identify the load fed by each circuit.

The front panel shall be of minimum number 12 gauge, full-finished steel, with rust-inhibiting primer and baked-enamel finish. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the rating shown on the panelboard schedule or on the drawings. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL-listed. Panelboards shall be listed by the Underwriters Laboratories and bear the UL label.

2.2.6 Conduit

a. Where size is not indicated, it shall be in accordance with the requirements of the NEC. Unless otherwise indicated, the minimum size conduit shall be 3/4 inch.

b. Rigid conduit installed exposed outdoor shall be hot-dip, galvanized steel with PVC coating conforming to Nema RN 1. Rigid conduit installed indoor shall be hot-dip, galvanized steel conforming to UL 6.

c. Liquid-tight flexible steel conduit shall conform to UL 1, UL 360 and UL 1660.

d. Couplings, connectors and fittings shall be of a type specifically designed and manufactured for the purpose, and for the conduit in use. Liquid-tight flexible steel conduit and connectors shall be used where final connection to equipment with rigid conduit is not practical, such as to equipment with adjustable mounting, and to all machinery.

2.2.7 Wiring and Cables

All conductors shall be annealed copper, conforming ASTM B3 stranding, class B.

2.2.7.1 Single conductor cables

Conductors with size 1/0 AWG and smaller shall have cross-linked-polyethylene insulation or ethylene-propylene rubber insulation, type NHHW or RHW. Conductors with size 2/0 AWG and larger shall have ethylene-propylene rubber insulation, type RHW.

2.2.7.2 Metal-clad cable

The cable shall conform to UL 1569 NFPA 70, type MC cable. The cable overall jacket shall be sun-light and weather resistant.

2.2.7.3 Power and control tray cable

The cable shall be U.L. listed, conforming to the requirements of the NEC, Article 340. The cable overall jacket shall be sun-light and weather resistant.

2.2.7.4 Flexible Loop Aerial Cables.

All wiring and conductors used for the flexible loop to the movable bridge shall be highly flexible, pre-assembled cables, equivalent to UL type SO or type W cable, with flexible rope stranding and a weather and sunlight resistant jacket.

The 480 volt motor feeder cables in the flexible loop shall be a separate dedicated cable of three conductors for each motor and one full size ground conductor.

Circuit conductors for 480 volt power circuits shall not be combined with circuit conductors of any other voltages in the flexible loop cables.

Control conductors in the flexible loop shall be cabled separately from all other miscellaneous lighting and power conductors

2.2.7.5 Special purpose cable

The cable shall have number and size of conductors as indicated on plans. Where installed exposed to the weather and sun light, the cable overall jacket shall be sun-light and weather resistant.

2.2.7.6 Splices

All wiring splices shall be made on terminal blocks in terminal boxes or enclosures. In wet locations, splices in conductors larger than AWG 10 shall be via compression connectors with epoxy or equivalent insulation.

2.2.8 Disconnect Switches

a. Disconnect switches shall be NEMA heavy-duty, type HD safety switches, conforming to NEMA KS-1, and U.L. listed. Motor in-sight disconnect switches provided for motors rated less than 10 Hp, 460 volts AC, 3-phase shall be of the motor manual starter switch rated 3-pole, 15 Hp at 460 volts AC, in NEMA 4 cast zinc or aluminum housing, similar to Square-D class 2510, or an approved equal.

b. Safety switches shall have switch blades which are fully visible in the off position, when the door is open. Lugs shall be U.L. listed for aluminum or copper cables and front removable. All current carrying parts shall be tin-plated. Switches shall have a quick-make, quick-break operating handle and mechanism which shall be an integral part of the box, not the cover. Switches shall have a dual cover interlock to prevent un-authorized opening of the switch door in the on position or closing of the switch mechanism with the door open. Handle position shall indicate if switch is in on or off position. Padlocking provisions shall be provided for locking in the off position. Enclosures shall be NEMA 12 for indoor use and stainless steel NEMA 4X for outdoor installation. All switches shall be horse-power rated for AC and/or DC as specified on plans or as required to suit the equipment served.

2.2.9 Pull/Junction Boxes, Terminal Cabinets, Wiring Device Boxes.

2.2.9.1 Fabrication

Pull boxes, junction boxes, terminal cabinets and fixture and wiring device boxes shall be NEMA 4 watertight, cast aluminum, welded aluminum plate, hot-dip galvanized cast iron, stainless steel, or, in the case of in-ground pull boxes, concrete with cast iron cover.

Cast aluminum boxes and enclosures shall be furnished with 1/8-thick neoprene shims or pads for isolation from concrete and masonry surfaces.

Hinges, bolts, screws, and other hardware shall be brass or stainless steel.

Doors shall be gasketed to be weather-tight, per NEMA 4.

Terminal cabinets shall be provided with tubular screw type terminal strips for wire terminations.

Cabinets, boxes, and enclosures located outdoors shall be provided with two 3/16 inch drain holes, located in diagonally opposite bottom corners.

2.2.9.2 Conduit and Cable Entrances in Boxes and Enclosures.

Conduit and/or cable entrances in boxes or enclosures located outdoors or in damp or wet locations shall be located in the bottoms of the cabinets or boxes to the extent practical, and shall utilize conduit hubs which shall be gasketed and caulked with sealant. Side or back entrances will only be allowed in situations where bottom entrances are not possible, and then only when appropriate drawings and details demonstrating the impossibility of bottom entrance are provided to the Engineer for review and waiver of the bottom entrance requirement on a case-by-case basis. Conduit and cable entrances in the tops of boxes and enclosures will not be allowed.

2.2.10 Roadway and Outdoor Area Lighting

2.2.10.1 General

Roadway lighting luminaires shall be high pressure sodium type, designed for use with a horizontally mounted lamp, and shall be fully weatherproof and watertight. The luminaire shall operate satisfactory with any appropriately sized high pressure sodium lamp now commercially available.

2.2.10.2 Housing

The luminaire housing shall be constructed of either one piece cast aluminum or die formed aluminum with welded corners.

All materials inside the housing shall be corrosion resistant, or shall have a protective coating providing a corrosion resistant finish.

2.2.10.3 Refractor

The refractor shall be formed out of ultra-violet stabilized clear polycarbonate of 1/8" minimum thickness free from imperfections. Refractor shall have a high transmission factor with smooth outside surface.

The refractor and housing design shall be such that the joint between refractor and housing effectively seals out bugs, moisture and other contaminants. Refractor shall be designed to allow for expansion and contraction with sufficient free play to eliminate the possibility of breakage due to expansion.

2.2.10.4 Ballast

The ballast shall be of high power factor, constant wattage, auto-transformer type or similar, suitable for the wattage and operating voltage of the luminaire as indicated on drawings. The ballast shall be capable of starting and operating the lamp at a temperature of minus 20 degrees Fahrenheit. The ballast shall be power factor corrected to at least 90%.

2.2.10.5 Lamp

A 250 watt high pressure sodium lamp shall be provided with each luminaire used for roadway or outdoor area lighting. The entire luminaire shall be completely pre-wired, requiring only the connection of the primary leads to the incoming feeders.

2.2.11 Photoelectric Control

Photoelectric control units shall have an all lexan enclosure which is not affected by weather, moisture or temperature. The unit shall have a 180 degree swivel and shall be provided with a 1/2 inch conduit fitting. The unit shall operate at 120 volts and shall have a single pole, single throw (SPST) normally closed snap action contact to prevent chatter and to illuminate all controlled lighting upon failure. A delay of up to two minutes shall be provided to prevent false switching due to lights from vehicles, lightning, etc.

2.2.12 Receptacles

Receptacles shall be specification grade, GFCI, NEMA type 5-20R

2.2.13 Snap Switches

UL 20

2.2.14 Pull/Junction Boxes, Terminal Cabinets, Wiring Device Boxes

2.2.14.1 Fabrication

Pull boxes, junction boxes, terminal cabinets and fixture and wiring device boxes shall be NEMA 4 watertight, cast aluminum, welded aluminum plate, hot-dip galvanized cast iron, stainless steel, or, in the case of in-ground pull boxes, concrete with cast iron cover.

Cast aluminum boxes and enclosures shall be furnished with 1/8-thick neoprene shims or pads for isolation from concrete and masonry surfaces.

Hinges, bolts, screws, and other hardware shall be brass or stainless steel.

Doors shall be gasketed to be weather-tight, per NEMA 4.

Terminal cabinets shall be provided with tubular screw type terminal strips for wire terminations.

Cabinets, boxes, and enclosures located outdoors shall be provided with two 3/16 inch drain holes, located in diagonally opposite bottom corners.

2.2.14.2 Conduit and Cable Entrances in Boxes and Enclosures.

Conduit and/or cable entrances in boxes or enclosures located outdoors or in damp or wet locations shall be located in the bottoms of the cabinets or boxes to the extent practical, and shall utilize conduit hubs which shall be gasketed and caulked with sealant. Side or back entrances will only be allowed in situations where bottom entrances are not possible, and then only when appropriate drawings and details demonstrating the impossibility of bottom entrance are provided to the Engineer for review and waiver of the bottom entrance requirement on a case-by-case basis. Conduit and cable entrances in the tops of boxes and enclosures will not be allowed.

2.3 Miscellaneous Systems

2.3.1 PA System

2.3.1.1 General

The PA system shall consist of U.L. listed indoor single-party wall stations, speaker amplifiers, speakers and all necessary wiring and

hardware to make up a complete system. The system shall operate on 120 volts AC. The system shall be a Gai-Tronics model 700 series or equal.

2.3.1.2 Indoor Wall Stations

Indoor wall stations shall consist of a handset with nonmoveable electronic hookswitch and noise cancelling microphone, a handset amplifier, and a speaker amplifier. All components shall be housed in a dust-tight, 16 gauge cold-rolled steel enclosure finished with textured polyurethane paint. Each unit shall be equipped with captive screws and provided with gaskets for extra protection against dust and moisture.

2.3.1.3 Speaker Amplifiers

Speakers amplifiers shall consist of a handset amplifier, and a speaker amplifier. All components shall be housed in a dust-tight, 16 gauge cold-rolled steel enclosure finished with textured polyurethane paint. Speaker amplifiers mounted outdoors shall be housed in a NEMA 4 cast aluminum box with gasketed aluminum cover plate and stainless steel screws.

2.3.1.4 Speakers

Indoor speakers shall be 8 ohm, 10 watt, capable of producing a sound level of 98 DB at 3 feet. Speaker shall be housed in a slope front baffle, walnut finish cabinet with built in volume control.

Outdoor speakers shall be direct radiating horn equipped with a built in driver. Horn shall be rated 8 ohm, and shall be capable of producing a sound level of 106 DB at 3 feet. Horn assembly shall be constructed of U.V. resistant, weatherproof, high-impact, glass-reinforced polyester. Horn shall be equipped with two integral ¾" conduit entries and terminal block for wire termination.

2.3.2 Fire Alarm System

The fire alarm system shall consist of a U.L. listed, 6 zone fire alarm control panel, compatible with two-wire ionization smoke detectors, photoelectric smoke detectors, and horn.

The control panel shall possess common alarm and trouble contacts, LED indication for trouble and alarm conditions for each zone and AC power and battery trouble LED indication. The unit shall be provided complete with battery charger, 6 AH gel cell battery, power supply/motherboard, two dual circuit class "B" zone initiating boards, and one single circuit class "B" indicating board. All components shall be housed in a heavy duty steel cabinet and shall operate on 120 volts AC.

Ionization smoke detectors shall be U.L. listed, 2-wire, having a dual chamber unipolar type ionization sensor with a normal sensitivity of 1.5% ft as measured in a U.L. listed smoke box. The detector shall be provided with a mounting bracket for direct surface mounting or shall be designed for mounting on a 4 inch octagon box. The detector shall be provided with an latching LED for visual indication. The detector shall be capable of withstanding wind velocities of up to 2500 feet per minute without alarming.

The fire alarm horn shall be U.L. listed, constructed of die cast zinc with red hammertone finish with alclad aircraft aluminum alloy diaphragm, and reed type horn. Horn shall operate at 24 volts DC and shall generate a sound level of 90 DBA at 10 feet. Unit shall be equipped with a type VALS

triangular warning strobe light.

2.3.3 Bridge Security System.

The bridge security system shall consist of a U.L. listed, security alarm control panel with 6 fully programmable zones. The unit shall have a non-volatile EEPROM memory, keypad for zone programming, a built-in 119 DB muti-tone siren driver, time refreshed event history log of 120 events per month. The unit shall be capable of storing panel activities and reports by time and date including programming adjustments, alarm, and open/close reports. Unit shall be capable of touch tone dialing with rotary dialing back-up capability. System shall be provided with all necessary magnetic switches, a self contained electronic siren, strobe warning light, back-up battery, and all necessary mounting hardware. All components shall be housed in a heavy duty steel cabinet and shall operate on 120 volts AC.

2.3.4 Aerial Beacons

Aerial beacons shall comply with FAA L-864 for a flash rate of 20 flashes per minute. Lights shall consist of a medium intensity, omnidirectional, aviation red, FA-250 lantern containing six high pressure halogen marine signal lamps mounted on a six-place lamp changer.

Beacons shall provide a 360 degree horizontal beam with 3.2 degrees vertical to 50% and shall be capable of providing a equivalent fixed intensity of 1530 cd at the specified flash rate. Bulbs shall be prefocused, T-4 envelope, and rated at 150 watts, 2000 hours.

Lamp changers shall include a microprocessor controlled stepper motor for automatic lamp replacement. An alarm output shall be provided to indicate that all lamps are inoperative. A photocell shall be provided to shut off the lamp during daylight hours.

Lights shall possess a cast aluminum base, silicone-rubber lens gasket, and four bolt mounting. A bird spike shall be provided at the top of the optic. Lights shall be hinged for relamping.

2.3.5 Waterway Navigation Lighting

The bridge navigation lighting system includes fender lights, lift span center-of-channel lights, conduit and wiring, and all other miscellaneous appurtenances, hardware, and labor required to complete the system.

Each lantern assembly of fender and Lift span lights shall be constructed of cast silicon bronze. Closure bolts, lens tie rods, and other hardware shall be stainless steel.

Lens shall be molded glass fresnel type, 200mm, red or green (as shown on plans), and shall emit light through a 180-degree arc in the horizontal plane.

Each lantern shall utilize a clear incandescent lamp, precisely located so that the filament is placed in the center of the fresnel lens for optimum photometric performance.

Fender Lights shall utilize 180-degree red lens, and be provided with a flange type base suitable for 3- or 4-hole mounting arrangements. Upper part of lantern body shall be conical shape, extended to an anti-perch

spike to repel birds.

Lift span lights shall utilize duplex lantern assemblies, each with one red 360-degree lens over one green 180-degree lens. Each color section shall be provided with its own dedicated lamp. Each lift span duplex lantern assembly shall be hung from a non-latching swivel suspension assembly on stainless steel pipe, with a neoprene conduit expansion/deflection fitting immediately above the lantern for shock and vibration absorption. Swivel suspension assemblies shall include grease fittings, water tight threaded conduit/cable connector, and stainless steel maintenance chain.

All mounting hardware shall be stainless steel.

The navigation lights shall be operated totally independent of the bridge control system, on a separate dedicated branch circuit, and shall be fully functional whether the bridge control system is turned on or off.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Contractor Requirements

a. The plans and specifications depict the general concept of the bridge electrical system, as intended by this contract. These plans and specifications are not intended to be complete in all details. It shall be the responsibility of the Contractor to provide additional detailing, as required to provide a complete, reliable, working system in conformance with the concepts and intent set forth on the plans, including whatever may be necessary to complete the installation and equipment in a manner acceptable to the Contracting Officer. Such additional detailing, equipment and labor shall be furnished by the Contractor without extra cost to the Government.

b. The Contractor shall submit a wiring diagram and list of equipment to be furnished for approval, prior to starting his electrical work. Wire numbers shall be provided on the wiring diagrams, as described in the Conductors and Wiring section of these specifications. All electrical work shall be strictly in accordance with the requirements of the National Electrical Code and all other applicable codes.

c. The Contractor shall submit a complete set of control circuit drawings for the bridge control circuit, showing the ladder-diagram control logic on the left side of the sheet, with the corresponding PLC programming immediately to its right, on the same sheet. A listing of the locations of all contacts for each relay or logic element shall be provided on the control circuit drawings. The control circuit drawings shall also illustrate, to scale, the layout of all PLC system components within the PLC cabinet.

3.1.2 Control System Vendor

a. The Contractor shall retain the services of the control system vendor for on-site installation check-out and startup services. The control system vendor shall have complete system responsibility for the detailing and manufacture of the total control system and shall furnish and/or approve and assist with the supervision of the installation and connection of all components associated with bridge operations, including drives, motors, brakes, limit switches, motor controls, motor control centers,

programmable logic controllers, control console, etc.

b. All equipment and components proposed for use shall be manufactured by a company which has established experience in the manufacture of such equipment and which, in the Contracting Officer's opinion has demonstrated its proficiency in the manufacture of such equipment. All equipment will be subject to the Contracting Officer's approval.

3.1.3 Enclosures

a. Install new cabinets, disconnect switches, circuit breakers at indicated or approved locations in accordance with manufacturer's instructions, and at convenient operating height, such that unless shown otherwise, no manually operable device will be within 1-1/2 feet of the floor or more than 6-1/2 feet above the floor, unless prior approval is granted by the Contracting Officer.

b. Adjust straight and plumb and fasten securely in place. Align and securely and independently fasten each section of multi-section enclosures.

c. Install all wall-mounted enclosures and cabinets on structural steel erector systems, such as Unistrut or equivalent.

d. Perform circuit wiring as specified elsewhere herein.

e. Ground as specified in UL 67, NEPA 70, Articles 200 and 250. Connect neutral wire directly to neutral bus in same cabinet as circuit interrupting device.

f. Neatly route, harness and support conductors in gutters, cable trays, conduits, wiring spaces and compartments. Bending radii not less than recommended by conductor manufacturer.

g. Isolate all aluminum boxes and enclosures from dissimilar metals and concrete with neoprene shims.

3.1.4 Conduit and Fittings

a. Conduit to motors, limit switches and other electrical vibrating equipment shall terminate in conduit fittings on the motors and/or equipment, the final connection being made with 18-inch length of liquid-tight, flexible metal conduit and suitable liquid-tight connectors, unless indicated otherwise.

b. Seal each underground joint and make liquid-tight.

c. Install liquid-tight unions where standard threaded couplings cannot be used.

d. Equip conduit terminations with grounding insulating bushing.

e. Install or repair conduits in accordance with the requirements of The National Electrical Code.

f. Support conduits at not more than 6-foot intervals, where possible, with at least one support between couplings, and install parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings with right-angle turns consisting of cast metal fittings or symmetrical bends. Support conduit with galvanized clamp pipe

hangers or secure by means of adhesive anchors on concrete, wood screws on wood, machine screws on sheet metal surfaces. Provide conduit supports on each side of conduit bends or elbows and not more than 3 feet on each side of each outlet panel, pull box or other conduit termination.

g. Make all bends with an approved hickey or conduit bending machine.

h. Fasten conduits securely to all outlets, junction and pull boxes, and cable trays with full number of threads projecting through tapped bosses. Use gasketed or O-ring waterproof conduit hubs or outside boxes where tapped bosses are not possible.

i. Furnish sleeves and inserts and install as required for the electrical work.

h. Conduits crossing expansion joints shall be provided with expansion fittings or other approved means to compensate for expansion and contraction. Expansion fittings shall allow for the amount of expansion and deflection required for each specific location.

i. Provide grounding-type, insulated bushings on conduits at all motor control centers and cable trays. Bond grounding bushings together and to the equipment enclosure, or where provided, the equipment ground bus.

j. Conduits for future use shall be capped until used.

k. Make up all conduit connections tight to provide good electrical conductivity throughout the entire length of the conduit run, including flexible conduits. A separate bonding wire shall be provided for lengths of flexible conduit exceeding 6 feet.

l. Install pull boxes or pull bodies in all conduit runs, as required, and locate, as approved. No exposed conduit run shall exceed 150 feet between boxes, fittings, pull bodies, etc.

3.1.5 Conductors and Wiring

a. Install wiring and conductors only when the conduit or raceway system has been completed. Thoroughly clean the inside of all conduits of any dirt, moisture or other foreign materials before pulling wire and cable. Pull wires and cables in conduits after an application of suitable, approved lubricant that will have no injurious effect on the installation of the conductor. No oil or grease shall be used.

b. Install exposed cables on supports or messenger cables as shown. Provide wrap or neoprene or suitable protective sleeve around cables where u-bolt or clamp straps contact the cables. All hardware shall be stainless steel or hop-dip galvanized with lock washers were applicable. Nylon or plastic straps, in general, shall not be used outdoors as the sole means of cable support.

c. Make no splices or joints in either feeders or branch circuits, except at outlets, accessible junction boxes or accessible raceway fittings.

d. Secure joints in circuit wiring mechanically and electrically. Conductors shall be joined by compression-type splicing sleeves, by means of bolted-type pressure connectors having cast-metal bodies, or on terminal blocks. Split-bolt-type connectors are not acceptable. Unless properly insulated by the connector, all joints shall be insulated at least equal to

the installation of the conductors.

e. Identity control wiring by color-coded, plastic-coated, self-sticking printed marker sleeves, permanently attached stamped metal foil markers or equivalent means. The identification of each control wire shall consist of a number and a letter based on the final approved control schematic. The number shall correspond to the line number on the schematic. The latter shall be determined as follows: the leftmost wire on Line 21 shall be 21A, the next wire to the right is 21B, etc. Provide conductor identification within each enclosure where a tap, splice or termination is made. Identify control circuit terminals on equipment also. Terminal and conductor identification must be shown on approved shop drawings. Hand lettering or marking is not acceptable.

f. Verify that circuits are wired, as indicated, and are continuous and free of shorts, opens and unintentional grounds. Energize and test each circuit. Test other electrical equipment, as recommended by the manufacturer or the Contracting Officer. Measure ground bus and grounded conductor resistance to true ground, resistance between enclosure and ground bus, between pairs of bus bars and between insulation and ground bus. Resistance must be within limits specified below. Troubleshoot and correct as necessary.

g. Repeat the circuit tests specified above in the presence of and to the satisfaction of the Contracting Officer.

3.1.6 Acceptable Resistances

a. Ground bus and grounded conductor to true ground: 2 OHMS, Maximum.

b. Between enclosure and ground bus: Less than 0.1 OHM.

c. Between pairs of bus bars: 100 MEGOHMS, Minimum.

d. Between bus bars and ground: 100 MEGOHMS, Minimum.

3.1.7 Installation of Boxes and Fixtures

Where several feeders pass through a common pull box, tag the feeders to indicate clearly the electrical characteristics, circuit number and panel designation.

3.1.8 Drive Motors

a. Install main drive motors as specified on the plans to provide proper operation and compatibility with the connected equipment.

b. Install motor control cabinets and make connections to motors as indicated on the drawings and in accordance with manufacturer's recommendations.

3.1.9 Cable Trays

Cable trays shall be supported in accordance with the recommendations of the manufacturer, but at no more than 6-foot intervals. Adjacent cable tray sections shall be bonded together by connector plates of an identical type as the cable tray sections. The Contractor shall submit the manufacturer's certification that the cable tray system meets all requirements of Article 318 of NFPA 70. The cable tray shall be installed

and grounded in accordance with the provisions of Article 218 of NFPA 70. Data submitted by the Contractor shall demonstrate that the completed cable tray systems will comply with the specified requirements. Cable trays shall terminate 10 inches from both sides of smoke and fire partitions. Conductors run through smoke and fire partitions shall be installed in 4-inch rigid steel conduits with grounding bushings, extending 12 inches beyond each side of the partitions. The installation shall be sealed to preserve the smoke and fire rating of the partitions. Penetrations shall be firestopped.

3.1.10 Factory Testing

a. The complete control system, including programmable controller, control console, and motor control centers, limit switches, optical encoders, etc., shall be assembled and temporarily interconnected for testing at the control system manufacturer's assembly plant prior to shipping to the project site. Various limit switches may be omitted in lieu of temporary toggle or selector switches for this test. Errors or deficiencies noted in this test must be rectified prior to shipment. This test shall be conducted in the presence of the Contracting Officer or his authorized representative. Accordingly, the Contracting Officer shall be notified at least one week prior to the test date. NOTE: The PLC control logic must be furnished, in ladder format, at least 30 days prior to the test.

b. The control system supplier shall provide bar-graph type tripping schedules for all limit switches. These schedules shall be part of the control circuit shop drawings.

c. Program settings shall be provided to fully document all settings of the programmable limit switch.

d. The complete control system interconnected for testing, as described above, shall be subjected to a minimum 120-hour continuous burn-in. The programmable controller and the programming devices shall demonstrate proper operation in the presence of both radio frequency (marine radio), as specified in the Programmable Logic Controller Section.

e. The Contractor shall engage the control system manufacturer's field service and have a factory-trained technician or engineer at the sire during installation, start-up, and at other times, as required, to make adjustments to provide proper and reliable bridge control system operation to the satisfaction of the Contracting Officer.

3.1.11 Testing After Placement

a. When the operating machinery installation is complete and ready for testing, the Contractor shall provide and connect to each flux vector drive output, approved chart-type recording voltmeters, ammeters and wattmeters or equivalent data acquisition instrument to continuously monitor and record these power variables throughout each test cycle of the machinery. The positions of the span shall be noted on each recording, along with designations of start, stop, raise and lower. Charts shall be run after final adjustments have been made, with bridge running the full cycle. Charts shall be run for both "raise" and "lower" functions. Such charts, and any electrical adjustments directed by the Contracting Officer as a result of their interpretation, shall be supervised by the control manufacturer's engineer or technician.

b. After being placed in service, and after all significant operating adjustments have been made, the PLC shall demonstrate 14 consecutive days of error-free operation, with the PLC operating continuously. Final acceptance of the system will not be made until after the 14-day error-free period has been achieved.

c. At the conclusion of all testing, the charts shall be turned over to the Contracting Officer.

d. The Contractor shall be prepared to conduct additional miscellaneous performance tests, as requested by the Contracting Officer, where necessary, to establish that a given installation meets all specified requirements and will operate in a reliable manner.

e. There will be no direct or additional payment for testing. The costs associated with the required testing, as outlined herein, shall be included in the lump sum price bid for the electrical system.

3.1.12 Spare and Renewal Parts

Spare and renewal parts shall be furnished in compliance with AASHTO, Part 6, Paragraph 6.7.5.48, as specified. It is required that recommended spares be listed in three or more categories arranged in order of importance to operations, inspection, maintenance, troubleshooting and repair. Copies of the manufacturer's recommendations shall be included in the Operation and Maintenance Manual.

a. Mandatory items to be provided shall include the following:

- Six fuses of each kind and size used.
- One complete set of stationary and moving contacts for each size of each device incorporating replaceable contacts.
- Three indicating light units, complete with lamp, fitted with cap of each color used in the installation.
- One coil for each size magnetic contactor and repairable relay used.
- One set of overload devices and/or heaters of each size and type used.
- Two complete limit switches of each kind and size used (contact blocks only for rotary cam limit switches, and rotary resolver for programmable limit switch).
- Four complete control and pilot relays and one complete timing replays of each type used in the control circuit, if applicable.
- Six fluorescent lamps of each size and type used.
- Two complete sets of AC flux vector drive cards or processor boards, and related devices as recommended by the control systems manufacturer, for each different size drive.
- One complete incremental motor encoder.
- One complete resolver of the type used.

- The PLC processor shall utilize ladder-logic, SFC, and structured text programming, with an advanced instruction set including: file handling, sequencing, diagnostics, shift register(s), immediate I/O, program control instructions, and mathematical functions. Processor memory shall be 32K or larger, battery backed static RAM with EEPROM program backup. Processor shall be capable of interfacing with up to 1024 I/O channels, with a scan time of 10 milliseconds or faster. PLC shall include any communication capabilities necessary for proper system operation. Processor shall be fully programmed identically to the installed processor.

b. In addition to the mandatory items listed above, the Contractor shall obtain supplementary spare and renewal parts list recommendations for optional purchase from each manufacturer supplying the various items of power, control and auxiliary equipment approved for permanent installation. The Contractor shall then confer with the Contracting Officer to establish an initial inventory of spare and renewal parts which shall be comprised of the specific mandatory items listed above, plus those additional items recommended for Government purchase from the manufacturer's listings.

c. All spare and renewal parts for both initial and future inventories shall be listed by categories with descriptions and manufacturer's catalog reference number or other designation. Each category shall be prepared in format suitable for insertion into the Operation and Maintenance Manual with section identification and index.

d. All spare and renewal parts shall be carefully prepared for storage in convenient packages of individual items or lots. Each package shall be completely identified as to its contents and delivered to the selected places of storage at such time as directed by the Contracting Officer.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 16110

BRIDGE ELECTRIC SERVICE

PART 1 GENERAL

WORK COVERED BY THIS SECTION. This section consists of the installation of materials and equipment for a new bridge electric service, as indicated.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)

ANSI/IEEE C37.20.3	Standard for Metal-Enclosed Interrupter Switchgear
ANSI/IEEE C37.20.4	Standard for Indoor AC Medium Voltage Switches used in Metal-Enclosed Switchgear.
ANSI/IEEE 24	Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings

UNDERWRITERS LABORATORIES (UL)

UL 489	(1996; Rev thru Nov 1997) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Shop Drawing and Manufacturer's Catalog; GA

Data shall be composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents of all electrical materials, equipment and devices proposed for the project.

SD-04 Drawings

Detailed Layout Drawings; GA

Layout drawings shall include the detailed layout and geographic wiring diagrams for the following equipment:

a. Unit substation

b. Equipment shelter

Shop Drawings; GA

Detail drawings consist of equipment drawings, illustrations, schedules, instructions, diagrams, ratings, specifications, and other information necessary to define the equipment and installation. Detail drawings shall show the rating of items and systems and how the components of an item and a system function, are assembled and installed on the project. Data and drawings of an item or system shall be coordinated and submitted as a unit in a single submission. Multiple submissions for the same equipment or system will not be acceptable, except where prior approval has been obtained from the Contracting Officer. Detail drawings shall show physical arrangements, construction details, connections, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Optional items shall be clearly identified as included or excluded. Detail drawings shall also be submitted when the installation and mounting details of equipment, system, fixtures and devices are different from or not specifically detailed on the contract drawings. Shop drawings for all equipment and system shall be submitted for review and approval by the Contracting Officer prior to ordering or commencing any work.

Shop drawings which have not been approved or require correction shall be resubmitted until such time as they are acceptable to the Contracting Officer, and such procedures shall not be considered as a cause for delay or an additional cost to the Government.

Working Drawings; GA

Detail drawings shall illustrate the Contractor's proposed method of accomplishing the required work prior to commencing construction. The drawings shall consist of equipment drawings, illustrations, schedules, diagrams, ratings and other information necessary to define the installation. Such required working drawings shall include, but need not be limited to, the following:

a. Single-line and three-line diagrams, schematics or elementary power and control diagrams of each electrical system.

b. Grounding and bonding diagrams.

c. Conduit, cable and wire routing.

d. Wire connection diagrams that show the termination of wiring routed between separate items and equipment.

e. Enclosure details of the unit substation.

f. Electrical apparatus certified dimension data.

g. Layout arrangement of electrical/mechanical equipment in equipment

shelter.

As-Built Drawings; FIO.

The as-built drawings shall be a record of the construction as installed and shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be full-sized set of prints marked to reflect all deviations, changes, and modifications. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full-sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor. Following the project completion and turnover, within 30 days, the Contractor shall furnish two sets of final as-built drawings to the Contracting Officer.

SD-08 Statements

Contractor Experience; GA

The Contractor shall submit a tabulation of experience in the installation and rehabilitation of high voltage electrical systems.

The supervisory personnel of the machinery installation, replacement, and rehabilitation operations shall have a minimum of five years of experience with high voltage electrical systems.

The journeymen performing the electrical installation, replacement and rehabilitation shall have experience in the installation and repair of large scale electrical transmission and control systems. The list of the experience of the electrical suppliers shall be submitted to the Contracting Officer.

SD-14 Samples

Samples; GA.

If requested by the Contracting Officer, the Contractor shall submit for inspection, samples of any proposed items at no cost to the Government. All support data shall be submitted in quintuplicate for checking. The Government will not be liable for any materials purchased or work done or any delay incurred prior to their review. Failure of the Contracting Officer to note unsatisfactory materials as received will not relieve the Contractor from responsibility.

SD-19 Operation and Maintenance Manuals

Operation and maintenance manual; FIO

The Contractor shall submit three copies of operation and maintenance

manual, bound in hardback binders, or an approved equivalent, for the unit substation and any other related electrical equipment indicated in this technical section. The Contractor shall furnish one complete manual prior to performance of systems or equipment tests, and the remaining manuals prior to the contract completion. The manual shall be inscribed with the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the system, equipment, name of the Contractor and contract number, included the names, addresses, and telephone numbers of each subcontractor or vendor installing or furnishing the system or equipment. The manual shall have a table of contents, and shall be assembled to conform to the table of contents, with the tab sheets placed before instructions covering the subjects. The instructions shall be legible and easily read, with large sheets of drawings folded in.

The manual shall include the following:

a. Internal and interconnecting wiring, control diagrams, of the unit substation with data to explain detailed operation and control of the system or equipment.

b. Description of the function of each principal item of the equipment.

c. Installation and maintenance instructions.

d. Safety precautions.

e. Diagrams and illustrations.

f. Testing methods.

g. Performance data.

h. Part list. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.

i. Appendix. The appendix shall list all qualified and permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

Posted operating instructions; FIO

The Contractor shall furnish approved and simple operating instructions for the unit substation to be posted as indicated for use by operation and maintenance personnel. The instructions shall include safety precautions and emergency operating procedures, shall be printed or engraved, and framed under glass or in approved laminated plastic. Where exposed to the weather, operating instructions shall be of the weather-resistant material or enclosed in weather-proof enclosures. The instructions shall not fade when exposed to sun light and shall be secured to prevent easy removal or peeling.

Instructions to personnel; FIO

The Contractor shall provide the services of competent instructors to give full instruction to Government personnel in the adjustment, operation, and maintenance of the bridge control system and equipment, including pertinent safety requirements as required. Each instructor shall be thoroughly familiar with all aspects of the installation and shall be trained in operating theory as well as practical operation and maintenance work of the

Programmable Controller, the AC Flux Vector Drive, the control system and control components. The instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. Five eight-hour man-days of instruction shall be furnished within a period of ten consecutive regular work days. The specific schedule will be determined by the Contracting Officer.

1.3 APPLICATION

1.3.1 General

The Contractor shall furnish all materials and equipment to install, adjust, test, and complete a permanent and trouble-free bridge control system and power distribution system for the operation of the entire lift bridge, including new main drive motors, AC Flux Vector drives, programmable controllers, motor control center, controls, interlocking, sequencing, cables and conduit, lighting, panelboards, related appurtenances and all other incidentals shown and described on the contract plans or specified elsewhere in these contract documents.

1.3.2 Summary

This work, in general, shall include, but not be limited to, the furnishing and installation of the following principals items of work shown and specified:

a. A new and complete unit substation, consisting of a high voltage fusible disconnect switch section, a transformer section, and a distribution section. Provision for metering equipment shall be provided within the substation.

b. New equipment shelter and slab foundation.

c. Removal of an existing structure at the location of the new equipment shelter.

d. New conduit and wiring to accommodate the new service equipment.

e. Additional detailing as required to complete the work intended by these drawings and specifications.

f. All adjustments and corrective measures required to properly complete all systems.

g. Clean-up, restoration, and painting, as required by the Contracting Officer.

h. Acquisition packaging, and delivery of specified spare parts.

i. Preparation and delivery of as-built drawings and operation and maintenance manual.

1.4 QUALIFICATION

1.4.1 Required Contractor Electrical Experience

The Contractor shall submit a tabulation of previous experience with the installation and rehabilitation of high voltage electrical power systems.

The supervisory personnel for the electrical installation, replacement, and rehabilitation activities shall have a minimum of five years of experience in the installation and repair of industrial electrical distribution systems. The list of experience of the supervisory personnel shall be submitted to the Contracting Officer for approval.

PART 2 PRODUCTS

2.1 UNIT SUBSTATION

2.1.1 General

The unit substation consists of three sections: the primary incoming line section, transformer section, and the secondary distribution section. These sections are to be integrated to form a single lineup of metal enclosed structures with metal barriers separating the incoming section from the transformer and the secondary from the transformer. The manufacturer is to furnish the necessary hardware, cable(s) wires and connectors to complete the unit substation's interconnections.

The unit substation shall be rated at 500 kVA, 95 kV B.I.L, 3-phase, 60-cycle. Primary voltage shall be 13.2 kV.

The substation shall be provided with a solid ground bus.

The equipment shall be totally adjusted and tested at the factory and sectionalized for shipment.

Cables shall enter the bottom of the incoming section and exit the bottom of the secondary distribution section.

The unit substation shall be painted ANSI 61.

The manufacturer will provide a nameplate depicting the single line diagram of the entire unit substation.

All nameplates are to be provided with a white background with 3/16 inch high black letters. Nameplates should be mounted with screws.

The necessary control power shall be provided by the manufacturer. The control transformer will be provided in the secondary distribution section for use in the entire unit substation. The manufacturer will provide the necessary terminal blocks and wiring to complete the circuitry. The wiring diagrams and terminal blocks will be identified so installation will be relatively simple.

2.1.2 Load Interrupter Section

The load interrupter switch shall conform to ANSI/IEEE C37.20.3, ANSI/IEEE C37.20.4 and ANSI/IEEE 24.

Switchgear: The metal-enclosed load interrupter switchgear shall be Square D type HVL or approved equal.

Fuses shall be Boric acid, expulsion type, fuse holders with replaceable refills or fuse units, complete with muffler exhaust control. Fuses shall be affixed in position in a non-disconnect fuse mounting with provisions for removal and replacement from the front of the gear. Fuses shall be "E"

rated, Voltage Class 15.0 kV.

A viewing window shall be installed in the switch enclosure and located so as to enable visible inspection of the switch blades and blown fuse indicators from outside the enclosure.

The load interrupter switch shall be rated at 600 amperes continuous and interrupting; and fixed mounted on NEMA class A-20 glass reinforced polyester standoff insulators. The stored-energy, manually operated mechanism shall be equipped with separate opening and closing springs. The opening spring shall be charged prior to the closing spring. Operation of the load interrupter switch shall be by means of a close/open lever. Operation shall be quick-make, quick-break with the speed of operation independent of the operator. The mechanism shall be equipped with an opening coil and operated from a 120 VAC source. To provide for dependable operation, the device shall not rely on chains or cables to drive the blade assemblies open and closed. The spring operator assembly shall be isolated from high voltage and coupled through a direct drive shaft.

The switch operating handle shall be permanently attached to the outside front of the switchgear and ready for immediate use. Removable handles are not acceptable. The handle must operate in the conventional fashion with the switch closed with the handle in the up position and the switch open with the handle in the down position. Provisions shall be available for padlocking the switch in either the open or closed position.

The high-voltage compartment door shall be interlocked to prevent opening with the load interrupter in the closed position. The interlock must be directly attached to the operating mechanism and should not rely on long cables and linkages.

Indicating lights shall be provided to indicate switch position.

Minimum sheet metal thickness shall be 11 gauge steel on all exterior surfaces. Adjacent bays shall be securely bolted together to form an integrated rigid structure. To assist installation and maintenance of bus and cables, the rear covers shall be removable. Each individual unit shall be braced to prevent distortion.

No energized parts should be within normal reach of the opened doorway. Four full-length vertical barriers of 3/16-inch thick glass-reinforced polyester, NEMA grade GPO-3, minimum, shall isolate the three phases of the load interrupter switch and fuses from each other and from the enclosure.

Main Bus shall be silver-plated copper insulated rated 600 amps, and is to be supported from the top of the enclosure on NEMA class A-20 glass reinforced polyester standoff insulators.

2.1.3 TRANSFORMER SECTION

The transformer section shall conform to ANSI C57.12.5 and, ANSI C57.12.55-1987.

The transformer shall be the substation type with side-wall mounted primary and secondary terminations.

Transformer shall be Uni-Cast, dry-type construction, mounted in a suitable, ventilated indoor enclosure.

The average temperature rise of the transformer windings shall not exceed 100° C when the transformer is operated at full nameplate AA and FA rating. The transformer(s) shall be capable of carrying 100% of nameplate kVA rating in a 40° C maximum, 30° C average ambient as defined by IEEE C57.12.02.

The transformer shall be rated 500 kVA. Primary voltage 13.2 kV volts delta. Secondary voltage 480 volts 4-wire, 60 Hz with two 2-1/2% full-capacity above normal and two 2-1/2% full-capacity below normal primary taps. Impedance shall be ±7-1/2%. Sound level shall not exceed the maximum specified by NEMA TR-1,1980 for the applicable kVA size of dry-type transformer.

Both high voltage and low voltage windings shall be of copper conductors. High voltage windings shall each be separately cast as one rigid tubular coil, and arranged coaxially. Each primary coil shall be fully reinforced with glass cloth, and cast under vacuum to provide complete, void-free resin impregnation throughout the entire insulation system. Reinforcement with suspended particulate matter is not acceptable. The coil supports shall maintain constant pressure during thermal expansion and contraction of the coils. There shall be no rigid mechanical connection between high voltage and low voltage coils. The low voltage windings shall be made with full width sheet. The secondary windings shall be completely wrapped in epoxy-impregnated Nomex®. Then, the windings shall be encapsulated using a vacuum pressure impregnation. To seal the end cavities, the coil ends shall be potted with an air-dried epoxy.

The impulse rating of the high voltage windings must be at least equal to the basic impulse level specified by IEEE C57.12.91 for oil-filled transformers of the same voltage class, without the use of supplemental surge arresters.

The impulse rating of the low voltage winding must be at least 10 kV for low voltage windings rated 1.2 kV and below.

The transformer core shall be constructed of high grade, grain-oriented silicone steel laminations, with high magnetic permeability. Magnetic flux density is to be kept well below the saturation point. The core shall be cruciform in shape, with mitered joints to keep core losses, excitation current, and noise level at a minimum. The outside surfaces of the core shall be protected against corrosion by painting with a suitable coating after assembly. Core dipping is not acceptable.

2.1.4 OUTGOING (DISTRIBUTION) SECTION

The distribution section shall consist of a low voltage circuit breaker conforming to UL 489and potential and current transformers for metering.

2.1.4.1 Circuit Breaker

The circuit breaker shall be molded case, quick-make, quick-break, thermal-magnetic, permanent trip type and shall be factory calibrated and sealed for accurate overcurrent response and maximum short-circuit strength.

The circuit breaker shall have an 800 amp frame with an interrupting capacity of 65 kA RMS symmetrical.

2.1.4.2 Metering

Potential and current transformers shall be provided which shall conform to the requirements of the local Utility for watthour metering.

2.2 Equipment Shelter

2.2.1 General

The enclosure will consist of a roof, two sidewalls, two end walls, and a floor/underframe incorporating prepainted aluminum stressed-skin semi-monocoque construction.

2.2.2 Roof

The roof shall incorporate a positive camber and be comprised of a mill-finish 6063-T6 extruded aluminum perimeter channel or "roof rail" with 16 gauge roll-formed galvanized crossmembers or "roof bows" mechanically fastened to the roof rails. In a drop-over (no floor/underframe/tank) enclosure, two (2) roof lift rings per side (4 total) of 10,000 pound capacity each shall be located within the roofrail perimeter for the purpose of handling the enclosure. Integral structural "spreader bars" shall be incorporated between adjacent pairs of lift rings.

The roof skin shall be a nominal 0.040-inch thick 3003-H16 or 3105-H14 mill-finish aluminum sheet and fastened to the roof bows and roof rails. The top skin shall be rolled over the perimeter of the roof rails to provide additional weather protection. A weatherproof mastic/sealant shall be used at the perimeter, as well as any joints required in the roof skin. The top skin shall be comprised of separate sheets of roof skin joined with lock-seam construction. This joint(s) shall include a high performance mastic tape or sealant for both joint structural integrity and weather protection.

2.2.3 Walls

The walls shall be manufactured utilizing mill-prepainted 0.040 inch thick (nominal) 3004-H36 aluminum panels hard-riveted 3 inches on center to 3-inch fabricated aluminized steel "Z" section wall posts located on 24 inch (maximum) centers. The enclosure walls shall incorporate an extruded structural "panel-cap" of mill finish extruded 6063-T6 aluminum.

The panel-cap will interlock into the adjoining roofrail for a weatherproof structural connection between the roof and sidewalls. The bottom exterior of the sidewalls will incorporate a mill finish extruded 6063-T6 aluminum "rubrail" for a structural connection of the sidewalls to the base perimeter.

2.2.4 Corner Posts

Corner posts shall be pairs of mating/interlocking mill finish 6063-T6 aluminum extrusions with one-half of each pair attached to the end of the wall. The halves will interlock upon assembly forming a structural, weatherproof corner.

2.2.5 Removable End Wall

One end wall shall be of a removable type retained with 0.250-inch stainless steel thread-forming hardware to facilitate equipment installation and maintenance.

2.2.6 Floor/Underframe

The floor structure shall be rated for a minimum distributed load of 200 lbs./ft2 and reinforced as required to support prevailing point-loading. The floor and underframe assembly shall consist of rectangular steel tubing or structural I-beams welded to form the outer perimeter. This perimeter shall be combined with formed or structural steel crossmembers (nominal 16-inch centers) so as to create a welded steel support structure. Steel tapping angles (nominal 0.375-inch thick) shall be incorporated into the floor structure for adequate structural support and attachment of the generator set and vibration isolators. The crossmembers shall be overlaid with a composite of 0.72-inch thick (nominal) oriented strand board (OSB) and finished with diamond steel plate. A rubber mat floor covering shall be provided.

2.2.7 Doors

One commercial door shall be provided. Door shall be of 18-gauge Galvanized steel construction painted to match the enclosure exterior and incorporated into 16-gauge painted Galvanized steel frames that are structurally integrated into the enclosure wall. The door shall include heavy-duty continuous aluminum gear hinges and a passage latch, which includes commercial key-sets. The passage latch shall incorporate a handicapped-access style lever-type operator for ease of egress in the event of emergency. The latch hardware shall allow escape from within when locked externally. Doors shall include a positive restraint to prevent the door from opening more than 100 degrees in normal operation. Door holdback hardware shall be provided to secure the door to the enclosure wall when the door is opened approximately 180 degrees during installation and maintenance evaluations. Wall adjacent to door includes aluminum protector plate for impact protection from the protruding door handle. All door openings shall include an overhead rain gutter for channeling rainwater away from the enclosure. Panic bar exit hardware will be available upon request.

2.2.8 Lift Points

Lift rings shall be provided at the base perimeter for the purpose of lifting the complete enclosure with installed equipment into place. The lift rings shall be 1.25-inch (nominal) steel plate and welded into the base or rupture basin (if applicable) perimeter at 4 locations.

2.2.9 Interior Finish

Interior lining shall be 1/2 inch varnished AC plywood over 3 inch insulation.

2.2.10 Electrical Equipment

The equipment shelter shall be supplied furnished and wired with the following electrical equipment.

a. one 60 amp, three phase, 120/208 volt panelboard

b. two incandescent lights, 120 volt, 100 watt, with vaportight fixtures

c. one single pole light switch

d. two GFCI duplex receptacles, 120 volt, 20 amp

e. one 12 inch exhaust fan with thermostat and gravity damper

f. one 5 kw heater with thermostat and cut out heater, 208 volt, three phase

g. one inlet louver wired to panelboard

2.3 Equipment Shelter Foundation

2.3.1 General

A new foundation shall be constructed on the existing concrete slab following removal of the existing structure as outlined in Section 3.2. The new foundation shall be a 6 inch thick slab of Class A concrete. The dimensions of the new foundation shall be identical with the existing foundation.

2.3.2 Preparation

Preparation of the existing foundation shall consist of the following:

a. Pressure washing of the foundation following removal of the existing structure.

b. Installation of six equally spaced dowels in the existing foundation to prevent movement of the new slab. Dowels shall be one inch diameter steel rods, epoxy grouted into the existing foundation. The dowels shall extend from the existing foundation so as to allow a minimum of 1 inch coverage by the new foundation.

c. Application of an approved bonding agent prior to installation of the new concrete.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Contractor Requirements

a. The plans and specifications depict the general concept of the bridge electric service, as intended by this contract. These plans and specifications are not intended to be complete in all details. It shall be the responsibility of the Contractor to provide additional detailing, as required to provide a complete, reliable, working system in conformance with the concepts and intent set forth on the plans, including whatever may be necessary to complete the installation and equipment in a manner acceptable to the Contracting Officer. Such additional detailing, equipment and labor shall be furnished by the Contractor without extra cost to the Government.

b. The Contractor shall submit a wiring diagram and list of equipment to be furnished for approval, prior to starting his electrical work. Wire numbers shall be provided on the wiring diagrams, as described in the Conductors and Wiring section of these specifications. All electrical work shall be strictly in accordance with the requirements of the National Electrical Code and all other applicable codes.

3.1.2 Conduit and Fittings

a. All conduits shall enter or exit the equipment shelter through wall penetrations located as near the floor as is practical. All penetrations through the walls shall be properly sealed.

b. Install liquid-tight unions where standard threaded couplings cannot be used.

c. Equip conduit terminations with grounding insulating bushing.

d. Install or repair conduits in accordance with the requirements of The National Electrical Code.

e. Conduit entering or exiting the equipment shelter shall be provided with conduit bodies to facilitate installation of conductors.

h. Fasten conduits securely to all outlets, junction and pull boxes, and cable trays with full number of threads projecting through tapped bosses. Use gasketed or O-ring waterproof conduit hubs or outside boxes where tapped bosses are not possible.

i. Furnish sleeves and inserts and install as required for the electrical work.

h. Conduits crossing expansion joints shall be provided with expansion fittings or other approved means to compensate for expansion and contraction. Expansion fittings shall allow for the amount of expansion and deflection required for each specific location.

i. Provide grounding-type, insulated bushings on conduits at all switchgear enclosures. Bond grounding bushings together and to the equipment enclosure, or where provided, the equipment ground bus.

j. Make up all conduit connections tight to provide good electrical conductivity throughout the entire length of the conduit run, including flexible conduits. A separate bonding wire shall be provided for lengths of flexible conduit exceeding 6 feet.

k. Install pull boxes or pull bodies in all conduit runs, as required, and locate, as approved. No exposed conduit run shall exceed 150 feet between boxes, fittings, pull bodies, etc.

3.1.3 Conductors and Wiring

a. Install wiring and conductors only when the conduit or raceway system has been completed. Thoroughly clean the inside of all conduits of any dirt, moisture or other foreign materials before pulling wire and cable. Pull wires and cables in conduits after an application of suitable, approved lubricant that will have no injurious effect on the installation of the conductor. No oil or grease shall be used.

b. Make no splices or joints in either feeders or branch circuits, except at outlets, accessible junction boxes or accessible raceway fittings.

c. Secure joints in circuit wiring mechanically and electrically. Conductors shall be joined by compression-type splicing sleeves, by means of bolted-type pressure connectors having cast-metal bodies, or on terminal blocks. Split-bolt-type connectors are not acceptable. Unless properly

insulated by the connector, all joints shall be insulated at least equal to the installation of the conductors.

f. Verify that circuits are wired, as indicated, and are continuous and free of shorts, opens and unintentional grounds. Energize and test each circuit. Test other electrical equipment, as recommended by the manufacturer or the Contracting Officer. Measure ground bus and grounded conductor resistance to true ground, resistance between enclosure and ground bus, between pairs of bus bars and between insulation and ground bus. Resistance must be within limits specified below. Troubleshoot and correct as necessary.

g. Repeat the circuit tests specified above in the presence of and to the satisfaction of the Contracting Officer.

3.1.4 Acceptable Resistances

a. Ground bus and grounded conductor to true ground: 2 OHMS, Maximum.

b. Between enclosure and ground bus: Less than 0.1 OHM.

c. Between pairs of bus bars: 100 MEGOHMS, Minimum.

d. Between bus bars and ground: 100 MEGOHMS, Minimum.

3.1.5 Installation of Boxes and Fixtures

Where several feeders pass through a common pull box, tag the feeders to indicate clearly the electrical characteristics, circuit number and panel designation.

3.1.6 Spare and Renewal Parts

Spare and renewal parts shall be furnished in compliance with AASHTO, Part 6, Paragraph 6.7.5.48, as specified. It is required that recommended spares be listed in three or more categories arranged in order of importance to operations, inspection, maintenance, troubleshooting and repair. Copies of the manufacturer's recommendations shall be included in the Operation and Maintenance Manual.

a. Mandatory items to be provided shall include the following:

- Six fuses of each kind and size used.
- One complete set of stationary and moving contacts for each size of each device incorporating replaceable contacts.
- Three indicating light units, complete with lamp, fitted with cap of each color used in the installation.
- One coil for each size magnetic contactor and relay used.
- One set of overload devices (including current monitors) and/or heaters of each size and type used.
- Six incandescent lamps of each size and type used.

b. In addition to the mandatory items listed above, the Contractor shall obtain supplementary spare and renewal parts list recommendations for

optional purchase from each manufacturer supplying the various items of power, control and auxiliary equipment approved for permanent installation. The Contractor shall then confer with the Contracting Officer to establish an initial inventory of spare and renewal parts which shall be comprised of the specific mandatory items listed above, plus those additional items recommended for Government purchase from the manufacturer's listings.

c. All spare and renewal parts for both initial and future inventories shall be listed by categories with descriptions and manufacturer's catalog reference number or other designation. Each category shall be prepared in format suitable for insertion into the Operation and Maintenance Manual with section identification and index.

d. All spare and renewal parts shall be carefully prepared for storage in convenient packages of individual items or lots. Each package shall be completely identified as to its contents and delivered to the selected places of storage at such time as directed by the Contracting Officer.

3.2 Removal of Existing Structure

The existing structure located as shown on the contract plans shall be removed in its entirety from the existing concrete slab foundation. All conduit penetrations through the existing slab shall be cut off flush with the top of the slab.

All removals shall become the property of the contractor, who shall be responsible for the prompt removal and disposal of same from the contract site.

-- End of Section --

SECTION 16120

BRIDGE STANDBY ENGINE GENERATOR SYSTEM

PART 1 GENERAL

WORK COVERED BY THIS SECTION. This section consists of the installation of materials and equipment for a standby engine generator system.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, INC. (AASHTO)

AASHTO	(1988) Standard Specifications for Movable Highway Bridges

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Shop Drawing and Manufacturer's Catalog; GA

Data shall be composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents of all electrical materials, equipment and devices proposed for the project.

SD-04 Drawings

Shop Drawings; GA

Detail drawings consist of equipment drawings, illustrations, schedules, instructions, diagrams, ratings, specifications, and other information necessary to define the equipment and installation. Detail drawings shall show the rating of items and systems and how the components of an item and a system function, are assembled and installed on the project. Data and drawings of an item or system shall be coordinated and submitted as a unit

in a single submission. Multiple submissions for the same equipment or system will not be acceptable, except where prior approval has been obtained from the Contracting Officer. Detail drawings shall show physical arrangements, construction details, connections, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Optional items shall be clearly identified as included or excluded. Detail drawings shall also be submitted when the installation and mounting details of equipment, system, fixtures and devices are different from or not specifically detailed on the contract drawings. Shop drawings for all equipment and system shall be submitted for review and approval by the Contracting Officer prior to ordering or commencing any work.

Shop drawings which have not been approved or require correction shall be resubmitted until such time as they are acceptable to the Contracting Officer, and such procedures shall not be considered as a cause for delay or an additional cost to the Government.

Working Drawings; GA

Detail drawings shall illustrate the Contractor's proposed method of accomplishing the required work prior to commencing construction. The drawings shall consist of equipment drawings, illustrations, schedules, diagrams, ratings and other information necessary to define the installation. Such required working drawings shall include, but need not be limited to, the following:

a. Single-line and three-line diagrams, schematics or elementary power and control diagrams of each electrical system.

b. Grounding and bonding diagrams.

c. Conduit, cable and wire routing.

d. Wire connection diagrams that show the termination of wiring routed between separate items and equipment.

f. Electrical apparatus certified dimension data.

g. Layout arrangement of electrical/mechanical equipment connection data.

As-Built Drawings; FIO.

The as-built drawings shall be a record of the construction as installed and shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be full-sized set of prints marked to reflect all deviations, changes, and modifications. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full-sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor

shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor. Following the project completion and turnover, within 30 days, the Contractor shall furnish two sets of final as-built drawings to the Contracting Officer.

SD-08 Statements

Contractor Experience; GA

The Contractor shall submit a tabulation of experience in the installation and rehabilitation of movable bridge electrical systems.

The supervisory personnel of the machinery installation, replacement, and rehabilitation operations shall have a minimum of five years of experience with a minimum of three movable bridge electrical systems.

The journeymen performing the electrical installation, replacement and rehabilitation shall have experience in the installation and repair of large scale electrical transmission and control systems. The list of the experience of the electrical suppliers shall be submitted to the Contracting Officer.

SD-19 Operation and Maintenance Manuals

Operation and maintenance manual; FIO

The Contractor shall submit three copies of operation and maintenance manual, bound in hardback binders, or an approved equivalent, for the barrier gate and any other related electrical equipment indicated in this technical section. The Contractor shall furnish one complete manual prior to performance of systems or equipment tests, and the remaining manuals prior to the contract completion. The manual shall be inscribed with the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the system, equipment, name of the Contractor and contract number, included the names, addresses, and telephone numbers of each subcontractor or vendor installing or furnishing the system or equipment. The manual shall have a table of contents, and shall be assembled to conform to the table of contents, with the tab sheets placed before instructions covering the subjects. The instructions shall be legible and easily read, with large sheets of drawings folded in.

The manual shall include the following:

a. Internal and interconnecting wiring and control diagrams, with data to explain detailed operation and control of the system or equipment.

b. Description of the function of each principal item of the equipment.

c. Installation and maintenance instructions.

d. Safety precautions.

e. Diagrams and illustrations.

f. Testing methods.

g. Performance data.

h. Lubrication schedule. The lubrication schedule shall include the type, grade, temperature range, and frequency for all new items requiring lubrication.

i. Part list. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.

j. Appendix. The appendix shall list all qualified and permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

1.3 APPLICATION.

1.3.1 General

The Contractor shall furnish all materials and equipment to install, adjust, test, and complete a permanent installation of a standby engine generator system, including transfer switch and related appurtenances and all other incidentals shown and described on the contract plans or specified elsewhere in these contract documents.

1.3.2 Summary

This work, in general, shall include, but not be limited to, the furnishing and installation of the following principals items of work shown and specified:

a. New engine generator, located as shown on the contract plans.

b. Sub base fuel tank, located beneath the engine generator.

c. The Contractor is herewith informed that additional detail development and coordination will be necessary. All additional detail development and coordination required for proper materials acquisition, and installation of the engine generator system shall be included in the price bid for this work.

d. All references on the Contract Plans and in the Specifications to specific manufacturers' model/catalog numbers is for the purpose of describing minimum features and quality. It shall be the responsibility of the Contractor to confirm the accuracy of the model numbers and catalog numbers. In no instances is it intended that such model numbers and catalog numbers are sufficiently complete or accurate to be used for direct purchasing.

e. Where brand names or specific manufacturers are listed, products of equivalent or better quality, features and performance may be proposed for substitution. In such cases, the Contractor is required, at no additional reimbursement, to submit complete technical specifications and performance data, and, at the option of the Engineer, may also be required to submit a representative sample of the item for the Engineer's examination and evaluation. All such submitted samples will be returned to the Contractor, at the Contractor's expense, following the evaluation.

f. Additional detailing as required to complete the work intended by these drawings and specifications.

g. All adjustments and corrective measures required to properly complete

all systems.

h. Clean-up, restoration, and painting, as required by the Contracting Officer.

i. Acquisition packaging, and delivery of specified spare parts.

j. Preparation and delivery of as-built drawings and operation and maintenance manual.

1.4 QUALIFICATION

1.4.1 Required Contractor Electrical Experience

The Contractor shall submit a tabulation of previous experience with the installation and rehabilitation of movable bridge electrical systems.

The supervisory personnel for the electrical installation, replacement, and rehabilitation activities shall have a minimum of five years of experience in the installation and repair of industrial electrical distribution and controls. The list of experience of the supervisory personnel shall be submitted to the Contracting Officer for approval.

PART 2 PRODUCTS

2.1 ENGINE GENERATOR

2.1.1 General

The engine generator set shall be a 480/277 volt, 60 Hz, three phase, 4-wire wye-connected, and rated 625 KW continuous standby, with a sub-base fuel tank and weather protective housing. The diesel engine generator shall be a Generac model SD625 or equal. Units exceeding 148 inches length, 58 inches width, or 11,000 lbs dry weight will not be accepted.

2.1.2 Engine

The engine shall be a turbocharged and aftercooled diesel engine with a minimum displacement of 1495 cu. inches, and a governed speed of 1800 rpm. Engine shall utilize No. 2 diesel fuel and shall be provided with an engine-driven fuel pump, fuel filter and fuel supply and return lines. Engine shall be equipped with a dry type air cleaner with replaceable filter elements.

The engine shall be provided with a liquid cooling system consisting of a unit-mounted radiator, radiator fan, water pump, thermostat, and 2500 watt 240 volt coolant heater.

The engine lubrication system shall consist of a positive displacement, full pressure lubrication oil pump, cartridge oil filters, dipstick and oil drain.

The engine shall be provided with an exhaust system consisting of a residential rated exhaust silencer and stainless steel flexible exhaust connectors.

The engine electrical system shall consist of a 30 ampere minimum battery charging alternator, a 24-volt battery (2 x 12) and an AC powered battery charger with automatic float/equalize operation with current limiting

circuitry to limit charging current to 10 amps maximum.

2.1.3 Fuel Tank

The engine shall be provided with a U.L. listed double wall sub-base fuel tank with a capacity of approximately 400 gallons. Tank shall be provided with fuel level gauge, locking fill cap, and with all necessary fuel supply and return lines to engine generator. Tank shall be rated to support the total weight of the engine generator, weather housing, and all accessories supplied.

2.1.4 Generator

The generator alternator shall be four-pole, revolving field, self-ventilated, tropicalized drip -proof construction with amortisseur rotor windings. The insulation shall be NEMA standard for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. The excitation system shall be brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within +/-2% at any constant load from 0% to 100% of rating.

The generator shall be capable of sustaining at least 300% of rated current for a least 10 seconds under a three-phase symmetrical short by inherent design.

The generator shall have a single maintenance-free bearing and shall be directly connected to the flywheel housing with a flexible disk coupling between the rotor and flywheel.

The engine generator shall be provided with a generator-mounted control/instrument console which shall include the following features:

Two-wire start/stop control which shall operate on opening/closure of a remote contact.

Cyclic cranking per NEMA-110, with over-crank limiter.

Interlock to prevent starter re-engagement with engine running.

Safety engine shut-down for high coolant temperature, low coolant level, low oil pressure, or overspeed.

A front panel mounted voltage adjusting rheostat.

A three position control switch (Run-Off/Reset-Auto) and indicator lamp test switch.

Alarm horn with silencing switch per NFPA-110.

Emergency Stop pushbutton.

AC voltmeter, AC ammeter, AC frequency meter, metering selector switch (7-position), engine water temperature gauge, engine oil pressure gauge, running time meter.

Indicator lamps for overcrank, low oil pressure, high engine temperature, overspeed, emergency stop, not-in-auto, low fuel, auxiliary alarm.

2.1.5 Weather Housing

A weather housing shall be provided to completely enclose the engine generator set, excluding the exhaust silencer, which shall be mounted on the top of the weather housing. Access doors shall be provided on sides and end as required for full access to engine and generator.

2.2 Automatic Transfer Switch

Automatic transfer switch shall be Russelectric, Model RMT, or equal, enclosed, three-pole, rated 800 amps, 480 volts three-phase. Switches shall be U.L. listed to Standard UL-1008, three pole, open type, double throw, and shall be mounted in a NEMA 12 wall mounted enclosure.

The transfer mechanism shall be high speed, quick-break/quick-make, and shall be actuated by a single electric unidirectional AC gearmotor operator momentarily energized, and connected to the electrical contacts operator by a simple over center type spring-loaded linkage. The transfer switch shall be capable of transferring successfully in either direction, providing arc interruption in less than one-half cycle.

NOTE: linear motor and solenoid type transfer switches are not considered equivalent and are not acceptable.

Manual operation shall be via a hand-crank on the end of the transfer motor, providing same transfer speed as automatic and safety for the personnel operating it.

The normal and emergency contacts shall be positively interlocked both mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions. Separate arcing contacts, with magnetic blowouts shall be provided .

Transfer switch shall be provided with the following features:

Engine starting contacts, with adjustable time delay

Adjustable time delay transfer to standby source

Adjustable time delay retransfer back to normal source

Test switch to simulate loss of normal source

Time delay engine running unloaded for cool down

Adjustable close-differential voltage monitoring, normal source

Adjustable voltage/frequency monitoring, all phases of standby source

Source available indicator lights on front of enclosure - amber for both generator and utility power

Switch position indicator lights - green for normal, red for standby source selected

Auxiliary contacts: 1 NO & 1 NC for each position of switch for

use by bridge control system

Switchboard type voltmeter and ammeter with phase selector switches for monitoring transfer switch load, regardless of source.

PART 3 EXECUTION

3.1 INSTALLATION

The Contract Plans and Specifications depict the general intent of this Contract. They are not intended to be of sufficient detail to be used in lieu of Shop Drawings, Layout Drawings, and Wiring Diagrams. Additional detail development shall be required of the Contractor to provide and submit these drawings.

It shall be the responsibility of the Contractor to provide additional detailing and coordination of components, subsystems, manufacturers, vendors and installation as necessary to provide a complete, reliable, working system in conformance with the concepts and intent set forth on the Plans and in the Specifications. Any required additional detailing, coordination, labor and incidental materials shall be furnished at no extra cost.

The work shall be performed in compliance with the National Electrical Code, latest version, the AASHTO Standard Specifications for Movable Highway Bridges, and the AREMA Manual Movable Bridge Specification, as they apply. Any discrepancies between the Contract Plans and Specifications, and the referenced publications shall be brought to the attention of the Engineer for resolution prior to purchasing the materials or performing the work in question.

All workmanship shall be of the highest quality. Wiring, where practical, shall be bundled and run neatly, plumb or level, parallel to edges of cabinets, or at right angles. All conductors and terminal blocks shall be permanently labeled in accordance with the Wiring Diagrams and Shop Drawings.

3.2 Spare and Renewal Parts

Spare and renewal parts shall be furnished in compliance with AASHTO, Part 6, Paragraph 6.7.5.48, as specified. It is required that recommended spares be listed in three or more categories arranged in order of importance to operations, inspection, maintenance, troubleshooting and repair. Copies of the manufacturer's recommendations shall be included in the Operation and Maintenance Manual.

b. In addition to the mandatory items listed above, the Contractor shall obtain supplementary spare and renewal parts list recommendations for optional purchase from each manufacturer supplying the various items of power, control and auxiliary equipment approved for permanent installation. The Contractor shall then confer with the Contracting Officer to establish an initial inventory of spare and renewal parts which shall be comprised of the specific mandatory items listed above, plus those additional items recommended for Government purchase from the manufacturer's listings.

c. All spare and renewal parts for both initial and future inventories shall be listed by categories with descriptions and manufacturer's catalog reference number or other designation. Each category shall be prepared in format suitable for insertion into the Operation and Maintenance Manual

with section identification and index.

d. All spare and renewal parts shall be carefully prepared for storage in convenient packages of individual items or lots. Each package shall be completely identified as to its contents and delivered to the selected places of storage at such time as directed by the Contracting Officer.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 16200

TRAFFIC SIGNALS AND BARRIER GATES

PART 1 GENERAL

WORK COVERED BY THIS SECTION. This section consists of the installation of materials and equipment for a new traffic signal and barrier gate system.

1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Shop Drawing and Manufacturer's Catalog; GA

Data shall be composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents of all electrical materials, equipment and devices proposed for the project.

SD-04 Drawings

Shop Drawings; GA

Detail drawings consist of equipment drawings, illustrations, schedules, instructions, diagrams, ratings, specifications, and other information necessary to define the equipment and installation. Detail drawings shall show the rating of items and systems and how the components of an item and a system function, are assembled and installed on the project. Data and drawings of an item or system shall be coordinated and submitted as a unit in a single submission. Multiple submissions for the same equipment or system will not be acceptable, except where prior approval has been obtained from the Contracting Officer. Detail drawings shall show physical arrangements, construction details, connections, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Optional items shall be clearly identified as included or excluded. Detail drawings shall also be submitted when the installation and mounting details of equipment, system, fixtures and devices are different from or not specifically detailed on the contract drawings. Shop drawings for all equipment and system shall be submitted for review and approval by the Contracting Officer prior to ordering or commencing any work.

Shop drawings which have not been approved or require correction shall be resubmitted until such time as they are acceptable to the Contracting Officer, and such procedures shall not be considered as a cause for delay or an additional cost to the Government.

Working Drawings; GA

Detail drawings shall illustrate the Contractor's proposed method of accomplishing the required work prior to commencing construction. The drawings shall consist of equipment drawings, illustrations, schedules, diagrams, ratings and other information necessary to define the installation. Such required working drawings shall include, but need not be limited to, the following:

a. Single-line and three-line diagrams, schematics or elementary power and control diagrams of each electrical system.

b. Grounding and bonding diagrams.

c. Conduit, cable and wire routing.

d. Wire connection diagrams that show the termination of wiring routed between separate items and equipment.

f. Electrical apparatus certified dimension data.

g. Layout arrangement of electrical/mechanical equipment connection data.

As-Built Drawings; FIO.

The as-built drawings shall be a record of the construction as installed and shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be full-sized set of prints marked to reflect all deviations, changes, and modifications. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full-sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor. Following the project completion and turnover, within 30 days, the Contractor shall furnish two sets of final as-built drawings to the Contracting Officer.

SD-08 Statements

Contractor Experience; GA

The Contractor shall submit a tabulation of experience in the installation and rehabilitation of movable bridge electrical systems.

The supervisory personnel of the machinery installation, replacement, and rehabilitation operations shall have a minimum of five years of experience with a minimum of three movable bridge electrical systems.

The journeymen performing the electrical installation, replacement and rehabilitation shall have experience in the installation and repair of

large scale electrical transmission and control systems. The list of the experience of the electrical suppliers shall be submitted to the Contracting Officer.

SD-19 Operation and Maintenance Manuals

Operation and maintenance manual; FIO

The Contractor shall submit three copies of operation and maintenance manual, bound in hardback binders, or an approved equivalent, for the barrier gate and any other related electrical equipment indicated in this technical section. The Contractor shall furnish one complete manual prior to performance of systems or equipment tests, and the remaining manuals prior to the contract completion. The manual shall be inscribed with the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the system, equipment, name of the Contractor and contract number, included the names, addresses, and telephone numbers of each subcontractor or vendor installing or furnishing the system or equipment. The manual shall have a table of contents, and shall be assembled to conform to the table of contents, with the tab sheets placed before instructions covering the subjects. The instructions shall be legible and easily read, with large sheets of drawings folded in.

The manual shall include the following:

a. Internal and interconnecting wiring and control diagrams, with data to explain detailed operation and control of the system or equipment.

b. Description of the function of each principal item of the equipment.

c. Installation and maintenance instructions.

d. Safety precautions.

e. Diagrams and illustrations.

f. Testing methods.

g. Performance data.

h. Lubrication schedule. The lubrication schedule shall include the type, grade, temperature range, and frequency for all new items requiring lubrication.

i. Part list. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.

j. Appendix. The appendix shall list all qualified and permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

1.2 APPLICATION

1.2.1 General

The Contractor shall furnish all materials and equipment to install, adjust, test, and complete a permanent installation of barrier gates and traffic signals for the operation of the lift bridge, including related appurtenances and all other incidentals shown and described on the contract

plans or specified elsewhere in these contract documents.

1.2.2 Summary

This work, in general, shall include, but not be limited to, the furnishing and installation of the following principals items of work shown and specified:

a. Two new vertical lift barrier gates, located as shown on the contract plans.

b. Four new traffic signals, located as shown on the contract plans.

c. The Contractor is herewith informed that additional detail development and coordination will be necessary. All additional detail development and coordination required for proper materials acquisition, and installation of the barrier gates shall be included in the price bid for this work.

d. All references on the Contract Plans and in the Specifications to specific manufacturers' model/catalog numbers is for the purpose of describing minimum features and quality. It shall be the responsibility of the Contractor to confirm the accuracy of the model numbers and catalog numbers. In no instances is it intended that such model numbers and catalog numbers are sufficiently complete or accurate to be used for direct purchasing.

e. Where brand names or specific manufacturers are listed, products of equivalent or better quality, features and performance may be proposed for substitution. In such cases, the Contractor is required, at no additional reimbursement, to submit complete technical specifications and performance data, and, at the option of the Engineer, may also be required to submit a representative sample of the item for the Engineer's examination and evaluation. All such submitted samples will be returned to the Contractor, at the Contractor's expense, following the evaluation.

f. Additional detailing as required to complete the work intended by these drawings and specifications.

g. All adjustments and corrective measures required to properly complete all systems.

h. Clean-up, restoration, and painting, as required by the Contracting Officer.

i. Acquisition packaging, and delivery of specified spare parts.

j. Preparation and delivery of as-built drawings and operation and maintenance manual.

1.3 QUALIFICATION

1.3.1 Required Contractor Electrical Experience

The Contractor shall submit a tabulation of previous experience with the installation and rehabilitation of movable bridge electrical systems.

The supervisory personnel for the electrical installation, replacement, and rehabilitation activities shall have a minimum of five years of experience

in the installation and repair of industrial electrical distribution and controls. The list of experience of the supervisory personnel shall be submitted to the Contracting Officer for approval.

PART 2 PRODUCTS

2.1 BARRIER GATES

2.1.1 General

The two new barrier gate installations as shown on the plans shall be the Model VL-9900 Vertically Lifting Barrier, by B & B Electromatic, Inc., Norwood, LA Other models and manufacturers may not be available.

The barrier gate upper shroud shall have a vertical clearance from the centerline of the roadway of 23 feet, and the gate when fully raised shall be completely inside the shroud.

The barrier gate tower legs shall be 62 feet center to center of the legs, and the barrier arm shall be approximately 59'-7" long, forming a barrier across the roadway/railway and sidewalks on both sides of the bridge.

The barrier gate assembly shall have a raised platform mounted to one of the two tower legs containing a cabinet with all the operating machinery and controls. The platform shall be accessed from a tower leg ladder with safety cage and security lock.

The barrier gate furnished shall be designed and tested to NCHRP 350, Level 2 Specifications, and shall have the approval of the FHWA for use on federal highways. Crash withstand documentation shall be submitted to the Engineer for review.

The transmission shall be an all gear, direct drive type, running in an oil bath. Use of belts and chains is not acceptable. Steel shafts, crank arms and connecting rods shall be utilized. Connecting rods shall be adjustable, and shall utilize self-aligning ball ends. Motor shall be sized by the manufacturer, rated to operate on 480 volts, three-phase.

Specific motor and transmission data shall appear on the shop drawings. Motor/transmission/linkage ratings calculations shall be submitted with shop drawings demonstrating that the barrier gate operator mechanism can open and close the barrier gate with the specified gate arm against a 60 mph horizontal wind.

Barrier gate arms shall be an aluminum tubular arm assembly of two stepped 6061-T6 aluminum tubes, with external bracing and three internal 3/4" diameter stainless steel cables.

Arm end lock anchors shall be provided at each barrier tower leg for the arm end to lock into at each location.

Barrier gate counterweights shall be hot-dip galvanized steel, sized and configured by the manufacturer so as to balance the barrier gate throughout the entire range of vertical travel.

Flashing red warning lights shall be mounted on gate arms at 5-foot intervals. Lights shall be furnished with a 12 volt rough service lamp. Lights shall be circuited to alternately flash via the two circuits in the flasher. A heavy duty 2-circuit flasher shall be supplied and mounted in

the operator housing. The flasher shall provide two alternately flashing circuits and one steady burn circuit.

Warning lights shall be two-way lights, with 7-inch diameter red acrylic lenses, beam spread of 30 degrees. Light housings shall be cast aluminum, designed for and provided with standard traffic signal lamps, and of weatherproof construction. Lights shall be B & B Electromatic type BM122 or identical.

2.1.2 Operation

The barrier gates shall have four modes of operation:

Remote operation from the bridge control system.

Local operation from the ground, at the base of the tower leg containing the platform with the controls.

Local operation from the raised platform.

Hand/emergency operation from the platform. The time to operate the barrier gate, under emergency hand operating conditions shall be 1.5 to 2 minutes.

2.1.3 Electric Service

Service to the barrier gates shall be 480 V, 3 phase.

All outdoor exposed and buried conduit shall be plastic coated rigid hot-dip galvanized steel. Electrical metallic tubing (EMT) and intermediate electrical conduit (IMC) will not be allowed in any outdoor, underground, or concrete encased applications.

Rigid conduits and fittings for use outdoors, underground, or concrete encased shall be hot-dip galvanized steel per ANSI C80.1 with a factory-applied polyvinyl-chloride (PVC) exterior coating with a nominal 40 mil thickness. The galvanized surfaces of the conduit and fittings shall be coated with an epoxy-acrylic primer before the plastic coating is applied. A two-part urethane or epoxy coating shall be applied to the interior with a nominal 2 mil thickness. The interior coating shall afford sufficient flexibility to permit field bending without cracking of flaking of the interior coating.

Sizes of conduits shall be as indicated on the contract plans. Where conduit sizes are not indicated, the size shall be in accordance with the requirements of the National Electrical Code (NEC).

Couplings, connectors, and fittings shall be of a type specifically designed and manufactured for the application and for the conduit used.

Where final connection to equipment with rigid conduit is not practicable, flexible liquid-tight conduit shall be used.

Flexible conduit shall be liquid-tight, galvanized steel or aluminum conduit. All flexible conduits shall be made liquid-tight by covering the metal core with a smooth, abrasion-resistant, liquid-tight polyvinyl chloride cover. All terminations and fittings for flexible liquid tight conduit shall be specifically designed for the purpose and shall be liquid tight.

Flexible liquid tight conduit shall be used as final connection to all equipment with adjustable mountings, to navigation lights, to all limit switches, and to all motors, and to all machinery with electrical connections. Minimum length of flexible conduit for such applications shall be 18 inches.

Sleeves for conduit or wiring holes through concrete or masonry walls and floors shall be PVC through slab sleeves or PVC pipe, cast in place or epoxied in place after drilling. Sleeves shall be trimmed flush with the concrete surface.

An insulated throat grounding bushing with a bonding lug or screw shall be provided on the end of each conduit terminating in boxes, cabinets, enclosures, or cable trays or raceways. Conduits shall be explicitly bonded with a bonding jumper (wire) to each metal cabinet, box, wireway, and other equipment enclosure which they enter.

General purpose wire and cable shall be stranded copper conductors of ASTM Class B stranding, UL listed, with insulation of type RHW, THHW, THW, or XHHW, rated 600 volts. Minimum conductor size shall be AWG # 12. Wiring and cable shall be rated for wet locations.

All wiring installed in exposed locations shall be furnished with a UV stabilized jacket, sunlight and weather resistant.

Hinges, bolts, screws, and other hardware shall be brass or stainless steel.

Doors shall be gasketed to be weather-tight, per NEMA 4.

Conduit and/or cable entrances in boxes or enclosures located outdoors or in damp or wet locations shall be located in the bottoms of the cabinets or boxes to the extent practical, and shall utilize conduit hubs which shall be gasketed and caulked with sealant. Side or back entrances will only be allowed in situations where bottom entrances are not possible, and then only when appropriate drawings and details demonstrating the impossibility of bottom entrance are provided to the Engineer for review and waiver of the bottom entrance requirement on a case-by-case basis. Conduit and cable entrances in the tops of boxes and enclosures will not be allowed.

2.2 TRAFFIC SIGNALS & WARNING GONGS

2.2.1 General

The new approach warning signals as shown on the plans shall be the type 1201 warning signal manufactured by B & B Electromatic, Inc., Norwood, LA or equivalent.

Warning Signals shall have a twelve inch lens and be designed for heavy duty applications. Warning signal housing shall be cast aluminum for durability and corrosion resistance. Access door shall be hinged and sealed using a neoprene gasket.

A tunnel visor shall be supplied with each unit. The tunnel visor shall be of heavy sheet aluminum and be adjustable or removable without the use of tools.

The standard finish shall be equivalent or better than one coat of primer and two coats of baked on enamel. Warning signals shall be painted traffic signal yellow with the exception of the inside of the tunnel visor, which shall be black.

The lamp receptacle shall be spring mounted on the highly polished aluminum reflector. Lamp assembly shall provide easy access to all components and connections.

Traffic signal lamp shall be an 8000 hour, 67-watt traffic signal type lamp of equal or better standard.

The lens shall be manufactured to meet or exceed ITE specifications, shall be 12 inches in diameter, and red in color.

Mounting clamps shall be provided to allow for pole mounting as shown on plans.

Solid state flashers shall be provided for operating requirements.

The new approach warning gongs as shown on the plans shall be model Z-555 gong by B & B Electromatic, Inc., Norwood, LA or equivalent.

The warning gongs shall be heavy duty, motor driven industrial quality. The housing shall be cast aluminum and accurately machined. Access shall provide easy access to all gong components and be sealed via synthetic gasket.

All gears in the gear train shall be journaled in oil impregnated bronze bearings for long life. The gear train shall drive a cam and hammer to strike the gong shell approximately 100 blows per minute.

The gong shell shall be 12 inches outside diameter and constructed of hot pressed steel. A cast aluminum weather guard shall protect the shell.

Warning gongs shall be mounted atop each of the four traffic signal poles.

Traffic signal poles shall be 4 inch schedule 40 galvanized steel, as shown on the plans.

2.2.2 Operation

The bridge traffic signals shall be operated from the bridge control console.

Upon initiation by the operator warning signals and gongs will activate. Gongs will continue to operate until barrier gates achieve the fully lowered position. Gongs will reactivate when the barrier gates move off of the fully lowered position. When conditions allow, the traffic signals and gongs will be secured by the operator from the control console.

Traffic signals and gongs shall be interlocked such that if any barrier moves off of the fully open position and signals have not been initiated they will be initiated automatically.

2.2.3 Electric Service

Service to the barrier gates shall be 120/208V, 3 phase.

All outdoor exposed and buried conduit shall be plastic coated rigid hot-dip galvanized steel. Electrical metallic tubing (EMT) and intermediate electrical conduit (IMC) will not be allowed in any outdoor, underground, or concrete encased applications.

Rigid conduits and fittings for use outdoors, underground, or concrete encased shall be hot-dip galvanized steel per ANSI C80.1 with a factory-applied polyvinyl-chloride (PVC) exterior coating with a nominal 40 mil thickness. The galvanized surfaces of the conduit and fittings shall be coated with an epoxy-acrylic primer before the plastic coating is applied. A two-part urethane or epoxy coating shall be applied to the interior with a nominal 2 mil thickness. The interior coating shall afford sufficient flexibility to permit field bending without cracking of flaking of the interior coating.

Sizes of conduits shall be as indicated on the contract plans. Where conduit sizes are not indicated, the size shall be in accordance with the requirements of the National Electrical Code (NEC).

Couplings, connectors, and fittings shall be of a type specifically designed and manufactured for the application and for the conduit used.

Where final connection to equipment with rigid conduit is not practicable, flexible liquid-tight conduit shall be used.

Flexible conduit shall be liquid-tight, galvanized steel or aluminum conduit. All flexible conduits shall be made liquid-tight by covering the metal core with a smooth, abrasion-resistant, liquid-tight polyvinyl chloride cover. All terminations and fittings for flexible liquid tight conduit shall be specifically designed for the purpose and shall be liquid tight.

Flexible liquid tight conduit shall be used as final connection to all equipment with adjustable mountings, to navigation lights, to all limit switches, and to all motors, and to all machinery with electrical connections. Minimum length of flexible conduit for such applications shall be 18 inches.

Sleeves for conduit or wiring holes through concrete or masonry walls and floors shall be PVC through slab sleeves or PVC pipe, cast in place or epoxied in place after drilling. Sleeves shall be trimmed flush with the concrete surface.

An insulated throat grounding bushing with a bonding lug or screw shall be provided on the end of each conduit terminating in boxes, cabinets, enclosures, or cable trays or raceways. Conduits shall be explicitly bonded with a bonding jumper (wire) to each metal cabinet, box, wireway, and other equipment enclosure which they enter.

General purpose wire and cable shall be stranded copper conductors of ASTM Class B stranding, UL listed, with insulation of type RHW, THHW, THW, or XHHW, rated 600 volts. Minimum conductor size shall be AWG # 12. Wiring and cable shall be rated for wet locations.

All wiring installed in exposed locations shall be furnished with a UV stabilized jacket, sunlight and weather resistant.

Hinges, bolts, screws, and other hardware shall be brass or stainless steel.

Doors shall be gasketed to be weather-tight, per NEMA 4.

Conduit and/or cable entrances in boxes or enclosures located outdoors or in damp or wet locations shall be located in the bottoms of the cabinets or boxes to the extent practical, and shall utilize conduit hubs which shall be gasketed and caulked with sealant. Side or back entrances will only be allowed in situations where bottom entrances are not possible, and then only when appropriate drawings and details demonstrating the impossibility of bottom entrance are provided to the Engineer for review and waiver of the bottom entrance requirement on a case-by-case basis. Conduit and cable entrances in the tops of boxes and enclosures will not be allowed.

PART 3 EXECUTION

3.1 INSTALLATION

The Contract Plans and Specifications depict the general intent of this Contract. They are not intended to be of sufficient detail to be used in lieu of Shop Drawings, Layout Drawings, and Wiring Diagrams. Additional detail development shall be required of the Contractor to provide and submit these drawings.

It shall be the responsibility of the Contractor to provide additional detailing and coordination of components, subsystems, manufacturers, vendors and installation as necessary to provide a complete, reliable, working system in conformance with the concepts and intent set forth on the Plans and in the Specifications. Any required additional detailing, coordination, labor and incidental materials shall be furnished at no extra cost.

The work shall be performed in compliance with the National Electrical Code, latest version, the 1988 AASHTO Standard Specifications for Movable Highway Bridges, and the 2000 AREMA Movable Bridge Specification, as they apply. Any discrepancies between the Contract Plans and Specifications, and the referenced publications shall be brought to the attention of the Engineer for resolution prior to purchasing the materials or performing the work in question.

All workmanship shall be of the highest quality. Wiring, where practical, shall be bundled and run neatly, plumb or level, parallel to edges of cabinets, or at right angles. All conductors and terminal blocks shall be permanently labeled in accordance with the Wiring Diagrams and Shop Drawings.

3.2 Removals

Existing Traffic Gates shall be removed and disposed of as directed by the Engineer.

Existing barrier gates, associated counterweights, and operating machinery shall be removed and disposed of as directed by the Engineer.

Existing traffic signals shall be removed and disposed of as directed by the Engineer.

3.3 Spare and Renewal Parts

a. Spare and renewal parts shall be furnished in compliance with AASHTO,

Part 6, Paragraph 6.7.5.48, as specified. It is required that recommended spares be listed in three or more categories arranged in order of importance to operations, inspection, maintenance, troubleshooting and repair. Copies of the manufacturer's recommendations shall be included in the Operation and Maintenance Manual.

b. In addition to the mandatory items listed above, the Contractor shall obtain supplementary spare and renewal parts list recommendations for optional purchase from each manufacturer supplying the various items of power, control and auxiliary equipment approved for permanent installation. The Contractor shall then confer with the Contracting Officer to establish an initial inventory of spare and renewal parts which shall be comprised of the specific mandatory items listed above, plus those additional items recommended for Government purchase from the manufacturer's listings.

c. All spare and renewal parts for both initial and future inventories shall be listed by categories with descriptions and manufacturer's catalog reference number or other designation. Each category shall be prepared in format suitable for insertion into the Operation and Maintenance Manual with section identification and index.

d. All spare and renewal parts shall be carefully prepared for storage in convenient packages of individual items or lots. Each package shall be completely identified as to its contents and delivered to the selected places of storage at such time as directed by the Contracting Officer.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

SECTION 16910

SIGNALING FOR RAILROAD LIFT BRIDGE

PART 1 GENERAL

1.1 DESCRIPTION

1.1.1 General

The Lift Bridge across the Reserve Basin carries road traffic and rail traffic at grade but not simultaneous. When bridge is closed, it is normally open to road traffic, but when train shows up, rail traffic will have precedence. When Lift Bridge is open for marine traffic, both road traffic and rail traffic stop.

1.1.2 Function

The signal system will provide the functions of train detection, and signaling for safe train operations. The Contract includes the design and furnishing of all circuitry necessary to provide complete operation of signal equipment required to perform these functions. This includes wayside signals, track circuits, rail seating and span lock checks, interlocking logic and related devices to maintain the proper functioning of the signal system.

1.1.3 Location

The Philadelphia Naval Business Center, which includes the lift bridge across the Reserve Basin.

1.1.4 Bidder Qualifications

The bidder shall demonstrate to the satisfaction of the Engineer that he can furnish the full range of services required as specified, and that he has successfully and satisfactorily completed a comparable contract using vital relay interlockings, equivalent in scope, complexity, and magnitude with another North American railroad or rapid transit system.

The Bidder shall have an experience engineering staff, manufacturing facilities and quality control procedures which, in the opinion of the Engineer, will ensure that quality and reliability of the system to be furnished and the satisfactory completion of this Contract.

The Bidder shall submit with his Proposal showing a minimum of 5 years of experience and a description of at least two similar works previously completed by him. The description shall include the Prime Contractor, owning/operating agency, period of performance and any other germane information required to fully describe the scope of work.

1.2 SCOPE OF WORK

1.2.1 General

The contract specifies the functional and system requirements of the new

relay based signaling system for the lift bridge.

The contract consists of detailed engineering, designing, furnishing wired houses/cases, factory testing, training, attending design meetings, field installation including cabling, field testing, and cutover.

The Contractor is responsible for furnishing all apparatus required for proper operation of the signal system.

The Engineer will determine the actual staging sequence for signal circuit design, construction activities, and cutover.

The Contractor shall review all applicable documents, particularly in the area of signal conduit system, signal power, cable plan & routing, sizing equipment housing, and case site plans. The Contractor shall submit to the Engineer within 30 days of the NTP, written confirmation that the following can effectively interface to the Contractor's signal design:

a. Equipment housing and case sizes

b. Adequacy of cable plan shown in contract drawing X-004.

c. Cable routing

d. Conduit sizing and cable sizing

e. Mounting of rail seat check equipment, span lock check equipment, and track circuit connector equipment.

The Contractor shall submit a listing of all discrepancies found in his review process to the Engineer for resolution prior to the Contractor's initial submittal of the detailed signal circuit design.

1.2.2 Load Calculation

The Contractor shall submit a detailed calculation for 60 hertz power requirements for signal system which shall include direct current (DC) power requirements for individual locations.

1.2.3 House/Case Sizing

All housing and case sizes shall be as specified, unless the Contractor can provide written documentation within 30 days of the NTP to justify modifications.

1.2.4 Factory Testing

The Contractor shall perform factory testing of all completed instrument houses and cases in the presence of the Engineer not later than the dates specified. The Engineer shall be notified in writing of all factory tests not less than 30 days prior to the beginning of any testing. All specified testing shall be approved as properly executed by the Engineer before delivery of the housings.

1.2.5 Delivery

The instrument houses and cases shall be delivered to the material staging area complete, tested, sealed and undamaged not later than the dates specified. All other Contractor-supplied equipment, specified by this

contract, shall be delivered to the staging area no later than that required for its associated location.

1.2.6 Field Installation

Contractor is responsible for field installation of all signal equipment and hook-up including coordination with other related disciplines.

1.2.7 Field Testing & Cutover

Contractor is responsible for field testing of all equipment individually and then perform system testing to satisfaction of Engineer before it is placed in service.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. When used, a designation following the "GA" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Test Procedure; GA

Submit detailed list of tests and test procedures for approval to establish safe and proper operation of Lift Bridge interlocking. Design test sequence to test each function for correct performance in accordance with these Specifications and the approved plans. Include simulated field conditions to perform complete interlocking circuits testing.

Procedures; GA

Submit test procedures, including pre-printed data sheets or inspection sheets for each test for approval. When completed by field test personnel and checked for accuracy and completeness, submit as test report.

Factory Test Program; GA

The Contractor shall submit the factory test program to the Engineer for his review and approval.

SD-04 Drawings

Installation Drawings; GA

Drawings shall show locations and installation details for houses, cases, rail seat circuit controllers, span lock circuit controllers, track circuit couplers, bonding and cables. Drawings shall show locations of signals and conduits. The layout plans shall be drawn to scale and show location of all equipment and components to be installed, the mounting framework, unused terminal blocks, door openings, and overall physical dimensions. The Contractor must prepare and submit the layout for houses and cases and receive approval of the Engineer before manufacturing.

Foundation Drawings; GA

The Contractor shall submit the C.I.L. and case foundations. The bolt

pattern and foundation installation requirements for mounting the C.I.L. and cases shall be supplied by the Contractor not later than 30 days from the NTP.

Circuit Drawings; GA

Detailed circuit drawings shall be submitted for approval by the Engineer for each location with sufficient information reflecting actual component wiring, identification, and placement.

Instructions;GA

Accompanying the track circuit equipment submittal, the Contractor shall provide factual evidence in support of the operational integrity for the equipment submitted.

Shop Plans; GA

All plans related to building of wired houses and cases must be furnished, reviewed, and approved by the Engineer prior to building the houses and cases as specified.

Cables; GA

All cable runs shall be continuous and without splices between cable terminating locations. Contractor to provide material and details submittals showing his method of installation.

SD-07 Schedules

Submission Schedule; GA

Design plans shall be submitted to the Engineer for review at the 50%, 90%, and 100% levels of completion for all locations. The Contractor is to assume that the Engineer's review time for each submittal is 30 days.

50% Submission; GA

The 50% design submission shall consist of all circuitry, sufficiently illustrated, to provide a comprehensible description of the signal logic requirements. This submittal shall include each case and housing layout, housing rack/wall layouts within the contract limits, to depict capacity for the installation of the various apparatus. Only circuit details such as repeater relays, contact assignment, cable termination and equipment placement shall be omitted from this submission.

90% Submission; GA

The 90% submission shall be progression from 50% submission with detailed circuit design to include items omitted in 50% design level shall be complete in all respect to 100% level of details for review by engineer.

100% Submission; GA

The 100% submission shall be a progression from the 90% design submittal that address and incorporates all of the Engineer's review comments.

Submit design changes made to obtain proper operation for approval.

SD-13 Certificates

Product Approval; GA

Each type of product which will be used to build the signal system shall be approved by the Engineer. All product specifications and performance data shall be submitted for approval by the Engineer. A serial listing shall be maintained for such product approvals.

SD-14 Samples

Training; GA

The Contractor shall submit to the Engineer programs of training for approval 90 days prior to the training.

Detailed List; GA

The submittal shall contain general syllabus, detailed list of material to be used and duration of each course element, as required under Section 1.20.

SD-18 Records

Test Reports; GA

Submit test reports with final description sheet to record discrepancies and corrective action. Submit all test documentation to the Engineer.

Test Verification; GA

Submit test reports dated and signed by the responsible employee of the Contractor or subcontractor on the day the test is performed. Provide space for signature of witnessing Engineer.

Test Instruments; GA

Submit test reports indicating specific test instruments used on each test, including instrument name, type, serial number, and calibration date.

1.4 REFERENCES

1.4.1 General

All applicable standards, instructions, specifications and operating practices shall apply. All portions of the signal system and its apparatus shall be designed, constructed, and tested to conform with the latest revision of the applicable codes, recommended practices, and standards at the time of the contract award.

1.4.2 List of References

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

Standard Dictionary	IEEE Standard Dictionary of Electrical and Electronic Terms

FEDERAL RAILROAD ADMINISTRATION (FRA)

Part 233, 234, 235, 236	Rules and Regulations Governing Railroad Signal and Train Control Systems

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION (AREMA)

AREMA Signal Manuals	Signal Manual of Recommended Practice, Vol. I - IV

1.5 FACTORY TESTING & INSTALLATION

1.5.1 Factory Testing

a. The Contractor shall perform inspections and tests to demonstrate that the system and components supplied under this contract comply with these specifications.

b. The Contractor shall submit to the Engineer a test program plan for approval. The submitted plan shall demonstrate the method of verifying the adequacy of the system. Meeting all technical and performance requirements in a logical, orderly sequence, and provide for documentation of the testing performed, result and any discrepancies discovered. The testing to be performed shall cause the system to be sequenced through normal required operation, including fail-safe operation for vital system and circuits.

c. Two (2) factory tests shall be conducted by the Contractor. One, by the Contractor qualified people and second in presence of the Engineer. The interlocking and associated remote location shall be consolidated for the purpose of the factory test.

d. During fabrication stage, the Contractor acknowledges that the work or product, as described, shall not be deemed final or acceptable until so determined by the Engineer. The Engineer may inspect all stages of construction of the pre-wired houses and cases. Wire purchased under this contract shall be inspected in accordance with the requirements of these specifications. The Contractor shall notify the Engineer two weeks prior to the date of the wire inspection.

e. The Contractor shall submit monthly status reports, listing in detail the status of the design, and construction of equipment housings and cases and related equipment in production and target dates for the following:

(1) Final assembly

(2) Testing

(3) Release for shipment (which shall be within 1 month following the Engineer approved factory test.)

f. The Contractor shall provide and be responsible for the cost of all the personnel, material and test equipment required for conducting all tests. The required test documentation shall be completed as specified.

g. The Engineer shall approve tests before they are conducted and shall be observed by Engineer when they are performed.

h. Test procedures as described in the FRA's Rules and Regulations Governing Railroad Signal and Train Control Systems, Part 233, 234, 235, 236, Subpart A, Subpart B, Subpart C, as well as the test described herein shall be performed and incorporated into the Contractor's test plan.

i. If any design or equipment fails to meet the test requirements, the Contractor shall make all necessary corrections and shall be responsible for the cost of additional test required to prove compliance. The houses and cases shall be completely wired and tagged before scheduling the factory tests. Written notice shall then be provided to the Engineer in order that arrangements can be made to have the authorized representatives witness and approve final breakdown tests and simulated operating tests before shipment.

j. Factory tests shall verify that each wire, tag, terminal, relay, and all other items are installed in accordance with circuit plans and specifications approved as a part of this Contract, and the proper system operation and simulated inputs to houses and cases.

k. Test to ensure proper operations and isolation of 60 Hz transformers, rectifiers, etc. shall be included in factory tests and procedures.

l. Test shall ensure that the equipment, when placed in service, shall function in accordance with the circuit plans. Alterations to any wiring or tagging are prohibited after tests are completed. The houses and cases shall then be sealed. A record of the seal numbers shall be submitted to the Engineer.

m. Contractor-supplied equipment shall be factory tested with approved procedures as specified. Operational test shall be conducted in accordance with applicable codes and regulations as specified. It shall be demonstrated to the Engineer that inspection and acceptance tests shall be based upon the latest revision of specified drawings or specifications. All circuits and systems, which have been factory wired shall be identified and factory tested.

n. The Engineer prior to testing shall approve all test procedures. The Contractor, as approved by the Engineer, shall provide test sheets. These documents shall be used to record testing and forwarded within ten days to the Engineer when test are complete. Any discrepancies from the approved plans shall be corrected before approval and shipment shall be permitted.

o. Inspection shall include functional and physical tests of all delivered items.

1.5.2 INSTALLATION

a. The Contractor is fully responsible for installation of entire signal system, including sub-systems, interconnections, cabling, and any accessories for the working of completed system. This will include coordination with other disciplines interfacing with signals, like civil/electrical departments.

b. The Contractor shall provide qualified manpower and approved equipment for installation and operational testing of all Contractors supplied system and equipment.

c. Contractor shall be required to submit for approval, the field installation and testing procedures. Those approved installation and testing procedures shall be followed by Contractor during construction and testing.

1.6 DEFINITIONS

1.6.1 General

The definition of terms listed in this section and others incorporated by reference shall apply to like terms wherever they are used in these specifications. In application of various standards and specifications reference herein, these definitions will supersede those referenced documents.

Advance of signal-The area relative to a signal, located beyond the signal as viewed from approaching train governed by the signal.

Alarm- Any abnormal condition which requires the attention of an attendant or operator.

AWG- American wire gauge

Ballast Resistance- The resistance offered by the ballast, ties, etc., to the flow of leakage current from one rail of the track circuit to the other.

Buss- A conductor or group of conductors, that are terminated as a common connection for two or more circuits

C.I.L.- Central Instrument Location

Circuit Controller- A device for operating, closing or shunting electrical circuits operated by a rod connected to a track rail or other device.

Electrical System-The complete electrical power distribution systems including signal power and lighting power.

Engineer- Contracting officer assigned by the U.S. Government.

Fail-safe- Fail-safe engineering provides the method by which any single failure due to opening of any element of an electrical circuit, predictable and acceptable equipment failure, or accepted environmental conditions will not produce a result in the controlled apparatus that is less restrictive than would be otherwise affected.

Full Service Brake Application-An Application of brakes by continuous or split reduction in brake pipe pressure at a service rate until maximum brake cylinder pressure is developed.

Hertz (HZ)- The unit for frequency in cycles per second.

Home Signal-A fixed signal governing the entrance to an interlocking.

Insulated Joint- A rail joint in which electrical insulation is provided between adjoining rails.

Instrument Housing- A walk-in type sheet metal house or sheet metal case used to house signal equipment or to terminate cables located along the railroad right-of-way.

Interface-The interconnection or interrelationship between two or more systems, subsystems, persons, or contracts required ensuring continuity and proper operation.

Interlocking-An interconnection of signals and signal appliances such that their movement or operation must succeed each other in a predetermined sequence, assuring that signals cannot be displayed simultaneously on conflicting routes.

Interlocking Limits- The tracks between the opposing home signals of an interlocking.

Locking- The electrical or mechanical establishment of a condition for a switch, interlocking route, speed limited, or automatic function which cannot be altered except by prescribed and inviolate sequence of unlocking.

Main Track- A track designated by the timetable upon which train movements are authorized by ABS, DCS or interlocking rules.

Mean Time Between Failures- The average time a component will operate without a failure.

Noise, Electrical- Interference brought about by undesirable random voltage or currents.

Non-Vital System- Non-vital systems perform functions of control, indication, communications and related tasks that do not directly perform any logic or function affecting the safety of train movements and protection of life and property. They may or may not interface with vital systems.

Route- A specified succession of one or more continuous blocks over which a signal governs movement of trains between two controlled interlocking signals.

Rear of Signal- The position relative to a wayside signal from which the aspect is in normal view.

Signal- An appliance which conveys information governing train movements at a stationary wayside location responsive to dynamic information based on conditions affecting safe train movement in advance of that location.

Signal Aspect- The Signal appearance, which conveys an indication as viewed from the direction of an approaching train.

Signal Indication- The information conveyed by the aspect of a signal.

Speed Slow- A speed not exceeding 15 miles per hour.

Subsystem- A subsystem comprises elements within a system, which are interconnected to perform a specific function.

Track Circuit- An arrangement of electrical and/or electronic equipment, including a length of the running rails, which permits detection of trains.

Track Transformer- A transformer designed to couple electrical energy to and from rails of a track circuit.

Train- An engine with or without cars.

Train Detection Equipment- The track circuits and associated equipment used to detect the presence of trains.

Train Shunt Impedance- The electrical impedance between running rails when spanned by train wheels and axles.

Unsafe Condition- Any condition which endangers humane life or property.

USACOE- United States Army Corps of Engineers

Vital Circuit- Any circuit directly affecting the safety of train operations is a portion of a vital system.

Vital System- Vital system includes all signal circuits, software and apparatus that is designed to directly perform a function to protect the safety of train movement, and actively used to protect life and property.

1.6.2 Other Definitions

The definitions of all terms not herein defined will be used consistent with the following, and shall apply to the work of this Specification, except as they may be modified herein, and are hereby made a part of this Specification, where the requirements of the following do not conflict with this section of the Specifications:

a. FRA Rules Part 233, 234, 235, 236, Subpart G

b. AREMA Signal Manuals, Part1.1.1 - Recommended definitions for technical terms used in railway signaling

c. IEEE Standard Dictionary of Electrical and Electronic Terms

1.7 DELIVERY AND SHIPMENT

a. Shipment to the construction staging area shall be authorized only upon receipt in writing from the Engineer that all required factory testing was acceptable.

b. Upon completion of the wiring and completion of the testing, the Contractor shall obtain shipping instructions to the construction staging area. At the delivery site but prior to the unloading, the houses and cases shall be thoroughly inspected by the Engineer for shipping damage. If for any reason the Engineer determines shipping damage to be excessive, the houses and cases shall not be unloaded, but shall be returned to the Contractor. The Contractor shall be responsible to provide appropriate repairs and shall be responsible for any additional cost incurred including applicable liquidated damages. Following inspection by the Engineer, unloading will be performed. All houses and cases and apparatus shall be shipped to the construction staging area. All housings shall be shipped without the relays installed. The relays shall be packaged in boxes, and shall be secured inside the appropriate houses for shipment. Each relay shall be clearly tagged to describe its proper installation place. The boxes shall be

clearly marked on the outside with the designated house for the relays provided within the box. Relays, shall be in individual boxes clearly and permanently marked on the outside, showing proper installation location including, but not limited to:

(1) Location

(2) Instrument housing

(3) Rack identification

(4) Location within rack

c. All relays shipped for use in the signal locations shall be the exact relay installed at the same location during all factory testing.

1.8 IDENTIFYING NOMENCLATURE

1.8.1 General

Standard method of identifying all signal equipment, circuitry and electrical units shall be used for all work. Any circuit or electrical unit that has a use without nomenclature shall use nomenclature as shown in AREMA Signal Manuals.

All wires, apparatus, busses, relay racks, and relay base fronts, and relay base rears shall be tagged or stenciled.

1.8.2 Signals

Signals shall be numbered identifying the track and the direction over which they control movement.

1.8.3 Wire Identification

a. Nomenclature on tag for wire identification shall correspond to that of the circuit plan. A sleeve type tag shall be installed on each wire end and connected to relays or apparatus.

b. Wires terminated on AREMA type terminals mounted on terminal boards shall be identified by a tag mounted on the terminal board with the wire passing through a hole in the tag and the terminal board. The nomenclature tags for the cables shall be included and identify destinations (to and from). The cable tags shall be located behind the terminal board in addition to the panel tag.

c. Break numbers for circuit tagging shall not be implemented within instrument locations. For line circuits entering and leaving instrument locations, the prefix of N and S shall designate the direction in which the circuit is traveling. The tag NN2BP is for a circuit-heading north out of the instrument location. When this circuit arrives at the next location south, the tag on the terminal board shall read SN2BP.

1.8.4 EQUIPMENT IDENTIFICATION

All signal equipment, including relay, wires, cables, assemblies and components shall be identified by labels or tags further specified to

ensure positive identification.

1.9 GRAPHIC SYMBOLS

1.9.1 General

All signal drawings shall use the current standard symbols. Any unidentified graphic symbols shall be used consistent with the definition and use by AREMA Signal Manuals.

1.9.2 AutoCad

AutoCAD 14 generated drawings shall use standard Army Corps of Engineers cell libraries which will be provided to the Contractor.

1.10 QUALITY ASSURANCE

a. The concept of total quality assurance shall be followed. This is based upon the principle that quality is a basic responsibility of each segment of the engineering, installation and construction process.

b. Written procedures shall be established and maintained for the quality assurance system and submitted for approval of the Engineer.

c. Adequate records shall be maintained that provides evidence of quality and accountability. These shall include results of tests, inspections, process controls, certification of processes and personnel, and other quality requirements defined on the contract.

1.11 FUNCTIONAL DESIGN REQUIREMENTS

All vital portions of the signal system shall be designed upon accepted fail-safe principles, whereby any single component failure or malfunction, shorted or open circuit will not cause an unsafe condition.

Signal apparatus shall be located along the track only where necessary. All other equipment shall be located in equipment housings.

1.12 PRODUCT REQUIREMENTS

a. All portions of the signal system shall use current proven technologies in all respects, including all components used in this project.

b. The vital system logic shall be configured as a contiguous fault tolerant system of high reliability, of a type that has been proven to have high Mean Time Between Failures (MTBF).

c. All equipment used shall be standard products produced by a manufacturer regularly engaged in the production of such equipment or material and will conform to all applicable codes and standards, to include current FRA's Rules and AREMA recommended practices.

d. Assemblies and components that are used to perform identical functions within the system shall be mechanically and electrically interchangeable.

e. Products of at least 5 years proven record shall be used.

Contractor shall submit each type of product for Engineer's approval before using it in the system design.

1.13 MAINTAINABILITY

All apparatus or components requiring regular adjustment, replacement, or inspection will be visible and accessible while mounted in normal position, without removal or disassembly of other components.

Built-in indicators or meters shall be provided where frequent observation, adjustment or inspection is required. All electronic modules will be provided with displays or LED's that provide demonstration of the operation of such devices as could be expected to be required, and shall depict normal functioning of such modules at a minimum.

1.14 SAFETY REQUIREMENTS

Fail-safe design shall be achieved by using the closed loop principle on vital circuitry, and shall protect against open circuits and short circuits. All such vital circuit shall consists of two wires, double break circuits in any instance where the relay controlled and all portions of the control circuit are not within the same instrument housing.

All relays being energized by a vital circuit shall be vital relays. All contacts used within any vital circuit to be contacts of vital relays.

1.15 SYSTEMS ASSURANCE

a. The Contractor shall provide to the Engineer reliability calculations.

b. The Contractor shall submit for each equipment subsystem, Mean Time Between Failure (MTBF) and Mean Time To Restore (MTTR).

c. The signal equipment furnished under this contract shall be designed for a useful life (per Mil-Std-721c) of 30 years to mechanical equipment and 25 years for Electromechanical Equipment.

d. All apparatus furnished shall be rated for operation without adjustment between temperature limits of -40 degrees F to +140 degrees F, unless otherwise specified.

1.16 ELECTROMAGNETIC INTERFERENCE (EMI)

No portion of the signal system shall suffer from, or contribute to harmful electromagnetic interference; either conducted, radiated, or induced.

1.17 SYSTEM TEST

a. The work associated with this Section consists of performing tests and inspections to demonstrate that systems, subsystems, assemblies, subassemblies, and components provided under this Contract are in compliance with these Specifications.

b. Perform tests and inspections during progress of this Contract and after completing installation of equipment. Required tests include: factory tests, circuit breakdown tests, wiring verification tests, continuity tests, resistance tests, voltage and current tests, time tests, operating tests, simulation tests, and other electrical and

mechanical tests and inspections.

c. Work includes costs of personnel, special equipment required to conduct tests and provide complete documentation.

d. In the event a system does not meet Specification requirements, make necessary corrections, and including tests or re-tests to prove compliance. Perform required disconnecting and re-connecting of wiring and devices, as required, for test purposes.

e. Perform tests specified elsewhere in these Specifications, related to and inclusive with testing.

1.18 SYSTEM REQUIREMENTS

1.18.1 General

The interlocking layout and signal aspects shall be as shown on the Contract Drawings. All circuits shall function to provide signal aspects in accordance with these Drawings.

Circuit design shall follow the guidelines of the typical circuits (Contract Drawings) furnished with this Specification, and as directed by the Engineer, and such special typicals provided to the Contractor as necessary to clarify unique situations relative to the Project.

Vital circuits shall be designed on fail-safe design principles, providing for, but not limited to, broken wires, damaged or dirty contacts, a relay failing to respond when energized or a loss of power supply energy and shall not result in unsafe conditions. Design shall fulfill all requirements of the "Rules, Standards and Instructions for Railroad Signal Systems" as set forth by the Federal Railroad Administration.

1.18.2 Signal Design

The Contractor is fully responsible for the functional design of the signal system in conformity with these Specifications, and all regulations and the operational requirements of the Lift Bridge. The typical circuit design supplied to the Contractor represents standard circuit design and does not necessarily fulfill all operational requirements of Lift Bridge. The drawings supplied for the rail seat circuit controller layout, span lock circuit controller layout, and track circuit coupler are typical layouts supplied for guidance and are in no way complete.

1.18.3 Signal Aspect

Conditions requiring a Stop aspect as determined by the FRA include, but are not limited to the following:

a. Occupancy by a train, locomotive or car;

b. A track relay is in a de-energized position or a device which functions as a track relay is in its most restrictive state; or when signal control circuit is de-energized;

c. A route in conflict is established;

d. Lift Bridge rails not seated properly;

e. Lift Bridge span locks not driven properly;

f. Lift Bridge open.

1.18.4 Vital Systems

a. All circuits, or portions of circuits, whose direct operation is required, for the safety of train movements in order to protect life and property is to be considered vital.

b. All relays that are to be energized by a vital circuit shall be vital relays. All contacts that are used within any vital circuit shall be contacts of a vital relay.

c. All vital systems will be designed to be fail-safe within established standards.

d. Fail-safe design will be achieved by using the closed circuit principle on vital circuitry. This design will protect against open circuits and short circuits. Vital circuits shall consist of two wires, double break circuits in any instance where the controlled relay and all portions of its control circuit are not within the same equipment case or house.

1.18.5 Non-Vital Systems

Systems that provide the interface to accept remote requests for control or provide indications local or remote will be non-vital. These non-vital systems will interface with vital systems. Following control requests by the non-vital systems, the vital systems will provide the vital decisions that determine response and action.

1.18.6 Drawings

a. USACOE will supply to the Contractor the Standard Drawing formats, title blocks, etc., which shall be used in drawing of plans. All drawings shall be prepared using circuit nomenclature and symbols in accordance with AREMA Signal Manuals, Section 16, and as shown in Contract Drawings.

b. All wires shown on circuit plans shall be identified by a circuit nomenclature method similar to that described in the AREMA Signal Manuals, Section 16, without break numbers included, and within these Specifications. When additions or revisions are made to existing drawings, the format, nomenclature and symbols shall be consistent with those used in the drawings being revised. Circuit symbols, lettering, equipment layout, etc., shall be readable at half size.

c. The final drawings revised to reflect the "As Shipped" Instrument Housings and Cases shall be delivered as reproducible vellum of a standard size, 28x40 inches, and electronic media as described below, not later than one month following delivery of each house or case. The "As Shipped" drawings shall conform strictly to USACOE Drafting Standards using USACOE Title Block and Frame, Cell Libraries, etc.

d. All drawings shall be prepared on a CADD system, 100% compatible with USACOE AUTOCADD-14, and in addition to being provided by the Contractor on vellum, be provided on electronic media as approved by the Engineer.

e. Following factory testing as described, the signal circuits, including house layout detail plans, shall be revised to reflect the "AS SHIPPED" status of the houses and cases.

1.19 CIRCUITS DESCRIPTION

1.19.1 Track Circuits

a. All track circuits shall be provided with five (5) seconds loss of shunt protection. Overlay track circuits used for re-requesting of signals shall not be provided with loss of shunt protection. Loss of shunt for a period of 5 seconds is required prior to the first track repeater relay becoming energized after being de-energized.

b. When a train does not reach the bridge before time has elapsed, a series overlay track circuit will be installed to become effective about 75' before the signal to re-request the signal. This overlay track circuit shall be provided as part of this Contract, as shown in Contract Drawings.

c. For bridge track circuit continuity, a track circuit coupler shall be provided between the Lift Span rail and the Fixed Span rail to provide for heavy duty make and break contact.

1.19.2 Line Circuits

All vital line circuits between C.I.L. and Loc B shall be double-break.

1.19.3 Route Request Circuits

The train on the approach track circuit automatically requests the signal. Route request shall determine if the bridge is properly seated down, locked and the tracks are clear for the movement. Route request circuits shall be timed out to prevent unnecessary locking of bridge due to track circuit failure.

1.19.4 Time Locking Circuits

A time release circuit shall be incorporated that will provide an alternate energy path to re-energize the ASR relay when the signal is cancelled and train has not entered over the signaled route to the Lift Bridge.

1.19.5 Route Locking Circuits

Route locking shall be provided for all interlocking moves over the Bridge. Route locking becomes effective after train takes the signal, and remains in effect until the tail of the train clears the Bridge.

1.19.6 Approach Stick Circuits

a. Approach locking shall not be provided.

b. The ASR circuitry shall be designed such that two adjacent track circuits after the home signal must be de-energized simultaneously to allow the ASR relay to energize after the relay has been de-energized. When two track pick cannot be achieved, ASR will pick through time locking circuits.

1.19.7 Detector Locking

Detector locking shall be effective when track circuit across Lift Bridge between opposing home signals is occupied.

1.19.8 Vital Wayside Signal Circuits

a. All home signal control relays for Lift Bridge interlocking shall be located within the same house. Repeater relays shall be provided in a distant case where necessary to provide proper voltage at the signal lamps.

b. The circuits shall be so interconnected as to ensure not more than one relay can be energized within the network of home signal controls, controlling any portion of a single route.

c. The last signal control repeater relay shall control the "RGP' circuit. Each interlocking signal shall have a designated individual RGP Relay.

d. All Bridge signals shall be Color Light type. The Contractor shall provide all necessary detailed design circuitry and equipment to light the signals per intent of Contract Drawings.

e. Signal lighting relays and power source shall be located to ensure proper voltage is maintained at signal lamps.

1.19.9 Bridge Check Circuits

Circuits shall be provided for lift rails seated check, span lock driven check, and for control of bridge operating contactor. Those checks shall be accounted for in signal control circuits.

1.19.10 Bridge Emergency Release

Failure of signal system will lock the bridge. A sealed Emergency Release button shall be provided with the bridge operator to release the bridge under these conditions.

1.19.11 Indication Circuits

All panel indication circuits are non-vital in purpose. Bridge operator shall be provided with indications as shown in Contract Drawings.

1.19.12 Circuit Testing Provisions

a. All tests shall be performed in such a manner to simulate actual train movement. All tests shall address AREMA and FRA mandated testing requirements and be approved by the Engineer.

b. Circuit logic shall be tested as installed to ensure compliance with the intended purpose of such circuit or group of circuits.

c. All mechanical devices performing vital functions shall be tested and adjusted to ensure their operation is as intended and vital functions operate as required.

d. All portions of vital signal apparatus and associated circuits shall be individually tested as recommended by the manufacturer prior

to being placed in service. Such testing shall include all cable, relays, track circuits, seating circuit controllers, signal aspects, highway flashers and other devices supplied by Contractor.

e. All relays and cable terminations shall be provided with a method of quickly opening and closing electrical connections at points required for test purposes, without removal of wiring.

1.19.13 Circuit Identifications

a. All cable terminations shall be clearly tagged to identify the circuit associated with each conductor used.

b. Each individual wire of all local wiring shall be clearly tagged near each termination with the circuit identification.

c. Stenciled markings shall be provided within equipment houses or cases.

d. Every relay shall be clearly marked with its circuit name by tagging with embossed label or approved equal.

1.20 TRAINING

1.20.1 General

The Contractor shall provide training to maintenance personnel in the operation and required maintenance of signal equipment. The Contractor shall provide a maintenance and service training course outline which indicates maintenance to be performed. This includes basic troubleshooting by a maintainer to make the system operational.

a. The typical training class day shall be eight hours long with a twenty-minute break both in the morning and afternoon session. A forty-five minute lunch break will be scheduled.

b. The course class size shall be determined and approved by Engineer.

c. All training shall be performed on the actual system installation unless otherwise approved by the Engineer.

d. Training programs shall include texts, videos, and operation and maintenance manuals.

e. Training of personnel shall include, but not be limited to, all aspects of systems operation, testing, use of diagnostic tools, troubleshooting, repair and background on system.

PART 2 PRODUCTS

2.1 GENERAL DESCRIPTION

a. This section includes specifications for furnishing signal apparatus for the signal system. All signal equipment shall conform to this section and the requirements of the signal design, and system requirements.

b. The equipment shall be provided to meet all the applicable parts of the AREMA Signal Manuals except wherever the word "may" appears -

substitute the word "shall". The design and workmanship of the apparatus furnished shall comply in every respect with the, "Rules, Standards and Instructions for the Installation, Inspection, Maintenance and Repair of Interlocking Systems". As set forth by the Office of Railroad Safety of the Federal Railroad Administration, and any supplements which shall become effective before this Contract is awarded.

2.2 Hardware Requirements

All signal products and electrical components used on this Contract shall be:

a. New and free of manufacturing defects

b. Free of storage and handling damage

c. Clearly and permanently labeled with type identification and specified values

d. All electrical components shall be rated to operate at + 20% and -10% of rated voltage

e. All electrical components shall retain their rated value and function as intended between ambient temperature range of -40 degrees to +70 degrees Celsius.

f. Vital signal equipment proposed for this Contract shall be proved by minimum in-service operation of five years or shall be made available for type acceptance testing. When requested by the Engineer, certification shall be furnished showing the installed dates and location of any equipment in question.

g. Drawings shall show locations and installation details for houses, cases, rail seat circuit controllers, span lock circuit controllers, track circuit couplers, signals, insulated joints, conduits, bonding and cables.

h. All product specifications and performance data shall be submitted for approval by the Engineer.

i. All product installations shall be consistent with procedures and standards as specified or, in the absence of such, established procedures as specified by the FRA or recommended by the AREMA, and approved by the Engineer.

j. All equipment shall be placed consistent with standards established by the manufacturer or as otherwise specified by the design.

k. All plug-in relays shall be rack mounted. All card holder chasis shall be rack mounted. Whatever cannot be rack mounted may be wall mounted.

2.3 TRACK CIRCUIT EQUIPMENT

2.3.1 General

Track circuit equipment is composed of three types:

a. Type "C" Track Circuit (approach tracks).

b. Rectified DC Track Circuit (Bridge Track).

c. Series Overlay Track Circuit

2.3.2 Requirements

The Contractor shall install all of the above referenced track circuit equipment within housings and cases.

a. Double rail track circuits shall be used on all tracks.

b. Broken rail protection shall be provided in accordance with Section 8 of the AREMA Signal Manuals.

c. Fuse protection, lightning protection and surge protection for all track circuits shall be provided and shall be installed in houses or cases.

d. Track relays except overlay shall be ST 400510 or approved equal.

e. Track transformers for type "C" track circuit will be dry, single phase, air cool rated at 396 VA and conform to AREMA Signal Manuals, Part 14.2.2.10.

f. All components, including track relays, shall have the approval of the Engineer.

g. Track circuit shall be immune to high voltage tension lines parallel or adjacent to tracks up to 100 V RMS.

h. Track circuit shunting sensitivity shall not be less than 0.25 ohms with a ballast resistance of 3.0 ohms/1000 feet.

i. Series overlay track circuit shall be Safetran SOTC-7A or approved equal, with an assigned frequency of 10 kHz.

2.3.3 Rail Bonding

Running rail bonding will be railhead type bonds using thermite type weld attachments where splice bars are in use.

2.4 WAYSIDE SIGNALS

All Bridge signals will be stacked units color light with a background using 10-volt 18-watt signal lamps and will be installed and wired in accordance with Contract Drawings and with the following:.

a. Adjustable resistor of adequate wattage shall be provided separately for each lamp in the controlling house/case. Minimum rating of resistors shall be 25W.

b. Signal lighting shall be AC 60 Hz primary power source, provided by lighting transformers of the air-cooled type with one secondary winding. The secondary winding shall have taps that provide adjustment in one-volt increments.

c. Signal lighting shall have a DC battery backup in the event of 60

Hz AC power failure. Signal lighting DC power will have appropriately rated battery backup to last up to 72 hours.

2.5 VITAL RELAYS

2.5.1 General

a. All vital relays shall be of the plug-in, biased neutral type, with a minimum of six (6) dependent/independent contacts, except in case of special application requirements. A minimum of one (1) spare front-heel-back contact set shall be provided for within each relay group. The relay group is defined to mean a relay and all subsequent repeaters that are designed to energize and de-energize together with that relay without additional delay.

b. Vital relays, other than those used as track relays, shall operate on 12 volts DC.

c. All relays shall be configured to be able to ascertain the state, energized or de-energized, by visual inspection while in use.

d. All furnished relays shall conform to all applicable Manual Parts of the AREMA Signal Manuals.

e. The relays shall be magnetically biased unless otherwise shown. Relays shall be provided with a means to permit de-energizing from the front.

f. Direct-current relays shall conform to the Manual Parts for Tractive Armature Direct Current Neutral Relay (Plug-in type) of the AREMA Signal Manuals, Part 6.2.1.

g. Relays shall be furnished with a transparent dust-proof molded cover of an approved material.

h. All vital relays of a given type shall be furnished by a single manufacturer, unless approved by the Engineer.

2.5.2 Relay Mountings

a. All plug-in relays shall be rack mounted.

b. Relays shall not be mounted more than six feet from the floor of the instrument housing and shall be secured from vibration in racks. Relays shall not be mounted on the bottom row of the relay racks closer than 12 inches from the floor.

c. Relays shall have indexing pins to prevent insertion of an improper relay in relay plugboards.

d. The fastening of relay to plugboard shall be so arranged as to securely hold the relay in place and yet be readily removable. The contacting members to carry current between relay and plugboard shall be reasonably constant in contact and the resistance of contact shall be not more than 0.03 ohm.

2.6 NON-VITAL RELAYS

Non-vital relays shall be of the plug-in, Din-Rail type and hermetically

sealed. Non-vital relay sockets shall consist of:

a. Socket, Custom Relay, Part # 63095-93. Relay shall be included and relay shall be:

(1) AROMAT - TYPE HC4-EH-DC 12V, Amber Sealed 4 form C or equal

(2) OMRON - TYPE MYQ4-DC12 or equal.

(3) PHOENIX - Non-vital, Part #7004897 single, #5524905 eight-way or equal.

b. Din Rail, Mounting - Rail. 2-meter lengths PART NUMBER 0801733-2M NS 35/7.5 (2 METER)

c. End Clamp, for Din Rail - PART # 1201442

d. Non-vital relays shall have an operating voltage range of 12 volts DC, except special application relays. Non-vital relays shall conform to AREMA Signal Manuals, Part 6.3.1

2.7 INDICATION PANEL

An indication panel equipped for plug connected cables shall be provided at the bridge operator's cabin with the following:

a. Panel lighting shall be LED type. Indications shall be provided to indicate bridge locking, span locks driven, lift rails seated, track circuit occupancy, and signal indication.

b. A DPST toggle switch shall be provided for "on" and "off" control of all indications.

c. A manual release lever of Entech make or approved equal shall be provided to operate the bridge in the event of signal system failure. This lever shall be provided with sealing arrangement.

d. The faceplate of the panel shall be smooth aluminum, photo engraved to depict the bridge layout, consisting of black background and aluminum color for depicting the layout and functions.

e. A typical panel diagram is included in the Contract Drawings.

2.8 EQUIPMENT HOUSES & CASES

2.8.1 General

a. The instrument houses and cases, when delivered to the site, shall be -complete, requiring only field installation, insertion of plug-in relays, termination of external cables, field adjustments and tests in order to be placed in service.

b. All openings of houses and cases shall be screened or sealed to prevent entry of animals and insects to the extent practical. Sealing compound, such as DuxSeal, or an approved equal, shall be provided of sufficient quantity to seal all entryways following installation of all cables and wiring entering the case or house.

c. Cable termination boards in all locations shall be constructed of

fire retardant plywood and have fire retardant paint applied. Field cable main terminal boards shall be mounted on the end of the house.

d. All instrument housings/cases shall have sufficient structural strength to permit lifting without additional bracing. The Contractor shall submit lifting details for the Engineer's approval

e. House/case foundations shall be pre-cast concrete per approved drawing. The Contractor shall submit design for foundation piers of each house and case.

2.8.2 Instrument Houses

Instrument houses shall consist of:

a. All instrument houses shall be constructed of an approved copper-bearing steel such as Cor-Ten, 14 gauge or thicker.

b. Doors of instrument houses shall be gasketed to provide a weatherproof seal, hinged, and secured with handles and hasps providing a three point locking device. The cable entrance door shall be locked from inside the location.

c. Space shall be provided at the front entrance of the house along the wall to store a minimum of four safety vests and coats. At least two coat hooks shall be provided, with a rack mounted above for hardhat storage. This area shall include a mounted fire extinguisher.

d. Intrusion detection cutout switches shall be mounted for front and back door of the C.I.L. Intrusion detection shall be wired up to a telephone jack.

e. 60 Hz power shall be distributed through the walk-in instrument houses for space heaters, vent fans and convenience outlets. An electrical service panel properly sized for demand shall be provided for the 60 Hz power. Separate galvanized conduit runs shall be provided for utility functions 60 Hz distribution.

f. Houses shall be provided with a ventilation system capable of maintaining a temperature not greater than 10 degrees above outside air temperature. Louvered intake vents, exhaust fans and associated louvers shall be arranged to prevent water from entering. Intake vents shall be provided with dust filters. No air conditioning units shall be provided.

g. An area shall be provided in the C.I.L. for a telephone. A hanging folder or other suitable device shall be provided in the C.I.L. for the storage of circuit plans.

h. An easily accessible portable eyewash system shall be wall mounted nearest the storage battery.

i. Cable trays shall be used within all houses. An open ladder-type wireway shall be supplied at ceiling level, 16 inches wide, and running the length of the house, parallel to, and in the center of the house. Perpendicular lateral wireways shall be provided every 24 inches of 8 inches in width at ceiling level.

j. The C.I.L. shall be equipped with the following:

(1) 1000 watt, 220 volt, thermostatically controlled electric heaters.

(2) 750 cubic feet per minute (CFM) thermostatically controlled exhaust fan which shall be adequate to maintain inside temperature as specified. The fan shall not obstruct terminal boards, relay apparatus or create a safety hazard.

(3) Houses shall be provided with fluorescent lighting, sufficient to illuminate all accessible areas to 30-foot candle minimum. Industrial type fluorescent lighting, double tube enclosed by unbreakable clear polycarbonate safety shields, four feet in length, in reflector housing mounted in the ceiling above free floor space at one light for each eight feet over eight feet of length. Minimum lights shall be one for each bay of racks and one for main terminal board.

(4) Retractable reel type trouble light Capable of reaching all areas within the house.

(5) Duplex receptacles shall be provided near each corner and every six feet along each wall within the C.I.L.

k. Ribbed, rubber matting shall be provided for floors and shelving within all houses and cases. Insulation material shall line the interior of house walls, doors and roofs, and shall be two inches of the highest R-value material available.

l. The material shall be flame retardant, non-conductive and installed in such a manner as not to introduce a hazard of any type.

m. All houses shall include a minimum of 25 percent spare usable space for each instrument rack, shelf, terminal board, etc. for additional apparatus and possible future expansion. The space at the bottom of all racks shall not be considered as usable space nor included in the 25 percent calculation.

n. A stainless steel cable chute shall be provided for cable entry into all signal locations. The chute will be connected to the C.I.L. in the field, arranged to provide protection in such a manner that no cable is exposed. The chute shall be of sufficient size, or additional chutes provided, to ensure cables and wires can freely enter the chute with 60% of cross-sectional area not in use.

o. The Contract Drawing shows a typical house layout.

2.8.3 Instrument Cases

Instrument cases shall consist of:

a. All instrument cases will be constructed of an approved copper-bearing steel, such as Cor-Ten.

b. Doors of instrument cases will be gasketed to provide a weatherproof seal, hinged, and secured with handles and hasps.

c. power shall be distributed through the instrument cases for vent fans, case lighting and convenience outlets.

d Cases shall be provided with a ventilation system capable of maintaining a temperature not greater than 10 degrees above outside air temperature. Louvered intake vents, exhaust fans and associated louvers shall be arranged to prevent water from entering. Intake vents shall be provided with dust filters.

e Cases shall be provided with minimum two (2) incandescent lamp, one in the front and the other in the back, and at least one duplex 110 volt, 15-amp outlet.

f All cases shall include a minimum of 25 percent spare usable space for each shelf, terminal board, etc. for additional apparatus and possible future expansion.

g Rigid conduit or cable chutes shall be provided for cable entry to each case, connected to the case and arranged to provide protection in such a manner that no cable is exposed. Sufficient number of conduit shall be supplied to ensure cables and wires can freely enter the conduit or pipe with 20% of cross-sectional area not in use.

h. All equipment shall be mounted and serviced from the front of the case, including cable terminals. No equipment shall be mounted on the rear except cable entrance and a light,

2.8.4 Instrument Racks

Instrument racks shall consist of:

a. Racks shall be provided within walk-in instrument houses for mounting of all relays, chasis, and other items designed for rack mounting.

b. Equipment shall be arranged in rows of racks such that similar functions are grouped together in numerical order where practicable. For relays where magnetic coupling is a problem, manufacturer's recommendations as to relay spacing shall be strictly adhered to.

c. Racks shall be clearly identified by number from left to right as seen from the front. Equipment spaces shall be clearly identified, rows by letter from top to bottom and equipment by number in the row from left to right.

d. Equipment on the racks shall not be placed less than 12" and not higher than 72" above the floor.

e. Each rack shall be provided grounding stud on the back. Standard 19" or 31" racks shall be used depending upon the mounting equipment.

f. Field cable Entrance Rack/Main Terminal board shall be placed at the end of the house at least 3 feet from cable entrance door.

g. The Contractor shall prepare Rack Layout drawing for each rack showing equipment mounting and submit to the Engineer for approval.

2.8.5 Instrument Housing Grounding

Each instrument house shall be supplied with all necessary grounding lugs, terminals and grounding rods in accordance with these Specifications. and

the following:

a. A grounding bus shall be installed within each house. This shall be a copper bar, at a minimum size of 1/8 inch thick, and 3 inches by 12 inches. It shall be mounted in a manner insulating it from the house. It shall have a smooth flat surface, drilled and tapped as necessary to accept connectors for all grounding purposes within the house.

b. The houses, cases, and all equipment within shall be grounded in accordance with this Specification and all applicable manufacturers' requirements.

c. A minimum of 4 ground rods at instrument houses four corners, and 2 ground rods at instrument cases shall be provided, with cable connections provided by thermite welding. Ground rods shall be 5/8" diameter copper covered steel and 8 feet in length.

d. Grounding wire shall not be less than #10AWG.

e. No loops or daisy chains are permitted in ground wire.

f. All transformer chassis, battery chargers, equipment racks, power panel lightning arrestors, and cable shields shall be grounded.

g. Grounding system resistance shall not exceed 5 ohms.

2.9 CIRCUIT AND EQUIPMENT PROTECTION

2.9.1 Circuit Breakers

Circuit breakers shall protect the various pieces of signal apparatus from the effects of short or overload, except as provided, in accordance with the manufacturer's equipment requirements. The Contractor shall furnish all circuit breakers required for the equipment and systems in accordance with circuit-wiring plans.

2.9.2 Lightning Protection

The Contractor shall provide all surge protection, lightning protection and related equipment necessary for installation. Low and high voltage lightning protection shall be provided as specified by these Specifications, or the manufacturer's requirements for all circuits that are directly susceptible to such influence.

2.10 GROUND DETECTORS

Individual automatic ground detectors shall be provided to monitor B12/N12 bus, BX12/NX12 buses. Ground indication shall be hooked to auto dial alarm system.

2.11 AC POWER

220V 3-wire 60 Hz service shall be provided in the C.I.L. as described in these Specifications and Contract Drawings. 110V 60 Hz power shall be provided for all cases from C.I.L.

The Contractor shall prepare detailed drawings, design and furnish the complete 60 Hz power distribution system, as approved by the Engineer.

2.12 DC POWER

a. The capacity for all transformers, battery chargers, and rectifiers shall provide for operation at a minimum of 200 percent of the design service load. The DC power supplies shall be capable of operating from 60 Hz 110V AC input. The DC charging voltage must be maintained within two percent of the specified value, with AC input voltage variations of plus or minus five percent.

b. Battery chargers shall be provided as part of this Contract. These shall be completely automatic, operating from 110 volt 60 Hz power as manufactured by Edison or approved equal. Each shall include input voltmeter and output voltmeter and ammeter in normal plain view.

c. For rack mounted relays, D.C.Bus connections to relay contacts and coils shall be of a continuous energy loop in a ring main fashion. These loops shall be per rack with bus terminals on the top row.

2.12.1 Storage Battery

a. All storage batteries will be supplied as part of this Contract, and shall be nickel cadmium type or approved equal.

b. The storage batteries of 12 volts shall be provided for at the C.I.L. and in Location B as specified in the Contract Drawings. Ampere-Hour capacity of the battery shall be calculated to last for 72 hours when power goes down. The minimum rating of battery shall be 240 AH.

2.13 CABLE AND WIRING

2.13.1 General

a. The equipment shall be wired in accordance with the circuit wiring plans approved by the Engineer as part of this Contract. Wire and wiring practice shall conform to applicable sections of the AREMA Signal Manuals and all specifications and standards designated herein.

b. Wires and cables shall be installed neatly, arranged in an uncluttered manner. Cables in trays or in troughs shall be laid and not pulled into place. Cables shall be installed with a minimum amount of crossover in the trays and troughs and shall not be pulled tightly around bends. All exposed wires and cables entering or leaving equipment racks or housing shall be protected from abrasion caused by sharp metallic edges.

c. Nylon straps shall be provided and installed for bundling and cabling of conductors where two or more single conductors are exposed in cable troughs. Straps shall be installed approximately every five feet along the cable run. Wires of multi-conductor cables exposed by the stripping of the cable jacket for terminations shall be tied in a neat workmanlike manner and tied approximately every three inches with nylon straps.

d. All wires and cables shall conform to AREMA Signal Manuals, Section 10, Wires and Cables.

e. All wires and cables shall be made from copper. No aluminum or

copperclad shall be used.

f. The Contractor shall purchase all cable and wire from one of the following suppliers: Tamaqua Cable, The Kerite Company, The Okonite Company, or an approved equal.

g. All wire and cable shall be less than one year old at the time of delivery.

2.13.2 Cable

a. It shall be the responsibility of the Contractor to determine the cable requirements. Typical sizes and cable types of outdoor cables are shown in Contract Drawings cable plan.

b. Cable types shall be defined consistent with the application, and all cables used for like purpose shall be of identical type.

c. All cable conductors will be implemented in such a manner that the last conductors, when counted with a standard cable count, are spare conductors, except in the case of special application cable. All cables shall be counted from the inside core outward, beginning with the marked conductor. All cables terminating within the C.I.L., except express cables, shall be counted clockwise. The functioning end of all local cables will be counted counterclockwise. All express cable conductors will be counted clockwise at the North End, and counterclockwise at the South End.

2.13.3 Wire

a. All local wiring shall be routed through cableways or dressed with cable ties following a regular vertical and horizontal pattern consistent with the wiring required.

b. The insulation material for both vital and non-vital local wiring shall be Ethylene-Tetrafluorethylene (ETFE) 600V grade, also know as Teflon or Tefzel.

c. When the manufacturer's equipment requires wire sizes other than that indicated it shall be noted on plans. Voltage drops shall not exceed 5 percent of the nominal voltage.

d. Source energy wires shall be sized to comply with equipment operating parameters and have a voltage drop not to exceed 5%. Minimum size shall be #10AWG.

e. All wiring for DC energy distribution shall be accomplished using single conductor stranded wire as specified, and shall use closed end energy loops where practicable to do so as specified. Minimum size of energy loops shall be #14AWG.

f. DC vital circuit rack wiring shall be accomplished with solderless connections using stranded wire, minimum size #16 AWG.

g. All signal lighting and track circuit wiring shall be #10AWG.

h. Non-vital circuit wiring shall be accomplished with solderless connections using stranded wire, minimum size #20 AWG.

2.13.4 Wire Termination

a. A securely fastened compression-type insulated terminal shall be provided at the end of each wire termination an AREMA terminal or other screw or nut accepting posts for termination. On all vital wiring, flag-type AMP terminals shall be utilized. For 16-AWG wire Amp No. 322307 and for 10-AWG wire Amp No. 322316 (or approval equals) shall be provided.

b. All vital wiring terminals, terminal blocks and busses shall conform to AREMA Signal Manuals, Part 14.1.5.

c. The house side of signal circuits which run in cable to outlying locations shall be wired to the Main Terminal Board of the C.I.L. The Main Terminal Board shall be provided with vertical double rows of AREMA terminal blocks, and cable conductors terminated on the right of terminal blocks as seen from the front.

d. House wires shall appear on the left side of the terminal blocks, and the links (Safetran 024-620-1 or approved equal) shall be provided for all wires so terminated.

e. Exposed terminals for circuit exceeding 90 volts shall have insulated nuts.

2.14 SIGNAL TEST EQUIPMENT

a. Provide and have ready for use test instruments and equipment required to conduct tests specified a minimum of one week in advance of the scheduled test. The term "ready for use" means properly matched for test parameters, properly calibrated, sufficiently supplied with leads, probes, adapters, stands, etc., to conduct the test in a professional manner.

b. Provide and have temporary or interim test related materials, special tools, connections, jumpers, etc., available and ready for use (minimum) one week in advance of scheduled test.

2.15 HIGHWAY CROSSING FLASHERS

a. Flashing light type signals shall be used to warn road traffic of a train crossing the bridge. The flashing lights shall have both front and back lights and be 12-inch diameter.

b. The flasher lights shall be from a manufacturer with a proven record for the manufacturing of this type of light.

c. Flashing light units shall conform to AREMA Signal Manuals Part 3.2.25.

d. Flashing light unit shall flash alternately. The number of flashes shall be 45 minimum to 65 maximum per minute.

e. Highway warning signals shall be installed so that the principal traffic light is to the right of approaching highway traffic.

f. Highway warning signal shall be painted. All metal parts that do not function as hoods and background shall be painted aluminum color. Hoods and backgrounds shall be painted flat black color.

g. Highway warning devices installations shall conform to AREMA Signal Manuals Section 3.

2.16 CIRCUIT CONTROLLERS

The circuit controller shall be US&S Model U5 or approved equivalent. Typical installation layout for rail seated check and lock driven check are included in Contract Drawings. Detailed design of the assemblies shall be submitted for approval before Fabrication.

2.17 TRACK CIRCUIT CONNECTORS

Typical track circuit connector JAW assembly is included in the Contract Drawings. Western-Cullen-Hays Model 101 or approved equal shall be used. Detailed installation design for track circuit connector/coupler shall be approved by Engineer before fabrication.

2.18 SECURITY

a. All padlocks for instrument housings and trackside equipment will be supplied by the Contractor.

b. All signal apparatus shall be constructed to accommodate a padlock type security system specified for use with such apparatus. This shall include all signal apparatus, such as, cases, houses and such containing vital circuits or mechanisms from unauthorized employees in accordance with the FRA Rules.

c. Approved intrusion detection shall be provided for the C.I.L.. The intrusion detection shall be of the autodialer type connected to a telephone jack. The Engineer's assigned telephone number shall be programmed.

PART 3 EXECUTION

3.1 WIRED INSTRUMENT HOUSINGS

a. Install signal equipment housings level and plumb and fasten with appropriate hardware. Provide CIL's to clear centerline of nearest running track by minimum of 8 feet 6 inches with trackside doors in open position, unless otherwise approved. Provide door restraints to prevent an open door from infringing on vehicle's dynamic clearance envelope. Height of grade to signal equipment housings not to exceed ten inches.

b. Ground each signal equipment housing and all associated equipment as specified within these Specifications.

c. Install cable entrance conduits.or chutes through knockouts or cored holes in floor of the signal equipment housing behind terminal board(s).

d. Install cables to enter signal equipment housing by approved system adequately sealed to prevent the entry of unfiltered air. Provide the required conduit system, entrance knockouts, and fittings and entrance pipes. Dress, pothead, tag and terminate cables as specified in these Specifications.

e. Seal cable entrance pipes with approved sealing compound.

f. Install relays on relay plugboards corresponding to relay nomenclature and identification plate, and securely fasten in place with approved hardware.

g. Install batteries on battery trays. Coat battery posts with an approved grease and fasten battery connectors to battery posts.

h. Install wiring raceway in accordance with these Specifications.

i. Install instrument racks, entrance racks and cabinets as shown on approved plans. Install racks complete with relays, other equipment

k. Provide interconnecting cables, wiring, and connections to power sources and entrance racks as shown on approved plans, including interconnections to self-contained, rack mounted equipment units.

l. Provide insulated nuts for terminations of wires with a voltage in excess of 90 Volts.

m. Provide a reference voltage for all energy busses terminated on the entrance rack. Locate the reference voltage within twelve inches of the source voltage.

n. Install interconnecting cables from entrance racks and power racks in cable trays and connect on terminal and power panels of each instrument rack.

o. Provide interconnecting cables of same manufacture as cables used in factory test of instrument racks.

p. Harness field installed wires bundles within rack in a neat manner and tie with nylon tie wraps.

q. Provide shock mounted racks secured to 12 gauge (minimum) cold rolled steel bases of same width as racks and with a height of 3-1/2 inches.

r. Paint entrance racks gray as specified. Paint instrument racks as specified and in accordance with manufacturer's standard, as approved. Upon delivery, ensure equipment is painted in accordance with these Specifications and correct deficiencies.

3.2 TRACK CIRCUITS INSTALLATION

Track circuit apparatus shall be located and installed in accordance with the Contract Drawings. The following is the installation of welded bonds:

a. All rail joint bonds shall be made by welds to the outside running rail as required by the Contract Drawings and shall conform where applicable to AREMA Signal Manuals Part 8.1.30 Recommended Design Criteria for Welded-Type Rail-Head Bonds, where these instructions and requisites are applicable and do not conflict with this Specification.

b. For all rail-joint bonds, the surfaces of the rails where the bond is to be applied shall be ground clean with a vitrified grinding wheel. After grinding, the surface shall be cleaned with "Inhibisol" or other approved non-toxic solvent to remove all traces of grease and dirt.

c. After the surface has been ground and cleaned, the surface shall be heated to drive out any moisture. The cable bond shall then be welded by the exothermic process in such a manner as to ensure a thorough mechanical and electrical connection.

d. The welding material shall consist of a copper exothermic mixture employing tin in an amount to effectively constitute 4.5% to 5.5% of the resulting weld metal.

e. It is of great importance that each rail connection be thoroughly welded to the rail. To reduce the possibility of any of these welds breaking in service, the Engineer reserves the right to require a test of each weld by hammer and striker, or in any other manner, which, in the opinion of the Engineer, is reasonable.

f. Any bond, weld or connection which, in the opinion of the Engineer, is found to be defective, shall be removed and a new bond shall be installed at no expense to the U.S. Government.

3.3 SIGNALS INSTALLATION

3.3.1 Signal Mounting

a. Signals shall be mounted on the traffic barrier mast using a mounting bracket as shown in contract drawings. See bridge drawings for more mounting details and coordination with the Contractor.

b. Signal layout shall be installed and wired in conformance with the Contract Drawings. Signals shall be aligned for optimum viewing distance and adjustment. Signals shall be "bagged" with heavy canvas between the time they are installed and placed in service.

3.3.2 Painting

a. The inside of the lamp compartment shall be painted to the manufacturers standard.

b. Each signal layout shall have one primer coat of rust-preventive paint and one finish coat of paint at the point of assembly prior to shipment. The finish coat of paint for the exterior of the lamp compartment housing shall be flat black. The finish coat of paint for background and hoods shall be flat black.

c. The exterior finish coat shall be in accordance with AREMA Signal Manuals Part 1.5.10. After installation and prior to final acceptance, an exterior painting shall be performed by the Contractor.

3.3.3 Final Adjustments

a. Lamp voltage shall be set at 9 to 9.5 volts at the signal head using either the 60 Hz normal power or the 12VDC backup power.

b. Final adjustment of signal head alignment for optimum viewing and securing of adjustments.

c. Final adjustment of near and far signal lens alignment for optimum viewing and securing of adjustments.

d. Test signal layouts in accordance with the approved factory test and inspection procedure and installation inspection procedure.

e. Inspect each signal layout after it has been installed in the field. This inspection shall conform to the Installation Inspection Procedure as approved by the Engineer. Installation shall not be considered complete until all installation defects are corrected to the satisfaction of the Engineer.

3.4 AC WIRING INSTALLATION

a. Conduit shall be run exposed, in straight lines, parallel or perpendicular to the floor or walls and to the walls when run overhead.

b. Conduit shall be securely supported to provide a rigid installation.

c. All wiring shall be continuous from unit to unit; no splices will be permitted in conduit.

d. Wire pulling shall follow the manufacturer's recommendations.

e. All 60 Hz breakers, receptacles, tagging, etc. to be plainly marked as "60 Hz".

f. All utility AC wiring 110/220 v shall be installed in galvanized rigid steel conduit.

3.5 DC WIRING INSTALLATION

a. Install battery chargers, rectifiers, and power supplies and ground detectors as described in these Specifications.

b. Arrange battery cells, in tier assemblies for each bank of batteries provided under this Contract.

c. Test equipment in accordance with manufacturer's requirements and those of Signal Tests of these Specifications.

3.6 EXTERNAL CABLE INSTALLATION

The installation of external cables shall conform to AREMA Signal Manuals, Part 10.3.10, except as modified herein.

3.6.1 Signal Cable Installation

Cable conductors shall be terminated in conductor sequence from top to bottom or left to right on terminal boards, including spare wires.

a. The Contractor shall provide sufficient slack in cable conductors at all terminating points to enable three reterminations of the conductor due to broken eyelets.

b. In types of installation where the cable cannot be constrained, sufficient cable slack shall be provided to prevent damage to the cable due to vibration.

c. At each location where signal cable conductors must be accessed, the cable shall be brought into instrument housing and all conductors

terminated on AREMA terminals whether utilized or spare.

d. Individual cable conductors shall be identified at each cable termination with plastic tags as specified in these specifications. All conductors in each cable, including spare conductors, shall be terminated in conductor order and identified.

e. Cable ends shall be kept sealed at all times, during transportation, in storage, and during cable placement to prevent moisture entry into the cable core. Cable end caps shall be used for this purpose.

f. Cables shall be carefully inspected by the Contractor prior to installation to be certain that the cable is free from defects.

g. The wiremen shall be instructed by his supervisor or foreman not to proceed with any wiring should there be a noticeable problem with the tools or cable.

h. During the placing operation, cable shall not be bent in a radius less than manufacturer's recommendation.

i. Every instance of damaged cable observed at any time, whether prior to installation, occurring during construction, or discovered by test or observation subsequent to installation, shall be immediately called to the attention of the Engineer. The method of correction of such damage shall be in accordance with the written instructions of the Engineer. The Contractor shall promptly repair such damage or make such corrections as approved by the Engineer.

j. All cables to be installed in the same duct shall be pulled simultaneously. Extreme care must be used during the installation of cables so as to avoid twisting, kinking, or in any way injuring the cable or its sheath. Glycerized liquid lubricant or other approved lubricant shall be applied to the cable when installing cables in conduit.

k. When pulling cable, an approved wire cable swivel grip extending not less than 18 inches back from the end of the cable shall be used and clutch on the pulling device shall be set to slip at 50% of the weight per 1,000 feet of the cable to be pulled. The equipment used for pulling cable shall be equipped with a dynamometer which will indicate the pulling force in pounds.

l. Where cable enters or leaves conduit, the ends of the conduit shall be fitted with plastic end bells to prevent damage to the cable.

m. Wherever multiple conductor cables are terminated, the outer sheath of the cable shall be carefully removed to the point of cable entrance. At the end of the cable sheath or covering, two layers of plastic electrical tape shall be applied. This tape shall be Reference No. 88, as manufactured by the 3M Company or an approved equal. The wiremen engaged in this phase of stripping the outer cable jackets shall properly remove the outer jackets by using the proper cable strippers without damaging the inner conductors. Under no circumstances will the cables be unravelled or pot-headed prior to visual inspection by the Engineer for cuts, nicks or abrasions to conductors.

n. The wiremen shall pot-head the cable, train the wires in a proper manner to the termination area, cut to length and strip the wire end, in the signal case, junction box or other signal device. Wiremen stripping ends will use wire strippers suitable for each size wire and shall properly remove the required amount of insulation without nicking the copper conductor.

o. Wiremen shall install the wire eyelets using calibrated crimping tools to properly install the required eyelets and attach the wire to the terminals. Special smooth jawed long nosed eyeing pliers shall be used for bending eyelets in solid conductor cables. Eyes must snugly fit over terminal posts and the eye should be completely closed.

p. The Contractor shall provide appropriate special protection for cables in areas where the cables are unavoidably exposed to hazardous conditions such as vibration or sharp corners on equipment.

r. After cable installation, all conduit ends whether above or below ground, in concrete tray, or instrument housings shall be sealed with "Duxseal" as manufactured by Manville Co., "Flame-Safe" as manufactured by T&B or approved equal.

s. Any voids remaining, where cables enter housings, junction boxes, signals, circuit controllers or any other apparatus shall be made moisture tight with cold sealing compound in accordance with AREMA Signal Manuals Part 15.2.15.

3.6.2 Aerial Cable

a. Cables crossing the river are attached to the lift-span in the form of U-shaped loop. This loop slack will provide for the raise height of lift-span. Special attention and extreme care must be paid to the loop cable installation on Lift Bridge in order to avoid possible damage from abrasion or vibration. Adequate flexibility shall be maintained for normal bridge operation.

b. Signal subcontractor shall lay cables across the lift bridge on the attachment fixtures provided for in the structural drawings by the Contractor.

Cables to bridge operator house shall be laid on attachment fixtures provided for by the Contractor.

3.6.3 Direct Burial

Cable trenching shall comply with the following:

a. Exercise extreme care when trenching, to avoid damage to existing cable. The general location of certain existing signal cables is shown on the utility Contract Drawings where existing cables and utility crossings are known to exist. The Contractor should anticipate the existence of such facilities where not shown or detailed and is responsible to avoid damage to such facilities.

b. All trenches excavated shall have barriers placed around the excavation and properly protected to prevent injury to individuals.

c. All cable will be placed 36" below the surface of ground or from the bottom of the ties when track crossings are involved. All cables,

crossing track shall be installed in Schedule 40 PVC conduit.

d. Paved area trench excavation, backfill, and street repair shall be provided by the Contractor. The signal subcontractor shall provide conduit for all street/track crossing.

e. No trench in the track area shall be backfilled before it is inspected. Notify the Engineer at least (24) hours before installation, so that an inspection can be made of the installation. No trench within the track area shall be left open without having the Engineer present for inspection and immediate backfill.

f. When burying cables if 36 inches of burial depth cannot be attained due to local conditions, the cables shall be buried as deep as possible and added protection shall be installed consistent with the depth achieved. If the depth achieved is more than two feet, 3" x 12" treated planking shall be installed over the cables at a depth of twelve inches. If the depth achieved is less than two feet, the cables shall be encased in PVC Schedule 80 duct, surrounded by a minimum of four inches of fine earth and covered by 3" x 12" treated planking at depth of at least four inches. Obtain the permission of the Engineer for all burial installation of a depth less than thirty-six inches.

g. Work in the vicinity of the tracks shall be conducted, such that the excavation, placement of cable or conduits, and the backfilling proceeds as one continuous operation, keeping the trench open for the least possible time necessary for actual construction.

h. Direct burial signal cable shall be placed on a protective cushion consisting of at least four inches of clean backfill which will pass a No. 4 screen.

i. Lay a six (6) inches wide TERRA-TAPE or equal in the trench at a depth of 12 inches from grade line, during backfill operation. "Buried Cable" at intervals not exceeding six feet to be labeled on tape.

j. For entrance into instrument housings from standard burial depth, conduit shall be a vertical length of PVC Schedule 40. Radius of cable bends shall not be less than manufacturer's recommendations. Where cable enters junction boxes or is brought to the surface from depth of two feet or less, galvanized rigid sweep shall be used.

3.7 WIRE INSTALLATION

3.7.1 General

a. Provide sufficient slack in wires adjacent to their terminals to permit movement of equipment. Slack shall be arranged in a neat and orderly manner.

b. No splices shall be made in any wire.

c. The wiring shall be cabled and held in place so as to present a neat and orderly appearance.

d. All wiring harness or securing attachments such as wire tie bars shall be covered with heat shrinkable tubing or taping to protect wire from physical trauma and abrasion.

e. Tag vital circuits to relays with a plastic, 3-line sleeve type tag which designates terminations and circuit nomenclature in accordance with the following typical.

Where wire comes from - relay name and contact number 1TPR12

Where wire goes to - relay name and contact number 2TPR13

f. Tagging shall have permanence and legibility. Sleeve tags shall be readable in an upright position and located on the conductor next to the terminal. All jumper wires on the same relay plugboard shall be provided with tags.

g. Non-vital circuits shall be identified by color coding or equivalent means.

h. Apparatus and cable terminations shall be tagged with nomenclature shown on drawings.

i. The cable identification tag shall be wrap-around Raychem type fastened around the neck of the cable. The legend on the tag shall state the cable size and "TO" and "FROM" destinations.

3.7.2 Wire Termination

a. Provide insulated solderless eye wire terminals at each wire end. Terminals shall conform to the requirements of AREMA Signal Manuals Part 14.1.1. Spade lug or fork lug wire terminals shall not be used.

b. Terminate all conductors entering instrument housing on Safetran Test Links and Terminals or approved equals.

c. In accordance with AREMA Signal Manuals Part 14.1.11, each binding post (14.1.11-9) shall be furnished with two binding nuts (14.1.11-6, one clamp nut (14.1.11-7) and three washers (14.1.11-8).

d. Binding posts and exposed terminals of other apparatus for circuits exceeding 90 volts shall be equipped with insulating nuts and sleeves.

3.7.3 Installation

a. Install internal wire and cable in accordance with the applicable requirements of AREMA Signal Manuals Section 10, as specified and as on Contract Drawings.

b. Install wires and cables in a neat, workmanlike manner. Cables in ladders shall be laid in and not pulled into same. Cables shall be installed with a minimum amount of crossover in the ladders and shall not be pulled tightly around bends. All exposed wires and cables entering or leaving equipment racks or housings shall be protected from abrasion by sharp metallic edges and nylon strap edges.

c. Provide and install nylon straps for bundling and cabling of conductors where two or more single conductors are exposed in internal rack bundles, cable ladders, or whenever wires are to be bundled. Tape shall not be used for this purpose. Straps shall be installed at intervals not greater than five feet along the cable run. Wires of multi-conductor cables exposed by the stripping of the cable jacket for

terminations shall be trained in a neat, workmanlike manner and tied approximately every three inches with nylon straps.

d. The main bundles and branches shall be secured to the racks in a manner which shall preclude physical damage due to pressure of abrasion. Prevent the wire weight from being supported by the wire terminations, connections, or plug connection. The arrangement of the wire bundles and cables shall be such that they do not interfere with visual inspection, trouble shooting, or repair of the rack-mounted equipment.

e. Route all rack-to-rack wiring via the overhead cable ladders with one foot of slack between the cable ladders and each rack to which the cable or wire is connected.

f. Use stranded wire, minimum size No. 16 AWG, as approved by the Engineer for wiring from entrance racks to instrument racks.

3.8 RELAY INSTALLATION

3.8.1 General

a. Install vital relays on wired racks located in equipment house/cases, as approved on the circuit plans.

b. Inspect and test to ensure that the relay operating characteristics have not been altered due to damage during shipping procedures.

c. Ensure that all AC and DC power buses are open while installing relays and do not re-connect these buses until all relays have been installed.

d. Specific relays used for factory test shall be re-installed in the same position in the field.

3.8.2 Field Tests

Test all relays provided individually in the field as part of this Contract in conjunction with the complete testing and adjustment requirements of the total installed system.

3.9 SYSTEM TEST

3.9.1 General

Devise the signal testing plan(s) to satisfactorily accommodate the various stages of installation and provide testing plans for all required stages of installation and cut-overs.

3.9.2 Factory Test Procedures

Provide confirmation that factory tests of systems and components have been performed to verify design, nameplate ratings, and proper performance.

a. All components and equipment shall be 100 percent inspected and tested. When testing the interlocking CIL's all outlying cases or housings within the interlocking limits must be temporarily cabled together and tested as a unit.

b. The Engineer reserves the right to oversee any or all tests and inspections in the Contractor's and/or subcontractor's plans. The Contractor shall advise the Engineer a minimum of four weeks in advance of each factory test.

c. When test results are not recorded on a test data plate affixed to the equipment or unit, provide certified test reports for each item at time of delivery in an approved form and format suitable for regular office file record keeping.

d. Inspect each component and unit at its point of manufacture, and indicate evidence of this inspection and acceptability on the component or unit where practicable.

3.9.3 Factory Tests and Inspections

3.9.3.1 General

Provide factory tested and inspected DC vital relays in accordance with AREMA Signal Manuals, Part 6.4.1.

Perform tests of completed pre-wired CIL equipment cases and bridge indication panel at the point of assembly with all equipment installed. and interconnected with simultation panel. Perform operational and wiring verification test in accordance with approved circuit drawings. Simulate functions external to the housing where required.

3.9.3.2 Energy Distribution Tests

Remove all fuses and carry out the tests to include, but not be limited, to the following:

a. Verify that circuit breaker and fuse sizes compares to approved circuit drawings.

b. Check energy distribution using resistance test instrument to verify accordance with approved plans.

c. Verify wire gauge complies with approved circuit drawings and correct any discrepancies.

d. Test each energy bus to all energy buses to ensure no crosses, shorts or grounds exist.

3.9.3.3 Wiring Verification Tests

Check circuitry for accuracy against the approved circuit drawings. Tests may be performed with energy on or off. Perform the following:

a. Verify point to point wiring, including energy loops.

b. Record wire count for each terminal, relay contact, etc., during wire verification test to verify quantity of wires at each terminal, relay contact, etc. complies with approved circuit drawings and correct discrepancies.

c. Verify tags and nomenclature where applicable.

d. Verify components,relays, resistors, etc. are the same as indicated on approved circuit drawings and installed at indicated positions.

3.9.3.4 Vital Circuit Tests

a. Perform tests with energy on during simulation testing.

b. Test vital circuits to ensure the opening of each contact in control circuit cuts off control current under conditions shown on the approved plans following through all multiple circuits and cut around.

3.9.3.5 Interlocking Tests

In conjunction with the vital circuit tests, simulate operating conditions to ensure each circuit functions in accordance with these Specifications. Perform the following functionality tests:

a. Time locking.

b. Route locking.

c. Detector locking.

d. Verification of time release settings.

e. Proper polarity of energy to interconnect with existing and new circuitry outside housing or case tested.

f. Adjust and correct defects in house wiring to obtain proper operation.

g. Submit design changes made to obtain proper operation for approval.

3.9.3.6 Instrument Racks Wiring

a. Provide instrument racks wired and with equipment installed. Interconnect racks in accordance with the approved drawings.

b. Adjust and correct defects in rack wiring to obtain proper operation.

c. Submit design changes made to obtain proper operation for approval.

3.9.3.7 Component Tests

Provide factory tested and approved components, products in accordance with approved product submittals.

3.9.3.8 Simulation Panel

The Contractor shall include as part of the factory test a simulation panel which includes the following:

a. A faceplate which shows the track layout for the bridge interlocking being tested.

b. Upon this panel toggle switches shall be mounted which will be connected to the CIL's for the purpose of energizing or de-energizing

track circuit including overlay, and rail seat and span lock circuit controllers.

c. The panel should include lamps which represent signals and flashers. The color arrangement of these lamps shall conform to the signals/flashers they represent.

3.9.3.9 Summary

a. The Contractor shall organize a factory test program that verifies the adequacy of the system to meet all technical and performance requirements in orderly and logical sequence.

b. Tests shall be performed for the purpose of verifying the design parameters, assuring proper performance and safety and demonstrating compliance with the specifications and plans.

c. The tests to be performed shall cause each system or subsystem to be sequenced through its required operation, including the imposition of simulated conditions to provide that the equipment complies with all fail safe requirements.

d. All design changes found necessary to obtain proper systems operation shall be submitted to the Engineer for approval.

3.9.4 Test Results

a. Certified tests reports shall be furnished for each item at the time of delivery in a form and format suitable for regular office file record keeping.

b. Inspect each component and unit at its point of manufacture. Evidence of this inspection and acceptability shall be submitted at the time of delivery.

3.9.5 Field Test Procedures

a. Perform field tests so each system and subsystem is sequenced through its operations, including imposition of simulated conditions to demonstrate installation complies with specified fail-safe design requirements and operational functions.

b. Perform field tests for continuity, insulation resistance, resistance of ground connections, circuit breakdown, burn-in tests, visual inspection and other tests in accordance with these Specifications. Perform tests prior to operational testing of systems or subsystems.

c. When tests require specific meter or test instrument readings, furnish pre-printed data sheet with allowable range of values, for each part of test, including check-off system for each action and a blank space adjacent to the expected value to record test readings.

d. Where an error in field-testing occurs due to field wiring and connections in disagreement with approved circuit plans, correct it. However, do not make changes which affect safety of operation of approved circuits, as designed, without prior written approval of the Engineer.

e. The Engineer will determine whether to re-run a part or an entire test when a field test does not meet the requirements specified for the test.

f. Re-test in accordance with applicable test procedures if changes are made after completion of test procedure.

3.9.6 Field Tests and Inspections

Perform general field tests and inspections to include:

a. Ground verification tests;

b. Power racks and energy distribution system and failure alarm checks;

c. Breakdown test of all vital circuitry;

d. Wiring verification of all non-vital circuitry;

e. Line circuit verification between C.I.L., location B case, and bridge operator house.

f. Vital function tests;

g. Operating tests;

h. Applicable tests prescribed by AREMA Signal Manuals, Part 2.4.1, where inspections and tests prescribed by AREMA do not conflict with the requirements of these Specifications.

3.9.7 Specific Field Tests

Perform specific field tests to include, but not be limited to the following:

3.9.7.1 Resistance of Made Ground Connections

a. Test grounding connections using Ratio Ground Resistance Test method to determine ground resistance does not exceed 5 ohms.

b. Test C.I.L. and location case buses to ensure that the resistance between each bus and the single point ground source is not greater than 2 ohms.

c. Test all connections to the ground bus to verify proper and adequate connections.

3.9.7.2 Insulation Resistance Tests

a. Test all cables installed along the right of way and entering and leaving the CIL, case, or device after installation to ensure insulation of wires, cable and connected equipment meet specified resistance values. Use direct reading instrument, with 0 megaohm to 200 megohm scale range, and a self contained dc power supply rated 500V (minimum) to 1,000V (maximum), to measure insulation resistance. Resistance between conductors and ground shall not be less than 100 megohms.

b. Test insulation resistance of each conductor to ground and between each conductor and all other conductors in each multi-conductor cable. Disconnect power sources, made grounds and connections to rails from circuits during testing.

c. Utilize same ground point as that used in made ground test.

d. Record insulation resistance test values on approved Insulation Resistance Record forms and submit for approval.

e. Ground Readings

f. Test is to detect any leakage between cable conductors and conductors and earth ground.

3.9.7.3 Vital Relays

a. Test all DC vital relays for pick-up, working and drop-away values. These values shall be in accordance with the field requirement values stated in Table 1 of AREMA Signal Manuals Part 6.4.1.

b. These measured values shall be recorded on the approved relay record cards and turned over to Engineer upon acceptance of this test requirement.

c. These tests shall be performed at the housing location after the housing has been set.

d. Any relay failing to meet the specified operating values and the applicable AREMA Signal Manuals Specifications shall be replaced by one which does.

3.9.7.4 Energy "Off" Tests

Perform tests with power off to the C.I.L. and equipment cases as follows:

a. Open circuit breakers

b. Verify circuit breaker size complies with approved circuit drawings.

c. Test energy distribution using an approved resistance test instrument to verify compliance with approved drawings.

d. Verify gauge of wiring complies with approved circuit drawings and correct discrepancies.

e. Record wire count for each terminal, relay contact, etc. during energy distribution breakdown to verify quantity of wires at each terminal, relay contact, etc. complies with approved circuit drawings and correct discrepancies.

f. Verify nomenclature and terminal location on tags.

g. Test energy bus to other energy buses to ensure no shorts, grounds or crosses exists.

3.9.7.5 Energy "On" Tests

Upon completion of energy off tests, perform the following checks and tests:

a. Close circuit breakers for power supply feeds and verify size complies with approved circuit drawings.

b. Turn on energy feeds and test operation of power transfer for proper operation.

c. Measure and record ac voltage and current input.

d. Measure and record power supply or charger output voltage and current.

e. Verify proper voltage is present at distribution points.

f. Check circuit power failure and other alarms which indicate to central control.

3.9.7.6 Circuit Continuity Tests

Test wire and cable installed to verify continuity of conductors and connections are made to proper terminals as shown on the approved drawings. Where parallel circuits exist, test each parallel path independently to verify continuity of each path.

3.9.7.7 Vital and Non-Vital Circuit Breakdown.

Check circuits to verify accuracy with approved circuit drawings. Perform the following tests with energy on or off:

a. Verify point to point wiring

b. Record wire count of field installed wires for each terminal, relay contact, etc. to verify quantity of wires at each terminal, relay contact, etc. complies with approved circuit drawings and correct discrepancies.

c. Verify nomenclature of tags.

d. Verify components, relays, resistors, etc. and corresponding installations comply with approved circuit drawings.

3.9.7.8 Breakdown of Control Circuits

a. Test circuits in their entirety to verify correct operation of and response to each contact on each circuit element, such as relays, circuit controllers and contactors. Where parallel paths exist, perform tests to validate each path and open circuit.

b. Test circuit by simulating operating conditions to verify circuit operates in accordance with these Specifications and with approved drawings.

3.9.7.9 Track Circuits

a. Adjust track circuits in accordance with manufacturer's adjustment tables and test sensitivity with 0.06 ohm shunt.

b. Test each track circuit to ensure that the energy level at the

relay end is in conformance with the operating voltage levels of the track relay and the maximum broken rail detection.

c. Terminate, adjust and test all track circuits and disconnect prior to cutover. Provide detail track circuit adjustment data for each track circuit.

d. Test track circuits in accordance with AREMA Signal Manuals Part 8.6.1 and AREMA Signal Manuals Part 8.1.1 where the instructions are applicable and do not conflict with this Specification.

e. Test for integrity of insulated joints.

f. Observe and test for properly polarity connections to rail, and staggered polarity between adjacent track circuits.

g. Record all track circuit values after installation including but not limited to feed and relay voltages, etc.

h. After all circuit logic has been verified using track shunts, a complete series of tests shall be performed utilizing a test train.

3.9.7.10 Signal Layouts

The following tests on signal layouts are required:

a. Perform a continuity check of field wires and verify nomenclature.

b. Apply energy to signal lighting circuits and adjust lamp voltages to 9 to 9.5 volts at the signal head.

c. Breakdown signal clearing relay contacts and verify proper signal aspect is displayed.

d. Sight signals for maximum visibility.

3.9.7.11 Line Circuits

Perform the following test procedures to verify the integrity of line circuits between wayside instrument locations:

a. Perform continuity tests to verify nomenclature, line circuits and that voltage and polarity are correct.

3.9.7.12 Interlocking Tests

Test the following functions:

a. Detector locking,

b. Time locking;

c. Route locking;

d. Verify timing of time releases;

e. Signal operation in accordance with contract drawings

f. Loss of shunt; 5 sec between TR pick and TPR pick

g. Time locking; ASR-TE check

3.9.7.13 Bridge Operational Tests

Perform tests to verify the integrity of the installed wayside signal and interlocking system. Include tie in interface with the Lift Bridge controls and indications. Perform other system tests as follows:

a. For all possible routes, place a shunt, of an approved resistance value, sequentially on each track circuit in the route to simulate train movement. Verify wayside signals display proper signal aspects as indicated on the approved plans.

b. Record aspects observed during the progression of shunting each track circuit in the route.

3.9.7.14 Power Tests

Perform power tests and record results as follows:

a. Measure and record voltage of main power, from the source to the CIL.

b. Verify circuit breaker size and type.

c. Verify power supply, battery charger and battery settings and quantities.

d. Verify bus to bus to determine that no shorts, crosses or grounds exist.

e. Check all power alarms.

f. Verify full-charge battery recharge time.

g. Verify charger output.

h. Verify battery condition.

i. Verify power transfer operation. (POR Test)

3.9.7.15 Intrusion Alarm

a. Simulate conditions to cause alarm to activate.

b. Check alarm activation.

c. Check that alarm has been properly dialed and received.

3.9.8 CutOver Tests

Cutover tests will be conducted with support from the Contractor and will include but not be limited to:

3.9.8.1 Tests

a. Time Locking

b. Route Locking

c. Detector Locking

d. Track Circuits

e. Signal Aspects

f. Flasher Aspects/Flasher Rate

3.9.8.2 Test Duration and Times

Cutover tests will be conducted when all signal equipment and apparatus has been installed in place and undergone satisfactory pre-cutover testing. All pre-cutover testing and documentation shall be completed and submitted to the Engineer for approval prior to scheduling the final cutover.

3.9.8.3 Required Contract Support

a. The Contractor shall provide enough manpower to provide not less than one (1) man at each location involved in the cutover.

b. Contractor to provide all test equipment including radios for personnel use during the process.

c. The Contractor's Signal Engineer shall be in attendance at the cutover and shall operate under the jurisdiction of the Engineer with personnel managing the cutover.

d. The Contractor shall have his personnel mobilized not less than (2) two hours before the start of a cutover.

e. The Contractor shall have all start up material readily available on the cutover area property to facilitate replacement of any equipment or apparatus that is considered defective during the cutover procedure.

f. The Contractor's personnel will provide support and function under the direction of the Engineer during the cutover test procedures and make any changes or adjustments to equipment or apparatus as deemed necessary.

g. The Contractor shall have his personnel equipped with two-way radio units and two shunts at each location.

3.9.9 Correction of Defects

a. During test procedures any defect or failure to meet the described procedure shall be immediately corrected.

b. Failure of a material item shall be cause for the replacement of that item immediately.

c. When a defect or failure occurs during a test procedure the test procedure shall be halted and no further test shall proceed until the defect or failure is corrected.

-- End of Section --

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK