

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES	
			J	1	196
2. AMENDMENT/MODIFICATION NO. 0001	3. EFFECTIVE DATE 30-Jul-2002	4. REQUISITION/PURCHASE REQ. NO. W25PHS2161897		5. PROJECT NO.(If applicable)	
6. ISSUED BY US ARMY ENGINEER DISTRICT, CONTRACTING DIVISION WANAMAKER 100 PENN SQUARE PHILADELPHIA PA 19107-3390	CODE DACA61	7. ADMINISTERED BY (If other than item 6) US ARMY ENGINEER DISTRICT, POC: LINDA M. WANAMAKER 100 PENN SQUARE PHILADELPHIA PA 19107-3390		CODE E5CTCLG3	
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)			X	9A. AMENDMENT OF SOLICITATION NO. DACA61-02-B-0001	
			X	9B. DATED (SEE ITEM 11) 02-Jul-2002	
				10A. MOD. OF CONTRACT/ORDER NO.	
				10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE				
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS					
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer					
<input type="checkbox"/> is extended, <input type="checkbox"/> is not extended.					
Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required) UPGRADE AT BARRACKS, FORT DIX, NEW JERSEY					
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.					
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).					
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:					
D. OTHER (Specify type of modification and authority)					
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) The above numbered solicitation is amended as follows:					
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
			TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
_____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)		30-Jul-2002	

14. DESCRIPTION OF AMENDMENT (continued)

- a. SF 30 AND BIDDING SCHEDULE: Section 00010, Pages 2 and 3 - Please delete page 00010-2 and 00010-3, the Bidding Schedule, in its entirety and substitute the new page of the same number, annotated Amendment No. 0001, attached hereto.
- b. SECTION 00800 TABLE OF CONTENTS: Please delete Table of Contents, Special Contract Requirements in its entirety and substitute the revised Table of Contents, annotated Amendment No. 0001, attached hereto.
- c. SECTION 00800 - SPECIAL CLAUSES: Please delete Section 00800 in its entirety and substitute the revised Section of the same number, annotated Amendment No. 0001, attached hereto.
- d. SECTION 00810 WAGE RATES: Please delete Wage Rates (General Decision Number NJ020002) in its entirety and substitute the revised Wage Rates, annotated Amendment No. 0001, attached hereto.
- e. SECTION 00830 - SURVEY MONUMENT DESCRIPTION SHEETS: Please add Section 00830 in its entirety, annotated Amendment No. 0001, attached hereto.
- f. TECHNICAL SPECIFICATIONS:
- (1) PROJECT TABLE OF CONTENTS: Please delete Project Table of Contents in its entirety and substitute the revised Project Table of Contents, annotated Amendment No. 0001, attached hereto.
  - (2) SECTION 01010 - SUMMARY OF WORK: Please delete Section 01010 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.
  - (3) SECTION 01025 - MEASUREMENT AND PAYMENT: Please delete Section 01025 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.
  - (4) SECTION 01330 - SUBMITTAL PROCEDURES: Please add Submittal Register Sheets for Sections 02950 and 10160, annotated Amendment No. 0001, attached hereto.
  - (5) SECTION 01355 - ENVIRONMENTAL PROTECTION: Please delete Section 01355 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.
  - (6) Section 02950 - Trees: Please add new Section 02950 in its entirety, annotated Amendment No. 0001, attached hereto.
  - (7) Section 05500 - Miscellaneous Metal: Please delete Section 05500 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.
  - (8) Section 08710 - Door Hardware: Please delete Section 08710 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.
  - (9) Section 08810 - Glass and Glazing: Please delete Section 08810 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.

14. DESCRIPTION OF AMENDMENT (continued)

(10) Section 08850 - Fragment Retention Film for Glass: Please delete Section 08850 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.

(11) Section 10160 - Toilet Partitions: Please add new Section 10160 in its entirety, annotated Amendment No. 0001, attached hereto. .

(12) Section 13930 - Wet Pipe Sprinkler System, Fore Protection: Please delete Section 13930 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.

(13) Section 13935 - Wet Pipe Sprinkler System, Fore Protection: Please delete Section 13935 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.

(14) Section 15400 - Plumbing, General Purpose: Please delete Section 15400 in its entirety and substitute the revised Section, annotated Amendment No. 0001, attached hereto.

g. CONTRACT DRAWINGS: Please delete Drawing Numbers CE1, CE2, CE3, CE4, CE5, CE7, CE8, DA1, A2, A8, A17, A22, A23, A26, S2, M13, M16, P2, P3, P4, P5, P6, P8, P10, E7, E8, E13, E14, E15, E16, and E18 in their entirety and substitute the revised sheets, of the same Drawing Numbers, with a revision date of 26 July 2002, attached hereto.

h. Please indicate receipt of this amendment on Standard Form 1442(SOLICITATION, OFFER, AND AWARD) as Amendment No.0001. Failure to acknowledge all amendments may be cause for rejection of the bid.

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BIDDING SCHEDULE

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
1.	Base Bid - Upgrade/ Modernize AT Barracks Buildings 5404, 5405, and 5406, Less Work Included in Other Bid Items	--	Job	L.S.	\$
2.	Base Bid - Removal and Disposal of Interior Asbestos Insulated Doors	12	Each	\$	\$
3.	Base Bid - Removal and Disposal of Asbestos- Containing Pipe Insulation From Pipes in Chases	1,200	L.F.	\$	\$
4.	Base Bid - Removal and Disposal of Asbestos- Containing Floor Tile	30	S.F.	\$	\$
5.	Base Bid - Removal and Disposal of Asbestos- Containing Pipe Insulation From Pipes in Crawl Spaces	1,600	L.F.	\$	\$
6.	Base Bid - Removal and Disposal of Asbestos Contaminated Soil From Crawl Spaces	14	Ton	\$	\$
7.	Base Bid - Removal and Disposal of Asbestos- Containing Pipe Insulation From Pipes in Basements	120	L.F.	\$	\$
8.	Base Bid - Removal and Disposal of Asbestos- Containing Steam Pipe Insulation From Pipes in Kitchen Crawl Spaces	120	L.F.	\$	\$
9.	Base Bid - Removal and Disposal of Asbestos- Containing Pipe Insulation From Pipes on ground in Kitchen Crawl Spaces.	160	L.F.	\$	\$
10.	Base Bid - Repair of Existing Windows	210	Each	\$	\$_____

BASE BID TOTAL ESTIMATED AMOUNT        \$\_\_\_\_\_

BIDDING SCHEDULE (Cont'd)

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
11.	Option No. 1 - <b>Remove and Replace</b> Existing Parking Area	--	Job	L.S.	\$
12.	Option No. 2 - Replace Existing Exterior Doors with New Insulated Steel Doors	--	Job	L.S.	\$
13.	Option No. 3 - Patch and Paint Existing EIFS	--	Job	L.S.	\$
14.	Option No. 4 - Upgrade Base Bid Locksets to Electronic Card Reading Locksets	352	Each	\$	\$
15.	Option No. 5 - Construct New Parking Areas	--	Job	L.S.	\$
16.	Option No. 6 - Replace Existing Windows with New Windows Having <b>Laminated Glass</b> Glazing, Less Base Bid Window Repairs	423	Each	\$	\$_____
TOTAL ESTIMATED BASE BID AND OPTIONS AMOUNT					\$

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SECTION 00800  
SPECIAL CLAUSES

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SC-4	PHYSICAL DATA
SC-5	PERFORMANCE OF WORK BY THE CONTRACTOR
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SC-11	PERFORMANCE EVALUATION OF CONTRACTOR
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SC-13	INSURANCE REQUIREMENTS
SC-14	ACCIDENT PREVENTION

SPECIAL CLAUSES

SC-1 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

a. 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 720 calendar days after the date the Contractor receives the notice to proceed. **The Buildings will not become available to the Contractor until 16 October 2002.** The time stated for completion shall include **any or all of the Options which may be awarded within 60 calendar days from receipt of the notice to proceed** and final cleanup of the premises. (FAR 52.211-10)

SC-2 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 \$1,800 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. (FAR 52.211-12)

SC-3 CONTRACT DRAWINGS, MAPS AND SPECIFICATIONS (DEC 1991)

a. Upon obtaining the plans and specifications, the Contractor shall -  
(1) Immediately check the specifications and all drawings furnished immediately upon receipt;  
(2) Compare the specifications and all drawings and verify the figures before laying out the work;  
(3) Promptly notify the Contracting Officer of any discrepancies; and,  
(4) Be responsible for any errors which might have been avoided by complying with this paragraph (b).

b. Large scale drawings shall, in general, govern small scale drawings. Figures/dimensions marked on drawings shall take precedence over scale measurements.

c. 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.

d. The work shall conform to the specifications and the contract drawings which are available in electronic bid set format on the Philadelphia District website at <https://napws01phl/>. Drawings are titled: AT Barracks Upgrade, Fort Dix, Wrightstown, New Jersey. The list of drawings set out on Title Sheet (Plate T1) is hereby incorporated by reference into this clause. (DFARS 252.236-7001)

SC-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall 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. Highway 206 and Interstate Route 295 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 Military Reservation may be used by the Contractor subject to the approval of the Post Authorities. Such roads, if 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 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 at Fort Dix, Wrightstown, New Jersey. The site of the work is on a military reservation with restricted access, and all rules and regulations issued by the Commanding Officer covering general safety, security, smoking policy, and sanitary requirements, etc., shall be observed by the Contractor. Commercial vehicles will have limited access to Fort Dix via Gate 9 and will be subject to search. Privately owned vehicles (POVs) will be required to be registered and display a Fort Dix sticker. POVs without a sticker will have to go through Checkpoint 1 at the Wrightstown Circle. Bidders shall familiarize themselves with all regulations concerning access to Fort Dix.
- d. Magnitude of the Contract Work. The estimated value of the contract work is over \$10,000,000.
- e. Inspection of the Site. Prospective bidders 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. A site inspection will be held on July 15, 2002 starting at 9:00 AM. Attendees shall park at the lot on West 1st Street and Pennsylvania Avenue, diagonally across from Bldg 5406. All firms who wish to attend must submit the necessary information in order to gain access to Fort Dix on July 15th. The information must include names of all attendees, organization, vehicle license number, and a point of contact with phone number and fax in case additional information will be required. This information must be submitted via e-mail to (Joseph.A.Nowak@usace.army.mil) or fax (215-656-6748) by Noon EST, July 11, 2002. The information is required to notify security at Fort Dix and there shall be no exceptions to the date and time listed for submittal of information nor will an alternate/additional date for the site visit be selected.
- f. Hours of Work. The Contractor shall provide at least a 24 hour 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 designated "inspector" or Contracting Officer. Work shall only be performed between 7:30 a.m. and 4:30 p.m. daily, Monday through Friday, excluding federal legal holidays as outlined by Public Law Number 98-144 (or days not worked on Fort Dix due to the observance of such holidays). 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 previously arranged schedule. 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) Request for permission to shut down services shall be submitted in writing to the Contracting Officer not less than 17 days prior to date of proposed interruption. The request shall give the following information:

- (a) Nature of Utility (Gas, L.P. or H.P., Water, 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 or 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 event of emergency.

(6) Flow in gas mains which have been shut off shall not be restored until the Government 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 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 Contracting Officer's Representative for traffic guides and public safety.

SC-5 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, with its own organization, work equivalent to at least twenty (20) 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. (FAR 52.236-1)

SC-6 AVAILABILITY AND USE OF UTILITY SERVICES (APR 1984)

a. The Government will make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.

b. The Contractor, at its expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia. (FAR 52.236-14)

c. Electric service to Contractor-furnished office or storage facilities will be charged at the current rate prescribed by Army regulations. 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.

SC-7 IDENTIFICATION OF EMPLOYEES

The Contractor shall be responsible for obtaining an identification badge/card from Fort Dix for 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 required by Fort Dix. All prescribed identification shall immediately be delivered to Fort Dix for cancellation upon the release of any employee. When required by Fort Dix, the Contractor shall obtain and submit fingerprints of all persons employed or to be employed on the project. (CENAP)

SC-8 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)

- a. This clause does not apply to terminations. See 52.231-5001, Basis for Settlement of Proposals, 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-contractor 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, costs for the equipment shall be based upon the applicable provisions of EP 1110-1-8, "Construction Equipment Ownership and Operating Expense Schedule," Region I. 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 lessees.
- d. When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. This data shall be submitted on Standard Form 1411, "Contract Pricing Proposal Cover Sheet." (EFARS 52.231-5000)

SC-9 CERTIFICATES OF COMPLIANCE

Any certificates required for demonstrating proof of compliance of materials with specifications requirements shall be executed in triplicate copies. Each certificate 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 tests are performed on selected samples, the material is found not to meet the specific requirements. (CENAP)

SC-10 SUPPLEMENTAL WARRANTY OF CONSTRUCTION REQUIREMENTS (APR 1985)

The following supplemental requirements are required in conjunction with

Contract Clause: "Warranty of Construction":

a. 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 warranty under the terms of the various sections of the specifications, the Base Commander will be the authorized party for the purpose of implementing the provisions of such warranties on behalf of the Government.

b. 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. (CENAP)

#### SC-11 PERFORMANCE EVALUATION OF CONTRACTOR

a. As a minimum, the Contractor's performance will be evaluated upon final acceptance of the work. However, interim evaluation 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 Labor Standards, and 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 the evaluation, and all Contractor comments will be made a 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)

#### SC-12 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (OCT 1989)

a. This clause specifies the procedure for determination of 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.

(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 these 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 (5) DAY WORK WEEK AT DOVER AFB

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
5	3	2	2	2	2	2	2	2	2	2	2

c. Upon acknowledgment 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 Construction)". (ER 415-1-15)

SC-13 INSURANCE REQUIREMENTS

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, Lead-Based Paint Abatement, and PCB Removal Contractor Liability Insurance: \$500,000 per occurrence minimum.

SC-14 ACCIDENT PREVENTION

In accordance with the clause entitled "Accident Prevention", the Contractor will not be allowed to commence work on the job site until an acceptable accident prevention plan has been submitted and approved. The Contractor will receive official notification of the acceptance of the accident prevention plan.

-- End of Section --

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General Decision Number NJ020002

General Decision Number NJ020002 Superseded General Decision No. NJ010002

State: New Jersey  
 Construction Type:

BUILDING

HEAVY

HIGHWAY

County(ies):

ATLANTIC	CUMBERLAND	OCEAN
BURLINGTON	GLOUCESTER	SALEM
CAMDEN	MERCER	
CAPE MAY	MONMOUTH	

Building (excluding single family homes and apartments up to and including 4 stories), Heavy (does not include the counties of BURLINGTON, CAMDEN, GLOUCESTER, AND SALEM ) Highway Construction Projects.

Modification Number	Publication Date
0	03/01/2002
1	03/08/2002
2	03/15/2002
3	04/19/2002
4	04/26/2002
5	05/03/2002
6	05/10/2002
7	06/07/2002
8	07/05/2002

COUNTY(ies):

ATLANTIC	CUMBERLAND	OCEAN
BURLINGTON	GLOUCESTER	SALEM
CAMDEN	MERCER	
CAPE MAY	MONMOUTH	

ASBE0014C 05/01/2000

Rates Fringes

BURLINGTON (townships of Edgewater Park, Lumberton, Sampton, Shamong, Tabernacle, Westhampton, & Willingboro), CAMDEN, & GLOUCESTER COUNTIES:

ASBESTOS WORKERS/INSULATORS

(includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems. Also the application of firestopping material, openings and penetrations in walls, floors, ceilings, curtain walls and all lead abatement).

28.12 13.74

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 ASBE0042B 07/15/1999

Rates Fringes

SALEM COUNTY:

ASBESTOS WORKERS 23.99 9.89

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 ASBE0085A 06/01/1994

	Rates	Fringes
ASBESTOS WORKERS/INSULATORS Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems		
ZONE 1	20.20	6.35
ZONE 2	18.30	6.825

ASBESTOS WORKERS ZONE DEFINITIONS

ZONE 1: ATLANTIC, BURLINGTON (Bass River and Washington  
Twps.); CAPE MAY, CUMBERLAND AND OCEAN (Eaglewood,  
Lacy, Little Egg Harbor, Long Beach, Ocean, Stafford,  
Tuckerton, and Union Twps.) COUNTIES.  
ZONE 2: MONMOUTH (Remainder of County)

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 \* ASBE0089G 07/01/2002

	Rates	Fringes
BURLINGTON (includes the townships of Bordentown, Burlington, Chesterfield, Easthampton, Florence, Mansfield, Mount Holly, New Hanover, North Hanover, Pembereton, Roebling, Springfield, Wrightstown, & Woodland); MERCER COUNTY; MONMOUTH (includes the townships of Allentown, Blansingburg, Brielle, Englishtown, Farmingdale, Freehold, Howell, Manasquan, Millstone, Roosevelt, Sea Crit, South Belmar, Spring Lake Heights, Upper Freehold, Wall, & West Belmar); & OCEAN (includes the townships of Beachwood, Berkeley, Breton Woods, Brick, Cederwood Park, Dover, Gillford Park, Island Beach, Island Heights, Jackson, Lakehurst, Lakewood, Manchester, New Egypt, Ocean Gate, Pine Beach, Plumstead, South Toms River & Toms River) COUNTIES: ASBESTOS WORKERS/INSULATORS Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems	29.78	15.97

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 BOIL0028C 01/01/2002

	Rates	Fringes
BOILERMAKERS	32.03	44%+4.61

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 BRNJ0005A 11/01/2000

	Rates	Fringes
BRICKLAYERS, STONEMASONS, MARBLE MASONS, CEMENT MASONS, (Excludes Building Construction for Mercer County), PLASTERERS, TILE LAYERS, & TERRAZZO WORKERS	27.85	12.70

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 CARP0031B 05/01/2002

	Rates	Fringes
MERCER COUNTY (Remainder) CARPENTERS & INSULATORS	30.00	12.90
MILLWRIGHTS	30.00	12.90

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 CARP0454B 07/01/2001

	Rates	Fringes
DOCK BUILDERS & PILEDRIVERMEN	27.45	16.79+A

FOOTNOTE:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Presidential Election Day, and Thanksgiving Day; provided employee works any of the 3 days in the 5-day work week preceeding the holiday and the first work day after the holiday.

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CARP0623A	05/01/2002	
	Rates	Fringes
ATLANTIC, BURLINGTON, CAMDEN, CAPE MAY, CUMBERLAND, GLOUCESTER AND SALEM COUNTIES		
CARPENTERS, INSULATORS, MILLWRIGHTS AND SOFT FLOOR LAYERS		
	30.00	12.90
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CARP0781A	05/01/2002	
	Rates	Fringes
MERCER COUNTY (Beginning from the present Post Office in Lawrenceville to a point Northward through the present "Radio Site" to the junction of Rosedale Road and Read's Mill Road to the junction of Pennington and Mount Rose Road to the Somerset County line, again starting at the present Post Office in Lawrenceville and Eastward to the junction of Brunswick Pike and Delaware and Raritan Canal Bridge taking the center of the Road to CLarksville then South on Providence Line Road to the Pennsylvania Railroad then East on Dutch Neck North to Grover's Mills to the Middlesex County Line)		
CARPENTERS	30.00	12.90
MILLWRIGHTS	30.00	12.90
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CARP0999B	12/03/1994	
	Rates	Fringes
CAMDEN, GLOUCESTER AND SALEM COUNTIES		
TERRAZZO FINISHERS		
	12.93	5.05
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CARP0999C	12/03/1994	
	Rates	Fringes
ATLANTIC AND MONMOUTH COUNTIES:		
TILE FINISHERS		
	8.45	13%
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CARP0999D	12/03/1994	
	Rates	Fringes
CAMDEN, GLOUCESTER AND SALEM COUNTIES		
TILE FINISHERS		
	12.72	5.05
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CARP0999E	12/03/1994	
	Rates	Fringes
CAMDEN, GLOUCESTER AND SALEM COUNTIES		
MARBLE FINISHERS		
	12.95	5.05
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CARP1456G	05/01/2001	
	Rates	Fringes
DIVERS		
	37.13	23.56
DIVER TENDERS		
	27.67	23.56
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CARP1456H	05/01/2001	

	Rates	Fringes
MERCER AND MONMOUTH COUNTIES		
DOCK BUILDERS & PILEDRIVERMEN	30.39	23.56
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CARP2018A 05/01/2002		
	Rates	Fringes
OCEAN COUNTY		
CARPENTERS	30.00	12.90
MILLWRIGHTS	30.00	12.90
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CARP2212B 05/01/2002		
	Rates	Fringes
BURLINGTON, MERCER, MONMOUTH AND OCEAN COUNTIES		
SOFT FLOOR LAYERS	30.00	12.90
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CARP2250A 05/01/2002		
	Rates	Fringes
MONMOUTH COUNTY		
CARPENTERS	30.00	12.90
MILLWRIGHTS	30.00	12.90
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ELEC0269D 10/01/2000		
	Rates	Fringes
BURLINGTON (Area North of a line following the West and South limits of Burlington Borough from the Delaware River in a Southeasterly direction to the Burlington - Mt Holly Road, South-Southeast along this Road to and including the Town of Mount Holly, East along the Pennsylvania Railroad to and including New Lisbon and continuing along the Pennsylvania Railroad to Ocean County Line), AND MERCER COUNTIES		
LINE CONSTRUCTION (EXCEPT RAILROAD WORK):		
Linemen, Cable Splicers, Equipment Operators and Technicians	33.08	6.25+29%
Truck Drivers, Groundmen and Winch Operators	26.46	6.25+29%
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ELEC0269E 04/01/2002		
	Rates	Fringes
BURLINGTON COUNTY (Area North of a line following the West and South limits of Burlington Borough from the Delaware River in a Southeasterly direction to the Burlington - Mount Holly Road, South-Southeast along this road to and including the Town of Mount Holly, East along the Pennsylvania Railroad to and including New Lisbon and continuiong along the Pennsylvania Railroad to the Ocean County Line) AND MERCER COUNTIES		
ELECTRICIANS & CABLE SPLICERS	34.84	47.3%+.25
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ELEC0351A 10/01/2001		
	Rates	Fringes
ATLANTIC; BURLINGTON (Edgewater park, Delanco, Delran, Cinnaminson, Moorestown, Mount Laurel, Wilingsboro, Hainesport, Lumberton, Medford, Evesham Townships; and the portion of Shamong, Tabernacle, and Woodland Townships North of the Central Railroad of New Jersey Line; and the portion of Burlington, Westhampton, Easthampton, South Hampton and Pemberton Townships South of a line starting at the Delaware River and following the Southern		

boundary of Burlington Borough to the Burlington - Mount Holly Road, along this road to Mount Holly around but excluding Mount Holly to the Pennsylvania Railroad along the Pennsylvania Line through, but excluding, Pemberton, through but excluding New Lisbon to the Ocean County line and that portion south of the Central Railroad of New Jersey line running through Chatsworth); CAMDEN; CAPE MAY; CUMBERLAND; GLOUCESTER; and SALEM COUNTIES:  
 ELECTRICIANS & CABLE SPLICERS                    32.89                    51.05%+.20

ELEC0351C 10/01/2001

	Rates	Fringes
ATLANTIC; BURLINGTON (Edgewater park, Delanco, Delran, Cinnaminson, Moorestown, Mount Laurel, Wilingsboro, Hainesport, Lumberton, Medford, Evesham Townships; and the portion of Shamong, Tabernacle, and Woodland Townships North of the Central Railroad of New Jersey Line; and the portion of Burlington, Westhampton, Easthampton, South Hampton and Pemberton Townships South of a line starting at the Delaware River and following the Southern boundary of Burlington Borough to the Burlington - Mount Holly Road, along this road to Mount Holly around but excluding Mount Holly to the Pennsylvania Railroad along the Pennsylvania Line through, but excluding, Pemberton, through but excluding New Lisbon to the Ocean County line and that portion south of the Central Railroad of New Jersey line running through Chatsworth); CAMDEN; CAPE MAY; CUMBERLAND; GLOUCESTER; and SALEM COUNTIES: LINEMAN, HEAVY EQUIPMENT OPERATOR, & CABLE SPLICERS                                    32.89                    52.05% GROUNDMAN                                            27.95                    52.05%		

ELEC0400A 06/03/2002

	Rates	Fringes
MONMOUTH AND OCEAN COUNTIES ELECTRICIANS & CABLE SPLICERS                    36.01                    40.75%		

ELEC0400B 06/02/1997

	Rates	Fringes
MONMOUTH AND OCEAN COUNTIES LINE CONSTRUCTION (Excluding Railroad construction): Lineman, Equipment Operator, and Cable Splicer                                    28.96                    18.75%+5.83 Groundman                                                27.01                    18.75%+5.83		

ELEC0999A 12/03/1994

	Rates	Fringes
BURLINGTON, CAMDEN, CAPE MAY, CUMBERLAND, GLOUCESTER, MONMOUTH, OCEAN AND SALEM COUNTIES: LINE CONSTRUCTION (RAILROAD ONLY): Linemen                                                    16.96                    25% Line Equipment Operator                            16.20                    25% Groundman Winch Operator                        13.07                    25% Groundman                                                11.06                    25% Dynamite Man                                            14.20                    25% Street Light Mechanic                             12.97                    25% Line Equipment Mechanic                         12.90                    25%		

ELEV0005C 06/19/2000

	Rates	Fringes
ELEVATOR MECHANICS	33.395	6.935+A

FOOTNOTE:

- A. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day  
 PAID VACATION: Employer contributes 4% of basic hourly rate as vacation pay credit for 5 years or more of service, and 2% for 6 months to 5 years of service.

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 \* ENGI0825B 07/01/2002

	Rates	Fringes
POWER EQUIPMENT OPERATORS: BUILDING CONSTRUCTION PROJECTS; HEAVY; HIGHWAY; ROAD; STREET AND SEWER PROJECTS:		
GROUP 1	32.87	17.15+A+B
GROUP 2	31.28	17.15+A+B
GROUP 3	29.37	17.15+A+B
GROUP 4	27.74	17.15+A+B
GROUP 5	26.03	17.15+A+B
GROUP 6	34.59	17.15+A+B

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Autograde - Combination Subgrader; base metal spreader and 7 base trimmer (CMI and similar types); autograde placer, trimmer, spreader combination (CMI and similar types); autograde slipform paver (CMI and similar types); backhoe; central power plants (all types); concrete paving machines; cranes (all types, including overhead and straddle traveling type); cranes; gantry; derricks (land or floating); drillmaster, quarrymaster (down the hole drill) rotary drill; self propelled hydraulic drill; self-powered drill; dragline; elevator graders; front end loaders (5 yds. and over); gradalls; grader; raygo; locomotive (large); mucking machines; pavement and concrete breaker, i.e.; superhammer and hoe ram; pile driver; length of boom including length of leads, shall determine premium rate applicable; roadway surface grinder; scooper (loader and shovel); shovels; tree chopper with boom; trench machines.

GROUP 2: "A" frame; backhoe (combination); boom attachment on loaders (rate based on size of bucket) not applicable to pipehook, boring and drilling machines; brush chopper; shredder and tree shredder; tree shearer; cableways; carryalls; concrete pump; concrete pumping system; pumpcrete and similar types; conveyors, 125 ft. and over; drill doctor including dust collector, maintenance); front end loaders (2 yds. but less than 5 yds.); graders (finisher); groove cutting machine (ride on type); header planer; hoists; (all types hoists, shall also include steam, gas, diesel, electric, air hydraulic, single and double drum, concrete brick shaf't caisson, snorkel roof, and/or any other similar type hoisting machines, portable or stationary, except Chicago boom type); hoists (Chicago boom type); hydraulic cranes, 10 tons and under, hydro-axle; jacks screw air hydraulic power operated unit or console type (not hand jack or pile load test type); log skidder; pans; pavers (all concrete; pumpcrete machines; squeezecrete and concrete pumping (regardless of size); scrapers; side booms; straddle carrier; ross and similar types; winch truck (hoisting).

GROUP 3: Asphalt curbing machine; asphalt plant engineer;

asphalt spreader; autograder tube finisher and texturing machine (CMI and similar types); autograde curercrete machine (CMI and similar types); autograde curb trimmer and sidewalk; shoulder; slipform (CMI and similar types); bar bending machines (power); batchers; batching plant and crusher on side; belt conveyor systems; boom type skimmer machines, bridge deck finisher; bulldozers (all); car dumpers (railroad); compressor and blower type units (used independently or mounted on dual purposes trucks, on job site or in conjunction with job site in loading and unloading of concrete, cement, fly ash, instancrete, or similar type materials); compressor (2 or 3) (battery); concrete finishing machines; concrete saws and cutters (ride on type); concrete spreaders; hetzel; rexomatic and similar types; concrete vibrators, conveyors; under 125 ft.; crushing machines; ditching machine; small (ditchwitch or similar type); dope pots (mechanical with or without pump); dumpsters elevator; fireman; fork lifts (economobile; lull and similar types of equipment); front end loaders (1 yd. and over but less than 2 yds.). generators (2 OR 3) in battery; giraffe grinders; graders and motor patrols; gunnite machines (excluding nozzle); hammer vibratory (in conjunction with generator); hoist (roof, tugger, aerial platform hoist and house cars); hoppers; hopper doors (power operated); ladders (motorized); laddervator; locomotive; dinky type; maintenance; utility man; mechanics; mixers (except paving mixers); motor patrols and graders; pavement breakers, small; self-propelled ride on type (also maintaining compressor or hydraulic unit); pavement breaker; truck mounted; pipe bending machine (power); roller; black top; scales; power; seaman pulverizing mixer; shoulder widener; silos; skimmer machines (boom type); steel cutting machine; services and maintaining tractors; tug captain; vibrating plants (used in conjunction with unloading); welder and repair mechanics, concrete cleaning/decontamination machine operator, directional boring machine, heavy equipment robotics operator/technician, master environmental maintenance technician, ultra high pressure waterjet cutting tool system operator/maintenance technician, vacuum blasting machine operator/maintenance technician.

GROUP 4: Brooms and sweepers, chippers, compressor (single), concrete spreaders (small type), conveyor loaders (not including elevator graders), engines, large diesel (1620 H.P.) and staging pump, farm tractors; fertilizing equipment (operation and maintenance) fine grade machine (small type); form line graders (small type); front loader (under 1 yd.); generator (single); grease, gas, fuel and oil supply trucks; heaters (nelson or other type including propane, natural gas or flow-type units); lights; portable generating light plants; mixers; concrete small; mulching equipment (operation and maintenance) pumps (4 inch suction and over including sumbersible pumps); pumps (2 or less than 4" suction and over including submersible pumps); pumps (diesel engine and hydraulic) immaterial of power road finishing machines (small type); rollers; grade; fill or stone base; seeding equipment (operation and maintenance of); sprinkler and water pump trucks steam jennies and boilers, stone spreader; tamping machines; vibrating ride-on; temporary heating plant (nelson or other type, including propane, natural gas or flow type untis); water and sprinkler trucks; welding machines (gas,

diesel, and/or electric converters of Any type, single; two or three in a battery); welding systems, multiple (rectifier transformer type); wellpoint systems.

GROUP 5: Oiler.

GORUP 6: Helicopter Pilot.

FOOTNOTES:

- A. PAID HOLIDAYS: New Year's Day; Washington'd Birthday, Memorial Day; Independence Day; Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day
- B. Employee receives 20% Premium Pay for Hazardous Waste Work.

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 \* ENGI0825C 07/01/2002

	Rates	Fringes
POWER EQUIPMENT OPERATORS		
TANK ERECTION:		
GROUP 1	35.36	17.15+A+B
GROUP 2	34.52	17.15+A+B
GROUP 3	36.50	17.15+A+B
GROUP 4	32.43	17.15+A+B
GROUP 5	27.22	17.15+A+B

FOOTNOTES:

- A. PAID HOLIDAYS: New Year's Day; Washington's Birthday Memorial Day; Independence Day; Labor Day; Veteran's Day, Thanksgiving Day; and Christmas Day.
- B. Employee receives 20% premium pay for hazardous waste work.

TANK ERECTION CLASSIFICATIONS

GROUP 1: Operating Engineers--on all Cranes, derricks, etc. with booms including jib 140 ft. or more above the ground.  
 GROUP 2: Operating Engineers--on all equipment, including cranes derricks, etc. with booms including jib, less than 140 ft. above the ground.  
 GROUP 3: Helicopters--Pilot.  
 GROUP 4: Air compressors, welding machines and generators (gas, diesel, or electrical driven equipment and sources of power from a permanent plant, i.e., steam, compressed air, hydraulic or other power, for the operating of any machine or automatic tools used in the erection, alteration, repair and dismantling of tanks and any and all "DUAL PURPOSE" trucks used on the construction job site.  
 GROUP 5: Oiler.

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 \* ENGI0825D 07/01/2002

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
[STEEL ERECTION]:		
GROUP 1	34.64	17.15+A+B
GROUP 2	34.73	17.15+A+B
GROUP 3	32.34	17.15+A+B
GROUP 4	29.78	17.15+A+B
GROUP 5	28.25	17.15+A+B
GROUP 6	26.49	17.15+A+B
GROUP 7	37.00	17.15+A+B

FOOTNOTES:

- A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day.

B. Employees receive 20% premium pay for hazardous waste work.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

[STEEL ERECTION]

- GROUP 1: Cranes - (all cranes, land or floating with booms including job 140 ft. and over, above ground); derricks-(all derricks, land or floating with boom including jib 140 ft. and over, above ground).
- GROUP 2: Cranes - (all cranes, land or floating with booms including jib less than 140 ft. above ground); derricks (all derricks, land or floating with booms including jib, less than 140 ft. above ground).
- GROUP 3: "A" frame; cherry pickers 10 tons and under; hoists; all types hoists shall also include steam, gas, diesel, electric, air hydraulic, single and double drum, concrete, brick shaft caisson, or any other similar type hoisting machines, portable or stationary, except Chicago boom type; jacks-screw air hydraulic power operated unit console type (not hand jack or pile load test type) side booms.
- GROUP 4: Aerial platform used hoist; compressor, 2 or 3 in battery; elevators or house cars; conveyors and tugging hoists; fireman; forklift; generators, 2 or 3 maintenance-utility man; rod bending machine (power); welding machines--(gas or electric, 2 or 3 in battery, including diesels); captain power boats; tug master power boats.
- GROUP 5: Compressor, single, welding machine, single, gas, electric converters of any type, diesel; welding system multiple (rectifier transformer type); generator, single.
- GROUP 6: Oiler staddle carrier.
- GROUP 7: Helicopter pilot.

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 \* ENGI0825E 07/01/2002

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
OILOSTATIC MAINLINES & TRANSPORTATION PIPELINES:		
GROUP 1	33.50	17.15+A+B
GROUP 2	32.85	17.15+A+B
GROUP 3	29.71	17.15+A+B
GROUP 4	28.31	17.15+A+B
GROUP 5	26.49	17.15+A+B
GROUP 6	35.43	17.15+A+B

FOOTNOTES:

- A. PAID HOLIDAYS: New Year's Day; Washington's Birthday, Memorial Day; Independence Day; Labor Day; Veteran's Day, Thanksgiving Day; and Christmas Day
- B. Employee receives 20% premium pay for hazardous waste work.

OILOSTATIC MAINLINES AND TRANSPORTATION PIPE LINES  
 CLASSIFICATIONS

- GROUP 1: Backhoe; cranes (all types); draglines; front-end loaders (5 yds. and over); gradalls; scooper (loader and shovel); koehring and trench machines.
- GROUP 2: "A" frame; backhoe (combination hoe loader); boring and drilling machines; ditching machine, small; ditchwitch or similar type; fork lifts; front end loaders (2 yds and over but less than 5 yds.); graders, finish (fine); hydraulic cranes, 10 tons and under (over 10 tons - crane rate applies); side booms; and winch trucks (hoisting).

GROUP 3: Backfiller; brooms and sweepers; bulldozers; compressors (2 or 3 in battery); front-end loaders (under 2 yds.); generators; giraffe grinders; graders and motor patrols; mechanic; pipe bending machine (power); tractors; water and sprinkler trucks, welder and repair mechanic.

GROUP 4: Compressor (single); dope pots (mechanical with or without pump); dust collectors; farm tractors; pumps (4 in. suction and over); pumps (2 or less than 4 in. suction); pumps; diesel engine and hydraulic (immaterial or power); welding machines; gas or electric converters of any type, single; welding machines, gas or electric converters of any type, 2 or 3 in battery multiple welders; wellpoint systems (including installation and maintenance).

GROUP 5: Oiler, grease, gas, fuel and supply trucks and tire repair and maintenance.

GROUP 6: Helicopter-pilot.

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IRON0011B 07/01/2001		
	Rates	Fringes
MONMOUTH AND OCEAN COUNTIES		
IRONWORKERS:		
Structural & Ornamental	28.28	23.15
Reinforcing	26.38	23.15

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* IRON0068A 07/01/2002		
	Rates	Fringes
BURLINGTON (Remainder), MERCER, MONMOUTH (South half), AND OCEAN (Middle third) COUNTIES		
IRONWORKERS:		
Structual, Ornamental	27.76	22.35
Reinforcing (Concrete Rods)	25.76	22.35

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* IRON0350A 07/01/2002		
	Rates	Fringes
ATLANTIC, CAPE MAY, CUMBERLAND (Area East of a line drawn from Delaware Bay through the town of Cedarsville and upwards to the point where the county lines of Gloucester, Cumberland, and Atlantic meet), AND OCEAN (Remainder) COUNTIES		
IRONWORKERS:		
BUILDING CONSTRUCTION:		
Structural & Precast	28.70	19.35
Reinforced Concrete	27.70	19.35
Fencing, Graudrail, Erectors, Windows	24.85	19.35
HIGHWAY CONSTRUCTION:		
Reinforced Concrete	25.40	19.35
Structural & Precast	27.75	19.35

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* IRON0399A 07/01/2002		
	Rates	Fringes
BURLINGTON (Southern portion up to but not including Lumberton and Chatsworth Twps.), CAMDEN, CUMBERLAND (Remainder), GLOUCESTER, AND SALEM COUNTIES		
IRONWORKERS:		
Structural, Ornamental, and Reinforcing	31.35	14.15
Hazardous work	34.35	14.15

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LABO0172A 03/01/2002

ATLANTIC, BURLINGTON, CAMDEN, CAPE MAY, CUMBERLAND, GLOUCESTER,  
MERCER, OCEAN AND SALEM COUNTIES

LABORERS:

	Rates	Fringes
GROUP 1	24.55	11.20+A
GROUP 2	24.75	11.20+A
GROUP 3	25.05	11.20+A
GROUP 4	25.25	11.20+A
GROUP 5	25.50	11.20+A
GROUP 6	29.05	11.20+A
GROUP 7	27.55	11.20+A

FOOTNOTE:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day; Labor Day, Veteran's Day, Presidential Election Day, Thanksgiving Day, and Christmas Day, provided the employee works 3 days for the same Employer within a period of ten working days consisting of five working days before and five working days after the day upon which the holiday falls or is observed.

LABORERS CLASSIFICATIONS

GROUP 1: Common laborers, landscape laborers, railroad track laborers, flagmen, salamander tenders, pitman, dumpman, waterproofing laborers, rakers and tampers on cold patch work, and wrapping and coating of all pipes.

GROUP 2: Powder carrier, magazine tender, and signalman.

GROUP 3: Sewer pipe, laser men, conduit and duct line layer, power tool operator, jack hammer, chipping hammer, pavement breaker, power buggy, concrete cutter, asphalt cutter, sheet hammer and tree cutter operators, sandblasting cutting, burning and such other power tools used to perform work usually done manually by laborers.

GROUP 4: Wagon drill operator, timberman and drill master.

GROUP 5: Finisher, manhole, catch basin or inlet builder, form setter, rammer, paver, gunite nozzleman and stonecutter.

GROUP 6: Blaster.

GROUP 7: Hazardous waste laborer.(Excludes asbestos work).

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LABO0172B 03/01/2000

	Rates	Fringes
LABORERS; FREE AIR TUNNEL: GROUP 1	27.35	10.05+A
GROUP 2	23.95	10.05+A
GROUP 3	23.80	10.05+A
GROUP 4	23.30	10.05+A

FOOTNOTE:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day; Independence Day, Labor Day, Presidential Election Day, provided the employee works 3 days for the same Employer within a period of ten working days consisting of five working days before and five working days after the day upon which the holiday falls or is observed.

LABORERS; FREE AIR TUNNEL CLASSIFICATIONS

GROUP 1: Blasterers.



All Flagman, and those manning temporary heat of all types.

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 LABO0415A 05/01/2001

	Rates	Fringes
ATLANTIC; BURLINGTON (Twps. of Bass River and Washington); CAPE MAY; CUMBERLAND (Twps. of Commercial, Dawne, Fairfiled, Lawrence, Maurice, and Millville); AND OCEAN (That portion up to and including Lacy Twp.) COUNTIES		

LABORERS (BUILDING CONSTRUCTION):

CLASS A	22.45	11.25
CLASS B	21.95	11.25
CLASS C	18.66	11.25

LABORERS CLASSIFICATIONS (BUILDING CONSTRUCTION)

CLASS A: Jack Hammer, Tamper, Motorized Tampers and Compactors, Street Cleaning Machines, Scaffold Builder, Hydro Demolition Equipment, all types of Motorized Fork Lifts, Riding Motor Buggy Operator, Bobcat Operator, Mortar Man, Burners, Nozzle Man on Gunitite work.

CLASS B: All laborers not listed in Class A or C.

CLASS C: Laborers doing Janitorial- type light clean up work associated with the turnover of the project to the owner  
 All flagman, and those manning temporary heat of all types.

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 LABO0472A 03/01/2002

	Rates	Fringes
MONMOUTH COUNTY		
LABORERS (HEAVY AND HIGHWAY CONSTRUCTION):		
GROUP 1	24.55	11.20+A
GROUP 2	24.75	11.20+A
GROUP 3	25.05	11.20+A
GROUP 4	25.25	11.20+A
GROUP 5	25.50	11.20+A
GROUP 6	29.05	11.20+A
GROUP 7a	27.55	11.20+A
Group 7b	25.55	11.20+A

LABORERS CLASSIFICATIONS (HEAVY & HIGHWAY)

GROUP 1: Common laborers, landscape laborers, railroad track laborers, flagmen, salamander tenders, pitman, dumpman, waterproofing laborers, rakers and tampers on cold patch work, and wrapping and coating of all pipes, & Asphalt Laborers.

GROUP 2: Powder carrier, magazine tender, signalman, asphalt raker, and asphalt screedman

GROUP 3: Sewer pipe, laser men, conduit and duct line layer, power tool operator, jack hammer, chipping hammer, pavement breaker, power buggy, concrete cutter, asphalt cutter, sheet hammer and tree cutter operators, sandblasting cutting, burning, power tool operator, and such other power tools used to perform work usually done manually by laborers.

GROUP 4: Wagon drill operator, timberman and drill master.

GROUP 5: Finisher, manhole, catch basin or inlet builder, form setter, rammer, paver, gunitite nozzleman, and stone cutter

GROUP 6: Blaster.

Group 7a: Hazardous waste laborer required to wear level A,B, or C personal protection.

GROUP 7b: Certified laborer working a hazardous waste removal project or site at a task requiring hazardous waste related certification, but who is not working in a zone requiring level A,B, or C personal protection.

FOOTNOTE:

- A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Presidential Election Day, Thanksgiving Day, and Christmas Day provided the employee works 3 days for the same employer within a period of 10 working days consisting of 5 working days before and 5 working days after the day upon which the holiday falls or is observed

-----  
 LABO0595A 05/01/2001

	Rates	Fringes
BURLINGTON (Remainder), MERCER, MONMOUTH, and OCEAN (Remainder) COUNTIES:		

LABORERS (BUILDING CONSTRUCTION):

CLASS A	22.45	11.25
CLASS B	21.95	11.25
CLASS C	18.66	11.25

LABORERS CLASSIFICATIONS (BUILDING CONSTRUCTION)

CLASS A: Jack Hammer; Tamper; Motorized Tampers and Compactors Street Cleaning Machines; Scaffold Builder; Hydro Demolition Equipment; All types of Motorized Fork Lifts; Riding Motor Buggy Operator; Bob Cat Operator; Mortar Man; Burners; Nozzle Man on gunite Work.

CLASS B: All Laborers not listed in Class A or C.

Class C Laborers doing Janitorial type light clean up associated with the turnover of the project or part of a project to the owner; All Flagman; and those manning temporary heat of all types.

:

-----  
 LABO1030A 04/01/2001

	Rates	Fringes
LABORERS: (The removal, abatement, enclosure and decontamination of personal protective equipment, chemical protective clothing and machinery relating to asbestos and/or toxic and hazardous waste of materials which shall include but not necessarily be limited to: the erection, moving, servicing and dismantling to all enclosures, scaffolding, barricades, and the operation of all tools and equipment normally used in the removal or abatement of asbestos and toxic and hazardous waste or materials, the labeling, bagging, cartoning, crating, or other packaging of materials for disposal; and the clean up of the work site and all other work incidental to the removal, abatement, encapsulation, enclosure, and decontamination of asbestos or toxic and hazardous waste materials; and in addition, all work tasks involved in the maintenance and operation of energy resource recover plants (co-generation plants).)		

LABORERS	21.85	10.12
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-----  
 PAIN0252H 05/01/2001

	Rates	Fringes
--	-------	---------

ATLANTIC, CAMDEN, CAPE MAY, CUMBERLAND, GLOUCESTER, SALEM, and parts of BURLINGTON and OCEAN (everything south of these cities in Burlington and Ocean Counties-Florence to Bustleton to Columbus to Jobstown to Pemberton to Onga's Hat to Chatsworth to Whiting to Pinewald to Ocean Gate to Seaside Heights) COUNTIES:  
 GLAZIERS 26.55 12.15

PAIN0711A 05/01/2000

	Rates	Fringes
ATLANTIC, BURLINGTON, CAMDEN, CAPE MAY, CUMBERLAND, GLOUCESTER, MONMOUTH, OCEAN, & SALEM COUNTIES: PAINTING, PAPERHANGING & ALLIED WORK	28.75	2.54+27%
SPRAYING, SANDBLASTING, DIPPING, POWER TOOLS (Over 115 volts) & PAPERHANGING PASTING APPARATUS WORK ON TANKS, BRIDGES, TOWERS, STACKS, & OPEN STRUCTURAL STEEL, WORK FROM CABLES & SWINGING SCAFFOLDS, EXTERIOR WORK ABOVE THREE STORIES	31.25	2.54+27%
REPAINT WORK & PREPARATION THEREFORE (including jobs where no major alterations are taking place but excluding bridges, stacks, elevated tanks & generating stations)	22.00	2.54+27%

PAIN0711H 05/01/2000

	Rates	Fringes
MERCER COUNTY PAINTERS: New Construction and Major Alterations	28.75	27%+2.55
Repaint Work	22.00	27%+2.55
0 Spraying or application of 1 Hazardous or Dangerous 2 Materials on Repaint Work	24.00	27%+2.55
3 4 Bridges, TV & Radio Towers, 5 Structural Steel & Tanks above 3 6 stories in height (30' or over), 7 Smoke Stacks, Water Towers, Sand- 8 Blasting, Steam Cleaning, Spraying, 9 or application of Hazardous 0 Materials	31.25	27%+2.55
1 2 Paperhanging	25.60	27%+2.55

PAIN0711J 08/01/1999

	Rates	Fringes
7 DRYWALL FINISHERS & TAPERS	28.25	11.23

PAIN0711K 05/01/2000

	Rates	Fringes
2 MERCER, MONMOUTH and parts of BURLINGTON AND OCEAN (everything		

3 north of these cities in BURLINGTON and OCEAN COUNTIES Florence  
 4 to Bustleton to Columbus to Jobstown to Pemberton to Onge  
 5 Hat to Chatsworth to Whiting to Pinewald to Ocean Gate to  
 6  
 7 Seaside Heights) COUNTIES:

9 GLAZIERS:	28.75	10.30
0 -----		

1  
 2 PLAS0008I 05/01/2001

	Rates	Fringes
--	-------	---------

3  
 4 CAMDEN, GLOUCESTER and SALEM COUNTIES:

6 PLASTERERS	25.35	13.40
7 -----		

8  
 9 PLAS0008L 11/01/2001

	Rates	Fringes
--	-------	---------

10  
 11 ATLANTIC, BURLINGTON, CAPE MAY, CUMBERLAND, MERCER, MONMOUTH &  
 12 OCEAN COUNTIES:

13 PLASTERERS	28.50	13.40
14 -----		

15  
 16 PLAS0699A 05/01/2002

	Rates	Fringes
--	-------	---------

17  
 18 CAMDEN, GLOUCESTER, AND SALEM COUNTIES

19 CEMENT MASONS	27.30	12.55
20 -----		

21  
 22 PLUM0009I 03/01/2002

	Rates	Fringes
--	-------	---------

23  
 24 AIR CONDITIONING & REFRIGERATION  
 25 MECHANICS

	25.16	9.24
--	-------	------

26  
 27 SCOPE OF WORK:  
 28 Installation of air conditioning and refrigeration equipment  
 29 whose combined tonnage does not exceed 15 tons. Installation of  
 30 water cooled air conditioning that does not exceed 10 tons  
 31 (includes piping of component system and erection of water  
 32 tower). Installation of air cooled air conditioning that does  
 33 not exceed 15 tons. Installation of air conditioning equipment  
 34 of the "Package-Unitary" rooftop type, the combined tonnage of  
 35 which does not exceed 35 tons. Packaged Unitary Air Conditioning  
 36 and Refreigeration Institute (ARI) as follows: "A unitary air  
 37 conditioner consists of one or more cooling coil, and air moving  
 38 device, a cpmpressor and condenser combination, and may include a  
 39 heating function as well". Any and all related piping to the  
 40 above installation will be done under the appropriate trade  
 41 jurisdiction.

42  
 43 PLUM0009J 07/01/2001

	Rates	Fringes
--	-------	---------

44  
 45 BURLINGTON (from the town of Burlington City, to everything north

9 along County Road Route 541 East also known as High Street, until  
 0 it reaches the city of Mount Holly which is also Local 9  
 1 territory, Madison Avenue in Mount Holly to State Road Route 38  
 2  
 3 East, again everything north along State Road Route 38 East  
 4 until its cross over, State Road Route 206 and becomes County  
 5 Road Route 530, continuing on including Pemberton Boro to south  
 6 on Magnolia Road in Pemberton Township to Magnolia New Lisbon  
 7 Road (Route 545), to south on Mount Holly Misery Road to State  
 8 Road Route 70 East to the Ocean County Line), MERCER, MONMOUTH,  
 9 AND OCEAN COUNTIES:

1	PLUMBERS & PIPEFITTERS	33.13	15.25
---	------------------------	-------	-------

2 -----  
 3  
 4 PLUM0322A 05/01/2001  
 5  

		Rates	Fringes
--	--	-------	---------

 6 ATLANTIC; BURLINGTON (Remainder) CAMDEN; CAPE MAY; CUMBERLAND;  
 7 GLOUCESTER; AND SALEM COUNTIES

9	PLUMBERS/PIPEFITTERS	29.11	15.70
---	----------------------	-------	-------

0 -----  
 1  
 2 ROOF0004A 06/01/1996  
 3  

		Rates	Fringes
--	--	-------	---------

 4 MONMOUTH COUNTY (Remainder), AND OCEAN (Remainder) COUNTIES

6	ROOFERS	24.22	11.75
---	---------	-------	-------

7 -----  
 8  
 9 ROOF0030D 05/01/2002  
 0  

		Rates	Fringes
--	--	-------	---------

 1 ATLANTIC, BURLINGTON, CAMDEN, CAPE MAY, CUMBERLAND, GLOUCESTER,  
 2 MERCER AND SALEM COUNTIES; and the following portions of MONMOUTH  
 3 AND OCEAN COUNTIES: West of a line starting from the point on  
 4 Route 70 where Burlington and Ocean Counties meet, Easterly along  
 5 Route 70 to Route 571, along Route 571 to Cassville, Easterly on  
 6 Route 528 to Van Hiseville, Northerly on Route 527 to Manalapan,  
 7 Westerly on Route 33 to the Monmouth County Line

8  
 9 ROOFERS:  
 0 Shingle, slate and tile 19.25 6.17  
 1 All other work 26.00 13.05+A

2  
 3 FOOTNOTE:  
 4 A. PAID HOLIDAY: Election Day.  
 5 -----

6  
 7 SFNJ0669B 04/01/2002  
 8  

		Rates	Fringes
--	--	-------	---------

 9 ATLANTIC, BURLINGTON, CAPE MAY, CUMBERLAND, MERCER (Remainder),  
 0 MONMOUTH, OCEAN, AND SALEM (Remainder) COUNTIES

2	SPRINKLER FITTERS	33.00	6.05
---	-------------------	-------	------

3 -----  
 4

5 SFNJ0692C 05/01/2001  
6 Rates Fringes  
7 CAMDEN, GLOUCESTER, MERCER (Town of Trenton), AND SALEM (Penns  
8  
9 Grove, excluding Penns Grove Airport) COUNTIES  
0  
1 SPRINKLER FITTERS 33.57 11.00  
2 -----  
3  
4 \* SHEE0019M 05/01/2002  
5 Rates Fringes  
6 CAMDEN, GLOUCESTER, & SALEM COUNTIES:  
7  
8 SHEET METAL WORKER 30.68 17.90+H  
9  
0 H-Election Day is a paid holiday.  
1 -----  
2  
3 SHEE0027B 06/01/2000  
4 Rates Fringes  
5 ATLANTIC, BURLINGTON, CAPE MAY, CUMBERLAND, MERCER, MONMOUTH AND  
6 OCEAN COUNTIES  
7  
8 SHEET METAL WORKERS 31.00 15.38  
9 -----  
0  
1 SUNJ1002A 12/07/1993  
2 Rates Fringes  
3 MERCER COUNTY  
4  
5 CEMENT MASONS (BUILDING  
6 CONSTRUCTION ONLY) 19.60 8.83  
7 -----  
8  
9 TEAM0331A 01/01/1998  
0 Rates Fringes  
1 ATLANTIC AND CAPE MAY COUNTIES  
2  
3 TRUCK DRIVERS:  
4 GROUP 1 20.75 8.92+A  
5 GROUP 2 20.90 8.92+A  
6 GROUP 3 21.10 8.92+A  
7 GROUP 4 21.25 8.92+A  
8  
9 FOOTNOTE:  
0 A. PAID HOLIDAYS: New Year's Day; Washington's Birthday;  
1 Memorial Day; Independence Day; Labor Day; Veteran's Day;  
2 Presidential Election Day; Thanksgiving Day;& Christmas  
3 Day; provided the employee works 3 days in the week in  
4 which the holiday falls.  
5  
6 TRUCK DRIVERS CLASSIFICATIONS  
7  
8 GROUP 1: Striaight Truck Driver, Dump Truck Driver, Water Truck  
9 Driver, Transit Mix Driver, Pickup Truck Driver, Tank Truck Driver  
0 Track Truck Driver, Agitator Truck Driver, Concrete Mobile Unit

1 Driver,Tringer Bead Truck Driver,Ross Carrier Driver,Warehouse  
2 Forklift Driver,A Frame Truck Driver,Gin Pole Truck Driver,  
3  
4 Form Truck Driver,Driver for Truck having Self Loading/Unloading  
5 Attachment,& Vacuum Truck/Trailer.  
6 GROUP 2:Trucks Towing Driver  
7 GROUP 3:Trailer Truck Driver,Winch Truck Driver,Off Road Dump  
8 Truck Driver,Fuel Truck Driver,Tractor Trailer(any trailer  
9 driver),Asphalt Oil Distributor Driver,& Off Road Water Truck  
0 Driver.  
1 GROUP 4:Mechanics.

2 -----  
3

4 TEAM0469D 05/01/2000

5 Rates Fringes  
6 BURLINGTON (Remainder), MERCER, MONMOUTH, AND OCEAN COUNTIES

7  
8 TRUCK DRIVERS:

9 GROUP 1	26.35	11.835+A
0 GROUP 2	26.40	11.835+A
1 GROUP 3	26.50	11.835+A
2 GROUP 4	26.60	11.835+A

3  
4 FOOTNOTE:

5 A. Employees working or receiving pay for 80 days within a  
6 year receive one week's paid vacation (48 hours); 125  
7 days receive two weeks' vacation (96 hours); 145 days  
8 receive 15 days (120 hours); 15 years seniority and 145  
9 days receive 4 weeks vacation (160 hours).

0 PAID HOLIDAYS: New Year's Day; Washington's Birthday;  
1 Memorial Day; Independence Day; Labor Day; Columbus Day;  
2 Veteran's Day, General Election Day; Thanksgiving Day;  
3 and Christmas Day provided the employee has been assigned  
4 to work or "shapes" one day of the calendar week during  
5 which the holiday falls. Employee receives \$3.00 per  
6 hour premium pay for hazardous waste work.

7  
8 TRUCK DRIVERS CLASSIFICATIONS

9  
0 GROUP 1: Drivers on the following type vehicles: straight dumps,  
1 flats, floats, pick-ups, container haulers, fuel, water  
2 sprinkler, road oil, stringer, bead, hot pass, bus dumpcrete,  
3 transit mixers, agitator mixer, half truck, winch truck, side-0-  
4 matic, dynamite, power, x-ray, welding, skid, jeep, station  
5 wagon, stringer, A-frame, all dual purpose trucks, truck with  
6 mechanical tailgate, asphalt distributor, batch trucks, seeding,  
7 mulching, fertilizer, air compressor trucks (in transit), parts  
8 chaser, escort, scissor, Hi-lift, telescope, concrete breaker,  
9 gin pole, stone, sand, asphalt distributor and spreader, nipper,  
0 fuel trucks (drivers on fuel trucks, including handling of unit),  
1 skid truck (debris container - entire unit), concrete mobile  
2 trucks (entire unit), expediter (parts chaser), beltcrete trucks,  
3 pumpcrete trucks, line truck, reel truck, wreckers, utility  
4 trucks, tank trucks, warehousemen, warehouse partsmen, yardmen,  
5 lift truck in warehouse, warehouse clerk, parts man, material  
6 checkers,receivers shippers, binning men (materials cardex man);

7 drivers on the following type vehicle: broyhill coal tar epoxy  
8  
9 trucks, little-ford bituminous distributor, slurry seal truck or  
0 vehicle, thiokol trackmaster pick-up (swamp cat pickup, bucket  
1 loader dump truck and any rubber-tired tractor used in pulling  
2 and towing farm wagons and trailers of any description, similar  
3 type vehicles); off-site and on-site repair shop, team drivers,  
4 vacuum or vac-all trucks (entire unit)

5  
6 GROUP 2: Drivers on straight 3-axle materials; truck and floats

7  
8 GROUP 3: Drivers on all euclid-type vehicles; euclids,  
9 international harvesters, wabcos, caterpillar, koehring,  
0 tractors, and wagons, dumptors, straight, bottom, rear and side  
1 dumps, carryalls and scrapers (not self-loading - loading over  
2 the top), water sprinkler, trailers, water pulls and similar  
3 types of vehicles; drivers on tractors and trailer type vehicles;  
4 flat, floats, I-beam, low beds, water sprinkler, bituminous  
5 transit mix, road oil, fuel bottom dump hopper, rear dump, office  
6 shanty, epoxy, asphalt, agitator mixer, mulching, stringer,  
7 seeding, fertilizing pole spread, bituminous distributor, water  
8 pulls (entire unit) (tractor trailer), reel trailer and similar  
9 types of vehicles

0  
1 GROUP 4: Winch Trailer Drivers

2 -----

3  
4 TEAM0676A 05/01/1996

5 Rates Fringes  
6 BURLINGTON (Area West of the NJ Turnpike to the Delaware River),  
7 CAMDEN, CUMBERLAND, GLOUCESTER AND SALEM COUNTIES

8  
9 TRUCK DRIVERS:

0 GROUP 1	20.20	8.1875+A+B
1 GROUP 2	20.25	8.1875+A+B
2 GROUP 3	20.40	8.1875+A+B
3 GROUP 4	20.60	8.1875+A+B
4 GROUP 5	20.75	8.1875+A+B
5 GROUP 6	*	8.1875+A+B

6  
7 FOOTNOTES:

8 A. Employee who has worked or received pay for 90 days  
9 within a year prior to his anniversary date shall  
0 receive 56 hours straight time vacation pay; for 3 years  
1 but less than 8 years of service he will receive 100  
2 hours of straight time vacation pay; 15 years or more he  
3 will receive 165 hours of straight time vacation pay.

4 B. PAID HOLIDAYS: New Year's Day, Memorial Day,  
5 Independence Day, Labor Day, Veteran's Day,  
6 Presidential Election Day, Thanksgiving Day, Christmas  
7 Day, and two personal holidays, Good Friday, and  
8 Christmas Eve afternoon (provided employee works that  
9 morning) on the condition that the employee works or is  
0 available for work on at least two days in the week in  
1 which the holiday occurs.

2

3 TRUCK DRIVERS CLASSIFICATIONS

4

5 GROUP 1: Warehouseman

6

7 GROUP 2: Dump truck, water truck, transit mix, pickup, tank,  
8 track, agitator, concrete mobile unit, dytinger bead, tack  
9 rig, ross carrier, warehouse forklift, A-frame, gin pole  
0 form truck, truck having self-loading/unloading attachment,  
1 straight

2

3 GROUP 3: Truckstowing

4

5 GROUP 4: Trailer winch off road dump, fuel, tractor trailer,  
6 asphalt oil distributor, off road water truck

7

8 GROUP 5: Mechanics

9

0 \*GROUP 6: Truck drivers, on hazardous waste removal work on a  
1 state or federally designated hazardous waste site where  
2 the truck driver is in direct contact with hazardous  
3 materials and when personal protective equipment is  
4 required for respiratory, skin and eye protection  
5 the teamster shall receive \$2.25 per hour in addition to  
6 the regular rate of pay including overtime pay.

7 -----

8

9 WELDERS - Receive rate prescribed for craft performing operation  
0 to which welding is incidental.

1 =====

2

3 Unlisted classifications needed for work not included within  
4 the scope of the classifications listed may be added after  
5 award only as provided in the labor standards contract clauses  
6 (29 CFR 5.5(a)(1)(v)).

7 -----

8 In the listing above, the "SU" designation means that rates  
9 listed under that identifier do not reflect collectively  
0 bargained wage and fringe benefit rates. Other designations  
1 indicate unions whose rates have been determined to be  
2 prevailing.

3

4 WAGE DETERMINATION APPEALS PROCESS

5

6 1.) Has there been an initial decision in the matter? This can  
7 be:

8

- 9 \* an existing published wage determination
- 0 \* a survey underlying a wage determination
- 1 \* a Wage and Hour Division letter setting forth a
- 2 position on a wage determination matter
- 3 \* a conformance (additional classification and rate)
- 4 ruling

5

6 On survey related matters, initial contact, including requests  
7 for summaries of surveys, should be with the Wage and Hour  
8 Regional Office for the area in which the survey was conducted

9 because those Regional Offices have responsibility for the  
0 Davis-Bacon survey program. If the response from this initial  
1 contact is not satisfactory, then the process described in 2.)  
2 and 3.) should be followed.

3  
4 With regard to any other matter not yet ripe for the formal  
5 process described here, initial contact should be with the Branch  
6 of Construction Wage Determinations. Write to:

7  
8 Branch of Construction Wage Determinations  
9 Wage and Hour Division  
0 U. S. Department of Labor  
1 200 Constitution Avenue, N. W.  
2 Washington, D. C. 20210  
3

4 2.) If the answer to the question in 1.) is yes, then an  
5 interested party (those affected by the action) can request  
6 review and reconsideration from the Wage and Hour Administrator  
7 (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

8  
9 Wage and Hour Administrator  
0 U.S. Department of Labor  
1 200 Constitution Avenue, N. W.  
2 Washington, D. C. 20210  
3

4 The request should be accompanied by a full statement of the  
5 interested party's position and by any information (wage payment  
6 data, project description, area practice material, etc.) that the  
7 requestor considers relevant to the issue.

8  
9 3.) If the decision of the Administrator is not favorable, an  
0 interested party may appeal directly to the Administrative Review  
1 Board (formerly the Wage Appeals Board). Write to:

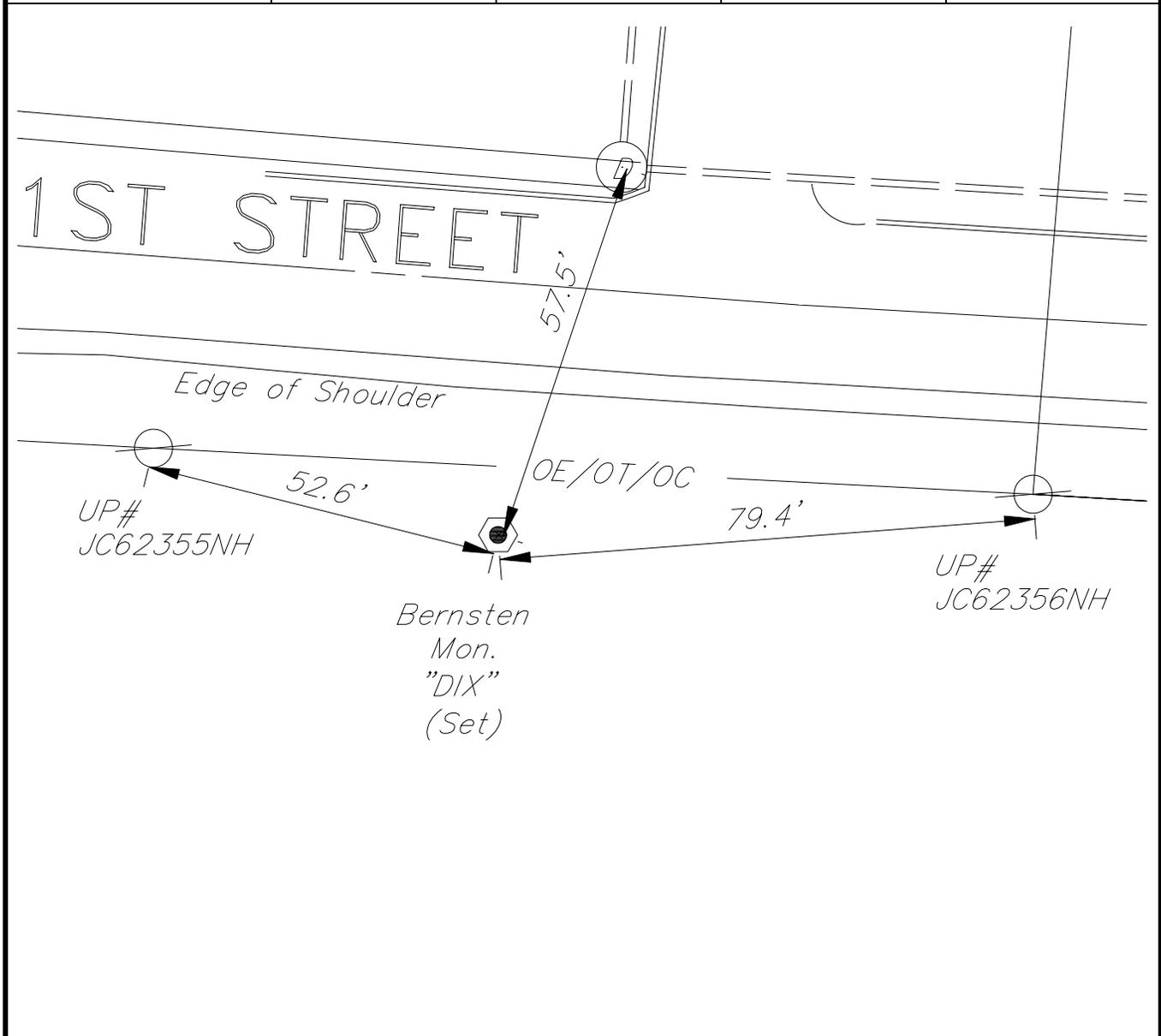
2  
3 Administrative Review Board  
4 U. S. Department of Labor  
5 200 Constitution Avenue, N. W.  
6 Washington, D. C. 20210  
7

8 4.) All decisions by the Administrative Review Board are final.

9 END OF GENERAL DECISION

COUNTRY USA	TYPE OF MARK BERNSTEN MONUMENT	STATION DIX	
LOCALITY NEW JERSEY	STAMPING ON MARK DIX	AGENCY (CAST IN MARKS) US ARMY COE - SURVEY MARK	ELEVATION 146.828 FT
LATITUDE 40°01'06.6431" N	LONGITUDE 74°37'28.3092" W	DATUM NAD 83\96	DATUM NAVD 88
(NORTHING) 431682.554 FT	(EASTING) 457249.111 FT	GRID AND ZONE SPCS-NJ	ESTABLISHED BY (AGENCY) RETTEW ASSOCIATES, INC.
(NORTHING) (FT) (M)	(EASTING) (FT) (M)	GRID AND ZONE	DATE 01/10/02
TO OBTAIN		GRID AZIMUTH, ADD	TO THE GEODETIC AZIMUTH
TO OBTAIN		GRID AZ. (ADD) (SUB)	TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC) (GRID) (MAGNETIC)	BACK AZIMUTH	GEOD DISTANCE		GRID DISTANCE	
			(METERS)	(FEET)	(METERS)	(FEET)
	° ' "	° ' "				



DA FORM 1959  
1 OCT 64

REPLACES DA FORMS 1959  
AND 1960, 1 FEB 57, WHICH  
ARE OBSOLETE.

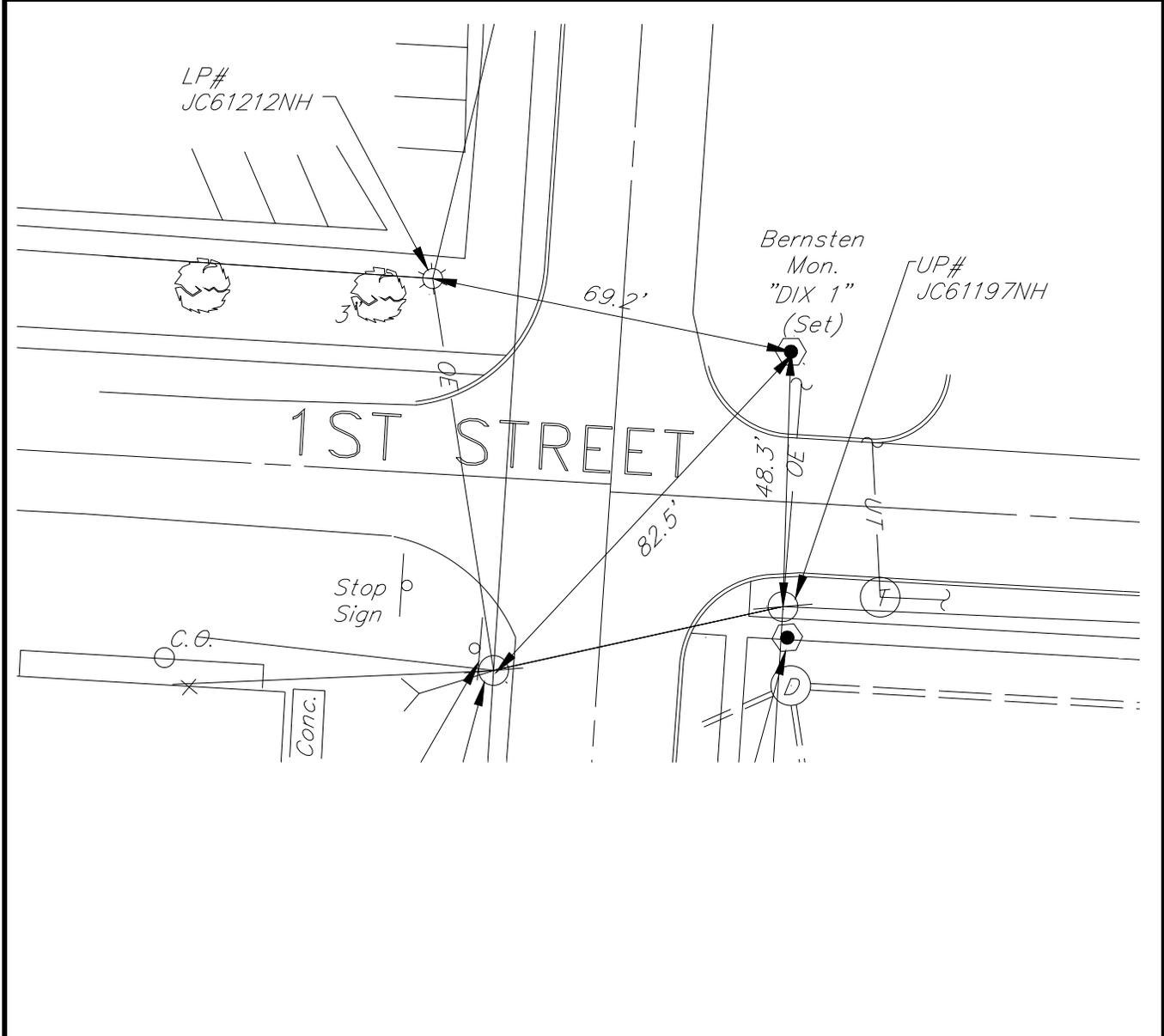
DESCRIPTION OR RECOVERY OF HORIZONTAL CONTROL STATION

For use of this form, see TM 5-237; the proponent  
agency is TRADOC.

COUNTRY USA	TYPE OF MARK BERNSTEN MONUMENT	STATION DIX 1		
LOCALITY NEW JERSEY	STAMPING ON MARK DIX 1	AGENCY (CAST IN MARKS) US ARMY COE - SURVEY MARK	ELEVATION 140.930 FT	
LATITUDE 40°01'06.7884" N	LONGITUDE 74°37'17.2108" W	DATUM NAD 83\96	DATUM NAVD 88	
(NORTHING) 431696.055 FT	(EASTING) 458112.529 FT	GRID AND ZONE SPCS-NJ	ESTABLISHED BY (AGENCY) RETTEW ASSOCIATES, INC.	
(NORTHING) (M)	(EASTING) (M)	GRID AND ZONE	DATE 01/10/02	ORDER GPS OBS

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH  
TO OBTAIN GRID AZ. (ADD) (SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC) (GRID) (MAGNETIC)	BACK AZIMUTH	GEOD DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		



DA FORM 1959  
1 OCT 64

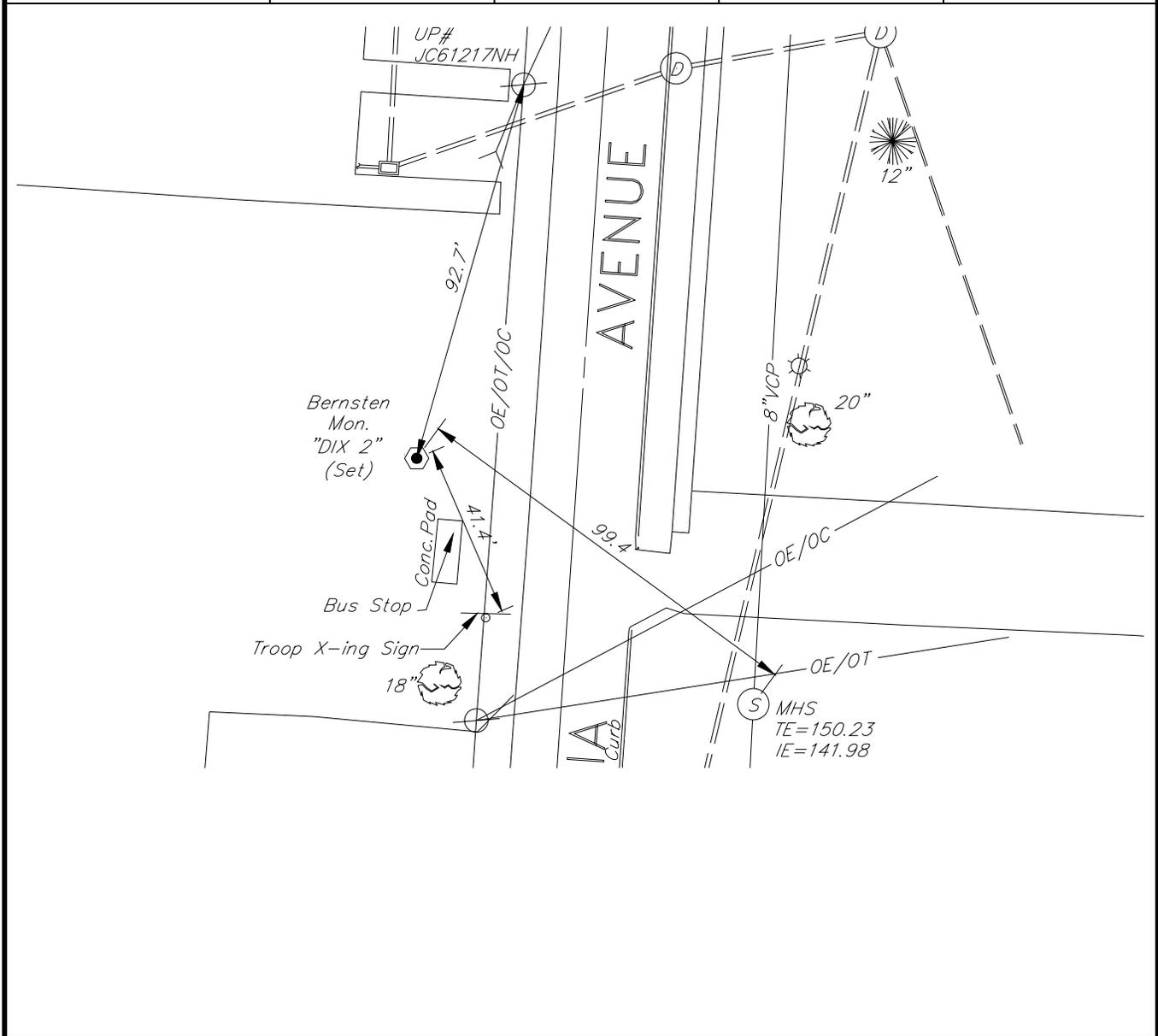
REPLACES DA FORMS 1959 AND 1960, 1FEB 57, WHICH ARE OBSOLETE.

DESCRIPTION OR RECOVERY OF HORIZONTAL CONTROL STATION  
For use of this form, see TM 5-237; the proponent agency is TRADOC.

COUNTRY USA	TYPE OF MARK BERNSTEN MONUMENT	STATION DIX 2		
LOCALITY NEW JERSEY	STAMPING ON MARK DIX 2	AGENCY (CAST IN MARKS) US ARMY COE - SURVEY MARK	ELEVATION 148.370 FT	
LATITUDE 40°01'02.6052" N	LONGITUDE 74°37'18.4851" W	DATUM NAD 83\96	DATUM NAVD 88	
(NORTHING) 431272.932 T	(EASTING) 458012.812 T	GRID AND ZONE SPCS-NJ	ESTABLISHED BY (AGENCY) RETTEW ASSOCIATES, INC.	
(NORTHING) (FT) (M)	(EASTING) (FT) (M)	GRID AND ZONE	DATE 01/10/02	ORDER GPS OBS

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH  
TO OBTAIN GRID AZ. (ADD) (SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC) (GRID) (MAGNETIC)	BACK AZIMUTH	GEOD DISTANCE		GRID DISTANCE	
			(METERS)	(FEET)	(METERS)	(FEET)
	° ' "	° ' "				



DA FORM 1959  
1 OCT 64

REPLACES DA FORMS 1959 AND 1960, 1 FEB 57, WHICH ARE OBSOLETE.

DESCRIPTION OR RECOVERY OF HORIZONTAL CONTROL STATION

For use of this form, see TM 5-237; the proponent agency is TRADOC.

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02315 EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS  
02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS  
02510 WATER LINES  
02531 SANITARY SEWERS  
02551 BITUMINOUS CONCRETE PAVING  
02630 RETENTION BASIN  
02763 PAVEMENT MARKINGS  
02770 CONCRETE SIDEWALKS AND CURBS AND GUTTERS  
02821 FENCING  
02935 TURF  
02950 TREES

DIVISION 03 - CONCRETE

03300 CONCRETE FOR BUILDING CONSTRUCTION  
03930 CONCRETE REPAIRS

DIVISION 04 - MASONRY

04200 MASONRY

DIVISION 05 - METALS

05120 STRUCTURAL STEEL  
05500 MISCELLANEOUS METAL

DIVISION 06 - WOODS & PLASTICS

06100 ROUGH CARPENTRY  
06200 FINISH CARPENTRY

DIVISION 07 - THERMAL & MOISTURE PROTECTION

07240 EXTERIOR INSULATION AND FINISH SYSTEMS

07311 ROOFING, STRIP SHINGLES  
07600 SHEET METALWORK, GENERAL  
07840 FIRESTOPPING  
07900 JOINT SEALING

DIVISION 08 - DOORS & WINDOWS

08110 STEEL DOORS AND FRAMES  
08210 WOOD DOORS  
08520 ALUMINUM WINDOWS  
08710 DOOR HARDWARE  
08810 GLASS AND GLAZING  
08850 FRAGMENT RETENTION FILM FOR GLASS

DIVISION 09 - FINISHES

09200 PLASTERING  
09250 GYPSUM WALLBOARD  
09310 CERAMIC TILE  
09510 ACOUSTICAL CEILINGS  
09650 RESILIENT FLOORING  
09680 CARPET  
09720 WALLCOVERINGS  
09900 PAINTS AND COATINGS

DIVISION 10 - SPECIALTIES

10160 TOILET PARTITIONS  
10430 EXTERIOR SIGNAGE  
10440 INTERIOR SIGNAGE  
10800 TOILET ACCESSORIES

DIVISION 12 - FURNISHINGS

12320 CABINETS AND COUNTERTOPS  
12490 WINDOW TREATMENT

DIVISION 13 - SPECIAL CONSTRUCTION

13080 SEISMIC PROTECTION FOR MISCELLANEOUS EQUIPMENT  
13280 ASBESTOS ABATEMENT  
13281 LEAD-BASED PAINT (LBP) DEMOLITION PROCEDURES  
13850 FIRE DETECTION AND ALARM SYSTEM, DIRECT CURRENT LOOP  
13852 FIRE ALARM REPORTING SYSTEM, RADIO TYPE  
13930 WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION  
13935 DRY PIPE SPRINKLER SYSTEM, FIRE PROTECTION

DIVISION 15 - MECHANICAL

15070 SEISMIC PROTECTION FOR MECHANICAL EQUIPMENT  
15080 THERMAL INSULATION FOR MECHANICAL SYSTEMS  
15190 GAS PIPING SYSTEMS  
15400 PLUMBING, GENERAL PURPOSE  
15620 LIQUID CHILLERS  
15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM  
15951 DIRECT DIGITAL CONTROL FOR HVAC  
15990 TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS  
15995 COMMISSIONING OF HVAC SYSTEMS

DIVISION 16 - ELECTRICAL

16070 SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT  
16415 ELECTRICAL WORK, INTERIOR  
16528 EXTERIOR LIGHTING  
16710 PREMISES DISTRIBUTION SYSTEM  
16815 CABLE TELEVISION PREMISES DISTRIBUTION SYSTEM  
16855 ELECTRICAL HEAT TRACING

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SCOPE

This section presents a general description of the work to be accomplished under this section.

1.2 DESCRIPTION OF CONTRACT WORK

The contract work includes renovation of three barracks buildings at Fort Dix in Wrightstown, New Jersey. The barracks are located between Delaware and Pennsylvania Avenues on 1st Street at Fort Dix Army Reservation.

1.3 DESCRIPTION OF DEMOLITION WORK

Sitework demolition includes sidewalks, curbs, bituminous paving, and underground and overhead utility lines.

The exterior demolition includes doors, partial exterior insulation and finish system, partial face brick, wall penetrations (fans, vents, etc.), concrete steps and landings, handrails, and roof penetrations (fans, vents, vtr's, etc.).

The interior demolition work includes CMU and gypsum board partitions, floor, wall, and ceiling finishes, windows, metal and wood doors and frames, partial concrete slab removal, and all utility systems.

1.3.1 Hazardous Materials

Demolition of flooring, pipe insulation, and steel doors includes removal of asbestos containing materials. Asbestos wall insulation, existing on the interior side of all exterior walls in the sleeping wings shall remain.

Precautions shall be taken in removing items from these walls. Where partitions to be demolished intersect with walls where asbestos insulation is present, saw cut the partition walls clear of the asbestos insulation.

Demolition of walls, doors, and partitions includes material containing lead-based paint.

1.4 DESCRIPTION OF NEW CONSTRUCTION WORK

Sitework construction includes, sidewalks, curbs, bituminous paving, concrete slabs, new interior and exterior fire towers, handi-cap ramp, handrails, wood fence, excavating, grading and seeding, and underground utility lines.

The exterior construction includes doors, exterior insulation and finish system, reinstallation of face brick, painting, fire tower, roof penetrations (hatches, fans, vents, vtr's etc.).

The interior construction work includes new CMU and gypsum board partitions; floor, wall, and ceiling finishes; construction of new fire stairs; window repair and replacement; providing fragment retention film on the glazing of all existing windows and exterior doors; new steel and wood doors with steel frames; concrete slab repairs; new sprinkler and fire alarm systems; and new plumbing, HVAC, and electrical systems.

#### 1.5 BASE BID AND OPTIONS

The project consists of a Base Bid and Six Options as described below.

##### 1.5.1 Base Bid Work

Base bid includes the upgrade/modernization of AT Barracks Buildings 5404, 5405, and 5406 at Fort Dix, New Jersey, including the removal and disposal of asbestos-containing materials, removal and disposal of lead-containing materials, window repairs, removal and installation of window units for new openings, construction of new exterior stairs with Exterior Insulation and Finish System (EIFS), and patch/repair of existing EIFS for new/demolished window openings and wall penetrations.

##### 1.5.2 Option 1

Option No. 1 consists of the **replacement** of an existing parking area. ***This consists of the complete removal of the existing paving and unclassified excavation of existing base, existing subbase and existing subgrade and replacement with new bituminous paving, new base and new subbase.***

##### 1.5.3 Option 2

Option No. 2 consists of the replacement of some existing exterior doors in Buildings 5404, 5405, and 5406 with new insulated steel doors.

##### 1.5.4 Option 3

Option No. 3 consists of the patching and painting of the existing Exterior Insulation and Finish System (EIFS) on Buildings 5404, 5405, and 5406.

##### 1.5.5 Option 4

Option No. 4 consisting of upgrading some Base Bid door locksets to electronic card reading locksets in Buildings 5404, 5405, and 5406.

##### 1.5.6 Option 5

Option No. 5 is for the construction of new parking areas for Buildings 5404, 5405, and 5406. ***Construction for this Option may not begin for up to 120 calendar days after Option award pending permit approval by the New Jersey Pinelands Commission. This will include the complete removal of existing paving and unclassified excavation of existing base, existing subbase and existing subgrade and replacement with new bituminous paving, new base and new subbase. This will also include unclassified excavation of non-paved areas and application of new bituminous paving, new base and new subbase. Included in this option is the construction of retention basins.***

##### 1.5.7 Option 6

Option No. 6 is for replacement of existing windows with new windows having ***laminated glass***.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 DESCRIPTION OF BASE BID ITEMS

1.1.1 Bid Item No. 1

Bid Item No. 1 includes the upgrade/modernization of AT Barracks Buildings 5404, 5405, and 5406 at Fort Dix, New Jersey, excluding the asbestos removal/disposal and window repair work covered in the other bid items. The work included under this bid item will not be measured for payment and all costs associated therewith shall be included in the contract lump sum price for Bid Item No. 1, "Base Bid - Upgrade/Modernize AT Barracks Buildings 5404, 5405, and 5406, Less Work Included in Other Bid Items".

1.1.2 Bid Item No. 2

Bid Item No. 2 includes the removal and disposal of interior asbestos insulated doors from Buildings 5404, 5405, and 5406. The work included under this bid item will be measured for payment by the number of asbestos insulated doors removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 2, "Base Bid - Removal and Disposal of Interior Asbestos Insulated Doors".

1.1.3 Bid Item No. 3

Bid Item No. 3 includes the removal and disposal of asbestos-containing pipe insulation from existing pipes located in chases of Buildings 5404, 5405, and 5406. The work included under this bid item will be measured for payment by the linear foot of asbestos-containing pipe insulation removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 3, "Base Bid - Removal and Disposal of Asbestos-Containing Pipe Insulation From Pipes in Chases".

1.1.4 Bid Item No. 4

Bid Item No. 4 includes the removal and disposal of asbestos-containing floor tile from Building 5406. The work included under this bid item will be measured for payment by the square foot of asbestos-containing floor tile removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 4, "Base Bid - Removal and Disposal of Asbestos-Containing Floor Tile".

1.1.5 Bid Item No. 5

Bid Item No. 5 includes the removal and disposal of asbestos-containing pipe insulation from existing pipes located in the crawl spaces of Buildings 5404, 5405, and 5406. The work included under this bid item will be measured for payment by the linear foot of asbestos-containing pipe insulation removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 5, "Base Bid - Removal and Disposal of Asbestos-Containing Pipe Insulation From Pipes in Crawl Spaces".

1.1.6 Bid Item No. 6

Bid Item No. 5 includes the removal and disposal of asbestos contaminated soil from the crawl spaces of Buildings 5404 and 5406. The work included under this bid item will be measured for payment by the ton of asbestos contaminated soil removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 6, "Base Bid - Removal and Disposal of Asbestos Contaminated Soil From Crawl Spaces".

1.1.7 Bid Item No. 7

Bid Item No. 7 includes the removal and disposal of asbestos-containing pipe insulation from existing pipes located in the basements of Buildings 5404 and 5406. The work included under this bid item will be measured for payment by the linear foot of asbestos-containing pipe insulation removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 7, "Base Bid - Removal and Disposal of Asbestos-Containing Pipe Insulation From Pipes in Basements".

1.1.8 Bid Item No. 8

Bid Item No. 8 includes the removal and disposal of asbestos-containing steam pipe (10") insulation from Buildings 5404, 5405 and 5406 in kitchen crawl space. The work included under this bid item will be measured for payment by the linear foot of asbestos-containing pipe insulation removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 8, "Base Bid -Removal and Disposal of Asbestos Containing Steam Pipe Insulation From Pipes in Kitchen Crawl Spaces".

1.1.9 Bid Item No. 9

Bid Item No. 9 includes the removal and disposal of asbestos-containing pipe insulation from Buildings 5404 and 5406 on the ground of kitchen crawl space. The work included under this bid item will be measured for payment by the linear foot of asbestos-containing pipe insulation removed and properly disposed of. Payment for this work will be made at the contract unit price under Bid Item No. 9, "Base Bid -Removal and Disposal of Asbestos Containing Insulation From Pipes on ground in Kitchen Crawl Spaces".

1.1.10 Bid Item No. 10

Bid Item No. 10 includes the repair of existing windows consisting of hardware replacement in Buildings 5404, 5405, and 5406. The work included under this bid item will be measured for payment by the number of windows repaired. Payment for this work will be made at the contract unit price under Bid Item No. 10, "Base Bid - Repair of Existing Windows".

1.2 DESCRIPTION OF OPTIONS

1.2.1 Bid Item No. 11 - Option No. 1

Option No. 1 consists of the **complete removal of the existing paving and unclassified excavation of existing base, existing subbase and existing subgrade** of existing parking areas **and replacement with new bituminous paving, new base and new subbase**. The work included under this bid item will not be measured for payment and all costs associated therewith shall

be included in the contract lump sum price for Bid Item No. 11, "Option No. 1 - **Remove and replace** Existing Parking Area".

1.2.2 Bid Item No. 12 - Option No. 2

Option No. 2 consists of the replacement of existing exterior doors in Buildings 5404, 5405, and 5406 with new insulated steel doors. The work included under this bid item will be measured for payment by the number of exterior doors removed and replaced with new insulated steel doors. Payment for this work will be made at the contract unit price under Bid Item No. 12, "Option No. 2 - Replace Existing Exterior Doors with New Insulated Steel Doors".

1.2.3 Bid Item No. 13 - Option No. 3

Option No. 3 consists of patching up to 10 percent of the total existing Exterior Insulation and Finish System (EIFS) and painting all of the existing EIFS on Buildings 5404, 5405, and 5406. This work excludes patching/repair of existing EIFS for new/demolished window openings and wall penetrations which is covered under the Base Bid. The work included under this bid item will not be measured for payment and all costs associated therewith shall be included in the contract lump sum price for Bid Item No. 13, "Option No. 3 - Patch and Paint Existing EIFS".

1.2.4 Bid Item No. 14 - Option No. 4

Option No. 4 consisting of upgrading the Base Bid door locksets to electronic card reading locksets in Buildings 5404, 5405, and 5406. The work included under this bid item will be measured for payment by the number of locksets upgraded to electronic card reading locksets. Payment for this work will be made at the contract unit price under Bid Item No. 14, "Option No. 4 - Upgrade Base Bid Locksets to Electronic Card Reading Locksets".

1.2.5 Bid Item No. 15 - Option No. 5

Option No. 5 is for the construction of new parking areas for Buildings 5404, 5405, and 5406. **This will include the complete removal of existing paving and unclassified excavation of existing base, existing subbase and existing subgrade and replacement with new bituminous paving, new base and new subbase. This will also include unclassified excavation of non-paved areas and application of new bituminous paving, new base and new subbase. Included in this option is the construction of retention basins.** The work included under this bid item will not be measured for payment and all costs associated therewith shall be included in the contract lump sum price for Bid Item No. 15, "Option No. 5 - Construct New Parking Areas".

1.2.6 Bid Item No. 16 - Option No. 6

Option No. 6 is for replacement of existing windows in Buildings 5404, 5405, and 5406 with new windows having **laminated glass**. The work included under this bid item will be measured for payment by the number of windows replaced with new windows. This bid item shall include a deduct for the cost of repairing the existing windows included in Bid Item No. 9, which will not be required work under this option. Payment for this work will be made at the contract unit price under Bid Item No. 16, "Option No. 6 - Replace Existing Windows with New Windows Having **Laminated** Glazing, Less Base Bid Window Repairs".

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 01355

ENVIRONMENTAL PROTECTION

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.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

33 CFR 328	Definitions
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
49 CFR 171 - 178	Hazardous Materials Regulations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) U.S. Army Corps on Engineers Safety and Health Requirements Manual
WETLAND MANUAL	Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

#### 1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

#### 1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

#### 1.2.4 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor shall discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" shall occur. Land Application shall be in compliance with all applicable Federal, State, and local laws and regulations.

#### 1.2.5 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

#### 1.2.6 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

#### 1.2.7 Wetlands

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLAND MANUAL.

### 1.3 GENERAL REQUIREMENTS

The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The Contractor shall comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

### 1.4 SUBCONTRACTORS

The Contractor shall ensure compliance with this section by subcontractors.

### 1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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 Preconstruction Submittals

Environmental Protection Plan; G,COR.

The environmental protection plan as specified herein.

### 1.6 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, the Contractor shall submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Issues of concern shall be defined within the Environmental Protection Plan as outlined in this section. The Contractor shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but which the Contractor considers necessary, shall be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, the Contractor shall meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan shall be current and maintained onsite by the Contractor.

#### 1.6.1 Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental

protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

#### 1.6.2 Contents

The environmental protection plan shall include, but shall not be limited to, the following:

- a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.
- b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.
- c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
- d. Description of the Contractor's environmental protection personnel training program.
- e. An erosion and sediment control plan, approved by the Burlington County Soil Conservation District, which identifies the type and location of the erosion and sediment controls to be provided. The plan shall include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations.
- f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.
- g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.
- h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.
- i. The Spill Control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1 . This plan shall include as a minimum:
  1. 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 and Facility Environmental Office 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 is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.

2. The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

3. Training requirements for Contractor's personnel and methods of accomplishing the training.

4. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

5. 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.

6. The methods and procedures to be used for expeditious contaminant cleanup.

j. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris. The plan shall include schedules for disposal. The Contractor shall identify any subcontractors responsible for the transportation and disposal of solid waste. Licenses or permits shall be submitted for solid waste disposal sites that are not a commercial operating facility. Evidence of the disposal facility's acceptance of the solid waste shall be attached to this plan during the construction. The Contractor shall attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. The report shall be submitted on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and shall be for the previous quarter (e.g. the first working day of January, April, July, and October). The report shall indicate the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.

k. A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. The plan shall detail the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

l. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

m. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time shall be included in the contaminant prevention plan. As new hazardous materials are brought on site or removed from the site, the plan shall be updated.

n. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan shall include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan shall include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, a copy of the permit and associated documents shall be included as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan shall include documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

o. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. The plan shall include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Contracting Officer.

#### 1.6.3 Appendix

Copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents shall be attached, as an appendix, to the Environmental Protection Plan.

#### 1.7 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings

as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. This survey report shall be signed by both the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor shall protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

#### 1.8 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. 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.

#### 1.9 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

#### PART 2 PRODUCTS (Not Applicable)

#### PART 3 EXECUTION

##### 3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

The Contractor shall be responsible for obtaining and complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations.

##### 3.2 LAND RESOURCES

The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or

attached to any trees for anchorage unless specifically authorized. The Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the Contractor.

### 3.2.1 Work Area Limits

Prior to commencing construction activities, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

### 3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

### 3.2.3 Soil Erosion and Sediment Control

#### 3.2.3.1 NJDEP Requirements

The Contractor shall conduct his operations in conformance with all New Jersey Department of Environmental Protection (NJDEP) sediment and stormwater regulations and the approved Erosion and Sediment Control Plan indicated on the drawings. Any proposed changes to the approved plan shall be coordinated and approved by NJDEP. The Contractor shall designate a responsible individual who holds a certificate of attendance at a NJDEP approved sediment and stormwater training class to administer the approved plan during the contract work. Certification must be obtained prior to initiation of any land disturbing operations. **Contact NJDEP for information on training and certification.**

#### 3.2.3.2 General Soil Erosion and Sediment Control Requirements

The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Contractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs) in conformance with the approved Soil Erosion and Sediment Control Plan. BMPs may include, but not be limited to, vegetation cover, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment

traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Contractor's best management practices shall also be in accordance with the National Pollutant Discharge Elimination System (NPDES). Any temporary measures shall be removed after the area has been stabilized.

#### 3.2.4 Contractor Facilities and Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

### 3.3 WATER RESOURCES

The Contractor shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. All water areas affected by construction activities shall be monitored by the Contractor. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

#### 3.3.1 Wetlands

The Contractor shall not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

### 3.4 AIR RESOURCES

Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and State air emission and performance laws and standards.

#### 3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The Contractor must have sufficient,

competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The Contractor shall comply with all State and local visibility regulations.

#### 3.4.2 Odors

Odors from construction activities shall be controlled at all times. The odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

#### 3.4.3 Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with the provisions of the State of New Jersey rules.

#### 3.4.4 Burning

Burning shall be prohibited on the Government premises.

### 3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

#### 3.5.1 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill shall be the minimum acceptable off-site solid waste disposal option. The Contractor shall verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

#### 3.5.2 Chemicals and Chemical Wastes

Chemicals shall be dispensed ensuring no spillage to the ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. This documentation will be periodically reviewed by the Government. Chemical waste shall be collected in corrosion resistant, compatible containers. Collection drums shall be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes shall be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

#### 3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable

State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The Contractor shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262 . The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. The Contractor shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The Contractor shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations.

The Contractor shall transport Contractor generated hazardous waste off Government property within 60 days, unless otherwise specified in other sections of the specifications, in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. The Contractor shall dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer and the Facility Environmental Office. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility.

#### 3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site shall be accordance with all Federal, State, and local laws and regulations.

#### 3.5.5 Waste Water

Disposal of waste water shall be as specified below.

- a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. shall not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. The Contractor shall dispose of the construction related waste water off-Government property in accordance with all Federal, State, Regional and Local laws and regulations.
- b. For discharge of ground water, the Contractor shall surface discharge in accordance with the requirements of the NPDES or State STORM WATER DISCHARGES FROM CONSTRUCTION SITES permit.
- c. Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing shall be

disposed of in conformance with the requirements of Section 02510  
WATER LINES.

### 3.6 RECYCLING AND WASTE MINIMIZATION

The Contractor shall participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project.

### 3.7 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

The Contractor shall maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. The Contractor shall submit a report to the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. The following shall be included in the report:

- a. Construction and Demolition (C&D) Debris Disposed in cubic yards or tons, as appropriate.
- b. Construction and Demolition (C&D) Debris Recycled in cubic yards or tons, as appropriate.
- c. Total C&D Debris Generated in cubic yards or tons, as appropriate.

### 3.8 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify 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 secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

### 3.9 BIOLOGICAL RESOURCES

The Contractor shall minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The Contractor shall be responsible for the protection of threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

### 3.10 PREVIOUSLY USED EQUIPMENT

The Contractor shall clean all previously used construction equipment prior to bringing it onto the project site. The Contractor shall ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. The Contractor shall consult with the USDA jurisdictional office for additional cleaning requirements.

### 3.11 MAINTENANCE OF POLLUTION FACILITIES

The Contractor shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

### 3.12 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel shall be trained in all phases of environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Additional meetings shall be conducted for new personnel and when site conditions change. The training and meeting agenda shall include: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, 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; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

### 3.13 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all areas used for construction in accordance with Contract Clause CLEANING UP. The Contractor shall, unless otherwise instructed in writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area shall be graded, filled and the entire area seeded unless otherwise indicated.

-- End of Section --

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SECTION 02950

TREES

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 NURSERYMEN (AAN)

AAN-01 (1990) American Standard for Nursery Stock

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2607 (1969) Peats, Mosses, Humus, and Related Products

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1909 (Basic; Notice 1) Fertilizer

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-08 Statements

Delivery; GA

The following work plans, before work is started.

- a. Delivery Schedule at least 10 days prior to the intended date of the first delivery.

SD-13 Certificates

Topsoil; Soil Amendments; GA; Plants; GA

Certificates of compliance certifying that materials meet the requirements specified, prior to the delivery of materials. Reports for the following materials shall be included.

- a. Topsoil: For pH, chemical analysis, mechanical analysis and particle size.
- b. Fertilizer: For chemical analysis and composition percent.
- c. Agricultural Limestone: For sieve analysis and calcium carbonate equivalent.

- d. Peat: For compliance with ASTM D 2607.
- e. Plant Materials: For botanical and common name, size, quantity by species, grade, nursery grown.

SD-18 Records

Plant Establishment Period; GA; Maintenance Report; GA; Maintenance Instructions; GA

- a. Maintenance Report. Written record of maintenance work performed and quantity of plant losses and replacements.
- b. Plant Establishment Period. Written calendar time period for the beginning of the plant establishment period. When there is more than one establishment period, the boundaries of the planted areas covered for each period shall be described.
- c. Maintenance Instruction. Written instructions for year-round care of installed plants.

1.3 SOURCE INSPECTIONS

1.3.1 Plant Materials

Plant materials shall be subject to inspection at the growing site by the Contracting Officer.

1.3.2 Delivered Topsoil

The source of topsoil shall be subject to inspection by the Contracting Officer.

1.4 SHIPMENT, DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Shipment

1.4.1.1 Preparation

Digging and preparation for shipment shall be done in a manner that will not cause shock or damage to branches, trunk, or root systems.

- a. Balled and Burlapped (BB) Plants: Ball size and ratio shall be provided as recommended by AAN-01. The ball shall be of a diameter and depth to encompass enough fibrous and feeding root system necessary for the full recovery of the plant. Removal shall be accomplished by hand digging or mechanical devices. Center the plant stem or trunk in the ball and clean cut all roots at the ball surface. No roots shall be pulled from the ground. The root ball shall be completely wrapped with burlap or other suitable material and securely laced with twine.
- b. Container-Grown (C) Plants: Container size shall be provided as recommended by AAN-01. Plants shall be grown in a container sufficiently long for new fibrous roots to have developed and for root mass to retain its shape and hold together when removed from container. Container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

1.4.1.2 Antidesiccant Application

Plants shall be sprayed with an antidesiccant as leaf budding occurs or when plant material has soft growth.

1.4.2 Delivery

1.4.2.1 Identification

Plants shall be identified with durable waterproof labels and weather-resistant ink. Plants shall have attached labels stating the correct plant name and size.

1.4.2.2 Protection During Delivery

Plants shall be protected during delivery to prevent desiccation of the plant or damage to the roots or balls. Branches of plants shall be protected by tying-in the branches and covering all exposed branches.

1.4.2.3 Topsoil

A soil test shall be provided for topsoil delivered to the site.

1.4.2.4 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.3 Inspection

Plant material shall be inspected upon arrival at the jobsite by the Contracting Officer for conformity to the paragraph PLANTS and paragraph Shipment, and any unacceptable plant material shall be removed from the jobsite.

1.4.4 Storage

1.4.4.1 Plant Storage

Plants not installed on the day of arrival at the site shall be stored and protected in areas designated by the Contracting Officer. Plants shall be protected from exposure to wind and shall be shaded from the sun. Covering that will allow air to circulate and prevent internal heat from building up shall be provided. All plants shall be kept in a moist condition by watering with a fine mist spray until planted.

1.4.4.2 Storage of Other Materials

Soil amendments shall be stored in dry locations away from contaminants. Storage of materials shall be in areas designated or as approved by the Contracting Officer.

1.4.5 Handling

Care shall be taken to avoid injury to plants. Materials shall not be dropped from vehicles. Balled and burlapped plants shall be handled carefully to avoid cracking or breaking the earth ball and container-grown

plants shall be handled by the container. Plants shall not be handled by the trunk or stems.

1.4.5.1 Time Limitation

- a. Mulch: Limitation of time between installing plant and placing mulch is 48 hours.
- b. Trunk Wrap: Limitation of time between installing deciduous trees and wrapping the trunks is 24 hours.

1.5 WARRANTY

Furnished plants shall be guaranteed to be in a vigorous growing condition for a period of 12 months regardless of the contract time period. A plant shall be replaced one time under this guarantee. A written calendar time period for the guarantee of plant growth shall be furnished to the Contracting Officer.

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Varieties

Plants shall be nursery grown or plantation grown stock conforming to AAN-01 and shall be of the varieties specified in the plant list bearing botanical names listed in one or more of the publications listed under "Nomenclature" in AAN-01.

2.1.2 Substitutions

Substitutions will not be permitted without written request from the Contractor for approval by the Contracting Officer.

2.1.3 Growing Conditions

Plants shall be grown under climatic conditions similar to those in the locality of the project.

2.1.4 Quality

Well shaped, well grown, vigorous, healthy plants having healthy and well branched root systems shall be provided. Plants shall be provided free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement and abrasion. Plants shall be provided that are typical of the species or variety and conforming to standards as set forth in AAN-01 and as specified herein.

2.1.4.1 Shade and Flowering Trees

A height relationship to caliper shall be provided as recommended by AAN-01. Height of branching should bear a relationship to the size and variety of tree specified and with the crown in good balance with the trunk. Trees shall not be "poled" or the leader removed.

- a. Single stem: Trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

- b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there should be no division of the trunk which branches more than six inches from ground level.
- c. Specimen: A plant shall be provided that is well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

#### 2.1.4.2 Deciduous Shrub

Plants shall be provided that have the height and number of primary stems as recommended by AAN-01. An acceptable plant shall be well shaped with sufficient well-spaced side branches recognized by the trade as typical for the variety grown in the region.

#### 2.1.5 Size

Plants shall be furnished in sizes indicated. Plants larger in size than specified may be provided at no additional cost to the Government, provided that all plants of the same species are of a uniform size.

#### 2.1.6 Measurement

Plant measurements shall be in accordance with AAN-01.

### 2.2 TOPSOIL

Topsoil shall be the existing surface soil stripped to the depth indicated and stockpiled on the site in accordance with Section 02210 GRADING. Additional topsoil, if required, beyond that available from stripping operations, shall be delivered. Delivered topsoil shall conform to topsoil requirement specified in Section 02210 GRADING and shall be amended as recommended by soil tests for the plants specified.

#### 2.2.1 Soil Test

A soil test shall be performed for pH, particle size, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of plants specified.

### 2.3 SOIL AMENDMENTS

Soil amendments consist of lime, fertilizer and organic soil amendments.

#### 2.3.1 Lime

Lime shall be agricultural limestone and shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass a 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve.

#### 2.3.2 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and conforming to CID A-A-1909.

2.3.2.1 Dry Fertilizer

- a. Granular fertilizer : Consists of nitrogen-phosphorous-potassium ratio: 10 percent nitrogen 6 percent phosphorous, and 4 percent potassium.
- b. Controlled-Release Fertilizer: Consists of nitrogen-phosphorous-potassium ratio: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium. Controlled-release fertilizer may be in packet or tablet form.

2.3.2.2 Liquid Fertilizer

Consists of nitrogen-phosphorous-potassium ratio: 15 percent nitrogen, 30 percent phosphorous and 15 percent potassium, in water soluble form.

2.3.3 Organic Soil Amendments

2.3.3.1 Peat

Peat shall be a natural product of peat humus derived from a bog, swampland or marsh and shall conform to ASTM D 2607.

2.3.3.2 Sand

Sand shall be clean and free of toxic materials and at least 95 percent by weight shall pass a 10-mesh sieve, and 10 percent by weight shall pass a 16-mesh sieve.

2.3.3.3 Rotted Manure

Rotted manure shall be unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials and containing no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

2.3.4 Soil Conditioner

For single use or in combination to meet requirements for topsoil.

2.3.4.1 Aluminum Sulfate

Aluminum sulfate shall be commercial grade.

2.4 MULCH

Mulch shall be free from weeds, mold and other deleterious materials.

2.4.1 Organic Mulch Material

Organic mulch materials shall be ground or shredded bark ranging in size from 1/2 to 1-1/2 inches.

2.5 GEOTEXTILE

2.5.1 Woven Polypropylene

Woven polypropylene shall be bi-directional, weigh a minimum 4 ounces per

square yard, be a minimum 10 mils thick and come in 6 feet wide rolls.

## 2.6 TRUNK WRAPPING MATERIAL

Tree wrap shall be two thicknesses of crinkled paper cemented together with a layer of bituminous material. Wrapping material shall be a minimum of 4 inches in width and have a stretch factor of 33-1/3 percent. Twine for tying shall be lightly tarred medium or coarse sisal yarn.

## 2.7 GUYING AND STAKING MATERIAL

### 2.7.1 Stakes

Stakes for tree support shall be rough sawn wood, free from knots, rot, cross grain, or other defects that would impair the strength. Standard stakes shall be hardwood or fir treated with pentachlorophenol.

#### 2.7.1.1 Bracing Stakes

Bracing stakes shall be a minimum of 2 inches by 2 inches or 2-1/2 inches in diameter by 8 feet long and pointed at one end.

#### 2.7.1.2 Ground Stakes

Ground stakes shall be a minimum of 2 inches by 2 inches or 2-1/2 inches in diameter by 3 feet long and pointed at one end.

### 2.7.2 Guying Material

#### 2.7.2.1 Guying Wire

Guying wire shall be 12-gauge annealed galvanized steel wire.

#### 2.7.2.2 Guying Cable

Guying cable shall be a minimum of five-strand, 3/16-inch diameter cadmium plated steel cable.

### 2.7.3 Chafing Guard

Hose chafing guards shall be new or used 2-ply reinforced rubber or plastic hose and shall be all the same color on the project. Length shall be 1-1/2 times the circumference of the plant at its base.

### 2.7.4 Flags

Flags to be fastened to guys shall be white surveyor's plastic tape, 6 inches in length.

### 2.7.5 Turnbuckles

Turnbuckles shall be galvanized or cadmium-plated steel and have a 3-inch minimum lengthwise opening fitted with screw eyes.

## 2.8 WATER

Water shall not contain elements toxic to plant life.

## 2.9 ANTIDESICCANT

Antidesiccant shall be an emulsion that will provide a film over plant surfaces permeable enough to permit transpiration, and shall not damage the plant.

## 2.10 EROSION CONTROL MATERIAL

### 2.10.1 Soil Erosion Control Blanket

Blanket shall be machine-produced mat of wood excelsior formed from a web of interlocking wood fibers, covered on one side with either knitted straw blanket-like mat-construction, covered with biodegradable plastic mesh, or interwoven with biodegradable thread, plastic netting or twisted kraft paper cord netting.

### 2.10.2 Soil Erosion Control Fabric

Control fabric shall be knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inchsquare with strips of biodegradable paper. Filler paper strips shall last 6 to 8 months.

### 2.10.3 Soil Erosion Control Net

Control net shall be heavy, twisted jute mesh weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inchsquare.

### 2.10.4 Anchors

Erosion control anchors shall be as recommended by the manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

#### 3.1.1 Verify Grades

The Contracting Officer shall verify the finished grades are as indicated on drawings, and the placing of topsoil and smooth grading has been completed in accordance with Section 02210 GRADING.

#### 3.1.2 Underground Obstructions to Planting

The location of underground utilities and facilities shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

### 3.2 SITE PREPARATION

#### 3.2.1 Layout

Plant material locations and bed outlines shall be staked on the project site before any excavation is made. Plant material locations may be adjusted by the Contracting Officer to meet field conditions.

#### 3.2.2 Protection of Existing Vegetation

If lawns have been established prior to planting operations, the surrounding turf shall be covered before excavations are made in a manner

that will protect turf areas. Existing trees, shrubbery, and beds that are to be preserved shall be barricaded in a manner that will effectively protect them during planting operations.

### 3.3 EXCAVATION

#### 3.3.1 Obstructions Below Ground or Poor Drainage

When obstructions below ground or poor drainage affect the contract operation, proposed adjustments to plant location, type of plant and planting method or drainage correction shall be submitted to and approved by the Contracting Officer.

#### 3.3.2 Turf Removal

Where planting beds occur in existing turf areas, the turf shall be removed to a depth that will ensure the removal of the entire root system.

#### 3.3.3 Plant Pits

Plant pits shall be dug to produce vertical sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The minimum allowable dimensions of plant pits shall be 6 inches deeper than the depth of ball or the depth of base roots; for ball or root spreads up to 2 feet, pit diameters shall be twice the root spread; for ball or root spreads from 2 to 4 feet, pit diameters shall be 2 feet greater; for ball or root spreads over 4 feet, pit diameters shall be 1-1/2 times the ball root spread.

### 3.4 PLANTING TIMES AND CONDITIONS

#### 3.4.1 Deciduous Planting Time

Install deciduous plants from October 15 to April 30.

#### 3.4.2 Planting Conditions

Planting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted to and approved by the Contracting Officer.

### 3.5 INSTALLATION

#### 3.5.1 Erosion Control

Where erosion control material is indicated or required, material shall be installed in accordance with manufacturer's instructions. Placement of the erosion control material shall be accomplished without damage to installed material or without deviation to finished grade.

#### 3.5.2 Backfill Soil Mixture

The backfill soil mixture shall be a proportioned mixture thoroughly mixed by volume of topsoil and selected soil amendments as follows: 3 parts topsoil and 1 part approved organic matter, plus 5 pounds of 10:6:4 fertilizer per cubic yard, mixed on-site to an approved consistency.

### 3.5.3 Setting Plants

Plants shall be set plumb and held in position until sufficient soil has been firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are even with the depth at which they were grown in the nursery, or container or as indicated on the drawing planting details.

### 3.5.4 Controlled-Release Fertilizer

Controlled-release fertilizer shall be placed in packet or tablet form in the plant pit in the immediate vicinity of the feeding roots in accordance with the manufacturer's recommendations.

### 3.5.5 Balled and Burlapped Plants

Materials shall be removed that are metal, plastic, nylon or treated burlap, prior to backfilling. Balled and burlapped stock shall be backfilled with backfill soil mixture to approximately half the depth of the ball and then tamped and watered. Biodegradable burlap and tying material shall be carefully opened and folded back. The backfill shall be completed, tamped and watered. A 4-inch high earth saucer shall be formed around individual plants.

### 3.5.6 Container-Grown Plants

Non-biodegradable containers or platforms shall be removed without damage to the plant or root system. Biodegradable containers shall be split. The backfill shall be completed as specified for BB plants.

### 3.5.7 [Enter Appropriate Subpart Title Here] 3.5.8 Staking and Guying

#### 3.5.8.1 One Bracing Stake

Trees 4 to 6 feet tall shall be held in place with one bracing stake. The tree shall be held firmly to the stake with a double strand of wire. A chafing guard shall be used where the wire contacts the tree. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or roots.

#### 3.5.8.2 Two Bracing Stakes

Trees over 6 feet tall shall be held in place with two bracing stakes placed on opposite sides. The tree shall be held firmly between the stakes with a double strand of wire. Chafing guards shall be used where the wire contacts the tree. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or roots.

#### 3.5.8.3 Three Guying Wires

Trees shall be held firmly in place with three guying lines of cable spaced equidistantly around the tree. The line shall be anchored with ground stakes. The line shall be anchored to the tree at a point equal to one half its height. Chafing guards shall be used where the line contacts the tree. One turnbuckle shall be centered on each line for tree straightening purposes. Ground stakes shall be driven into firm ground outside the earth saucer and plant pit with the top of the stake flush with the ground surface.

### 3.5.9 Flags

A flag shall be securely fastened to each guying line to be visible by pedestrians.

## 3.6 FINISHING

### 3.6.1 Plant Beds

Planted areas shall be uniformly edged to provide a clear-cut division line between the planted area and the adjacent turf area and to provide a shape as indicated. The entire planted area shall be raked and smoothed while maintaining the earth saucers.

### 3.6.2 Pruning

The total amount of foliage shall be pruned by one-fourth to one-third on installed trees to compensate for loss of roots and transplanting shock. The typical growth habit of individual plants shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth shall not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off."

### 3.6.3 Mulch

Mulch shall be spread to a uniform thickness of 4 inches within 48 hours after planting. Mulch shall be kept out of the crowns of shrubs and off buildings, sidewalks and other facilities.

### 3.6.4 Geotextile

When required for weed control, geotextile shall be placed in accordance with the manufacturer's recommendations and/or as indicated. Geotextile will be used under stone mulch only.

### 3.6.5 Trunk Wrap

The trunks to deciduous trees shall be wrapped within 24 hours after planting. Trees 1-1/2 inches or greater in caliper shall be wrapped with the specified material beginning at the base and extending up to the first branches. The wrapping shall be securely tied with twine at the top and bottom and at 18-inch intervals.

### 3.6.6 Water

Plants shall be watered as necessary to maintain an adequate supply of moisture within the root zone. Run-off, puddling and wilting shall be prevented.

### 3.6.7 Antidesiccant Application

Plants requiring further protection shall be sprayed with anti-desiccant in accordance with manufacturer's recommendations.

## 3.7 MAINTENANCE DURING PLANTING OPERATION

Installed plants shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is

installed and shall continue until the plant establishment period commences. The maintenance includes watering, pruning, wound dressing, straightening and other necessary operations. Plant beds and earth saucers shall be kept free of weeds, grass and other undesired vegetation. Plants shall be checked for settlement and shall be reset proper grade as necessary. Run-off, puddling and wilting shall be prevented.

### 3.8 RESTORATION AND CLEAN UP

#### 3.8.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

#### 3.8.2 Clean Up

Excess and waste material from the planting operation shall be removed and disposed of off the site. Adjacent paved areas shall be cleared.

### 3.9 PLANT ESTABLISHMENT PERIOD

#### 3.9.1 Commencement

On completion of the last day of the planting operation, the plant establishment period for maintaining installed plants in a healthy growing condition shall commence and shall be in effect for the remaining contract time period not to exceed 12 months. When the planting operation extends over more than one season or there is a variance to the planting times, plant establishment periods shall be established for the work completed, as directed. Written calendar time period shall be furnished to the Contracting Officer for the beginning of the plant establishment period. When there is more than one plant establishment period, describe the boundaries of the planted area covered for each period.

#### 3.9.2 Maintenance During Establishment Period

##### 3.9.2.1 General

Maintenance of plants shall include straightening plants, tightening stakes and guying material, repairing tree wrapping, protecting plant areas from erosion, maintaining erosion control material, supplementing mulch, accomplishing wound dressing, removing dead or broken tip growth by pruning, maintaining edging of beds, checking for girdling of plants and maintaining plant labels, watering, weeding, removing and replacing unhealthy plants.

##### 3.9.2.2 Water

The plants shall be watered as necessary to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is estimated to be the equivalent of one inch of absorbed water per week delivered in the form of natural rain or augmented as required by periodic waterings. Run-off, puddling and wilting shall be prevented.

##### 3.9.2.3 Weeding

Grass and weeds in earth saucers and plant beds shall not be allowed to reach a height of 3 inches before being completely removed, including the

root growth.

#### 3.9.2.4 Unhealthy Plants

A plant shall be considered unhealthy or dead when the main leader has died back, or 25 percent of the crown is dead. Determine the cause for an unhealthy plant. Unhealthy or dead plants shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

#### 3.9.2.5 Fertilizing

The plants shall be topdressed at least once during the period of establishment with dry fertilizer at the rate of 3 pounds per 100 square feet of plant pit or bed area or foliar feed plants with liquid fertilizer.

Dry fertilizer adhering to plants shall be flushed off. The application shall be timed prior to the advent of winter dormancy.

#### 3.9.2.6 Settlement

Topsoil shall be added to maintain grade and to maintain earth saucers. Serious settlement affecting the setting of the plant in relation to the depth at which it was grown requires replanting in accordance with paragraph INSTALLATION.

#### 3.9.2.7 Maintenance Report

A written record shall be furnished to the Contracting Officer of the maintenance work performed, the quality of plant losses, cause for plant loss and replacements made on each site visit.

#### 3.9.2.8 Maintenance Instructions

Written instructions shall be furnished to the Contracting Officer for year-round care of installed plants.

#### 3.9.3 Replacement Plants

Plants shall be provided for replacement in accordance with paragraph PLANTS. Replacement plants shall be installed in accordance with paragraph INSTALLATION. No extended plant establishment period shall be required for replacement plants. A plant will be replaced in accordance with paragraph WARRANTY.

### 3.10 FINAL ACCEPTANCE

#### 3.10.1 Preliminary Inspection

Prior to [the completion of the contract] [the plant establishment period] [or] [whichever occurs first] a preliminary inspection shall be held by the Contracting Officer. Time for the inspection will be established in writing. The quantity and type of plants installed and the acceptability of the plants in accordance with the plant establishment period shall be determined.

#### 3.10.2 Final Inspection

A final inspection shall be held by the Contracting Officer to determine that deficiencies noted in the preliminary inspection have been corrected. Time for the inspection shall be established in writing. Acceptance of the

planting operation is subject to the guarantee of plant growth.

-- End of Section --

SECTION 05500

MISCELLANEOUS METAL

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	(2001) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 36/A 36M	(2000a) Carbon Structural Steel
ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 653/A 653M	(2000) 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 221	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM E 814	(2000) Fire Tests of Through-Penetration Fire Stops

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(1998; Errata 10-98-1) Portable Fire Extinguishers
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**UNDERWRITERS LABORATORIES INC. (UL)**

<b>UL 299</b>	<b>(1995) Dry Chemical Fire Extinguishers, Eighth Edition</b>
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<b>UL 711</b>	<b>(1995) Fire Extinguishers, Rating and Fire Testing of, Fourth Edition</b>
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-02 Shop Drawings

Miscellaneous Metal Items; G, DO.

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 shall be submitted for all specified items.

1.3 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/A 123M, ASTM A 653/A 653M, or ASTM A 924/A 924M, 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.

1.4 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

1.5 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.

1.6 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.

#### 1.7 ALUMINUM FINISHES

Unless otherwise specified, aluminum items shall have standard mill finish.

#### 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 not be 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 of all doors and panels shall have a factory applied baked enamel finish.

#### 2.2 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.

##### 2.2.1 Steel Handrails

Steel handrails shall be fabricated from steel pipe conforming to ASTM A 53/A 53M. Handrails shall be 1-1/2 inch nominal size and shall be hot-dip galvanized after fabrication.

- a. Joint posts, rail, and corners shall be fabricated by the following method:

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, where allowed by the Contracting Officer, shall be butted and reinforced by a tight fitting interior sleeve not less than 6 inches long.

##### 2.2.2 Aluminum Handrails

Handrails shall be fabricated from aluminum plates and shapes, of the sizes indicated, conforming to ASTM B 221. Railings and pipe collars shall have a mill finish. All fasteners shall be Series 300 stainless steel.

- a. Jointing shall be by the following method:

Mitered and welded joints, made by fitting post to top rail and intermediate rail to post and corners, shall be groove welded and ground smooth. Splices, where allowed by the Contracting Officer, shall be butted and reinforced by a tight fitting dowel or sleeve not less than 6 inches in length. Dowel or sleeve shall be connected to one side of the splice by tack welding or by using epoxy cement.

## 2.3 CRAWL SPACE DOORS

### 2.3.1 Fabrication

Crawl space doors shall be factory fabricated steel frame with expanded metal mesh.

### 2.3.2 Doors

Doors shall consist of expanded metal mesh framed by 1-1/2 galvanized steel angles as shown on the drawings. Doors shall be pre-hung at the factory, with all expanded metal, hinges and door strike securely welded in position.

## 2.4 MISCELLANEOUS

Miscellaneous plates and shapes shall be provided to complete the work.

## 2.5 ROOF HATCHES

Roof hatches 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 37 by 30 inches. Cover and curb shall be insulated with 1 inch thick rigid insulation covered and protected by galvanized steel liner not less than 26 gauge. 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. Hatch shall be completely assembled with heavy hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles on inside and neoprene draft seal. The cover shall be equipped with an automatic hold-open arm complete with handle to permit one hand release. Exposed surfaces of hatches and curbs shall have a factory paint finish, color to match the windows.

## 2.6 WIRE SHELVING

Wire shelving shall be polyvinyl chloride (PVC) coated metal wire, modular, ventilated, flat shelving with back clips, braces, support arms, and plastic end caps as required for a complete installation. Shelving shall be fabricated from cold drawn steel rod having a minimum tensile strength of 100,000 psi. Steel rod shall be of a temper, alloy, and quality to insure that the shelving is free of blemishes, cracks, and other defects or imperfections which may impair the appearance, strength, or finish of the product. Shelving shall be designed to support a static load of 75 pounds per square foot. Steel surfaces shall have a factory applied, white PVC coating. Minimum dimensions and number of shelves shall be as indicated.

## 2.7 STEEL STAIRS

Steel stairs shall be complete with structural or formed channel stringers, metal pan cement-filled treads, landings, handrails, and necessary bolts

and other fastenings as indicated. Structural steel shall conform to ASTM A 36/A 36M. Stairs and accessories shall be shop primed for field painting in accordance with Section 09900 PAINTS AND COATINGS. Risers on stairs with metal pan treads shall be deformed to form a sanitary cove to retain the tread concrete.

## 2.8 FIRE **EXTINGUISHERS AND CABINETS**

Cabinets to be located in fire-rated walls shall be fire-rated type, fabricated in accordance with ASTM E 814, and shall be listed by an approved testing agency for 1- and 2-hour combustible and non-combustible wall systems. The testing agency's seal shall be affixed to each fire-rated cabinet. Cabinets shall be of the semi-recessed type suitable for 10 pound extinguishers. Box and trim shall be of heavy gage rolled steel. Door shall be a rigid frame with full length piano type hinge and double strength (DSA) glass panel. Door and panel shall have the manufacturer's standard white baked enamel finish inside and out.

### 2.8.1 **Fire Extinguishers**

**Fire extinguisher shall be portable, multi-purpose dry chemical unit conforming to UL 299, with 10 pound nominal capacity, having a 4A-60BC minimum fire test rating. Fire test rating requirements shall be those established by UL 711. Unit shall be equipped with an integral pressure indicating gage. Extinguishers shall have heavy-duty steel cylinders with corrosion and impact resistant epoxy finish, and metal valve with pull pin, siphon tube, and replaceable molded valve stem seal. Fire extinguisher shall be cabinet mounted. Mounting devices shall conform to UL standards.**

## 2.9 DOCK BUMPERS

Dock bumpers shall be high-impact resistant, designed for use at commercial loading docks. Bumpers shall be laminated rubberized truck tire pads assembled on two 1/4 inch thick steel angles of the size shown. Pads shall be punched to receive 3/4 inch diameter support rods. Rods shall be welded to the angle at one end and closed with nuts at the other end. Angles shall contain 13/16 inch diameter anchor bolt holes for attachment to loading dock. Exposed metal shall have a hot-dip galvanized finish.

## 2.10 TELEPHONE ENCLOSURES

Telephone enclosures shall be fabricated from stainless steel in accordance with the details shown on the drawings. Enclosures shall be acoustically treated with perforated interior panels, and shall have enclosed sides and tops for security.

## 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 REMOVABLE ACCESS PANELS

A removable access panel not less than 12 by 12 inches shall be installed directly below each valve, flow indicator, damper, or air splitter that is

located above the ceiling, other than an acoustical ceiling, and that would otherwise not be accessible.

### 3.3 ATTACHMENT OF HANDRAILS

#### 3.3.1 Installation of Steel Handrails

Installation shall be by grouting posts into drilled holes, with anchorage covered with standard pipe collar pinned to post.

#### 3.3.2 Installation of Aluminum Handrails

Installation shall be by means of pipe collars embedded into the concrete. Where aluminum is to be in contact with portland cement concrete, the contact surface shall be given a heavy coating of bituminous paint or asphalt varnish.

### 3.4 INSTALLATION OF FIRE EXTINGUISHER CABINETS

Metal fire extinguisher cabinets shall be furnished and installed in accordance with NFPA 10 where shown on the drawings or specified.

### 3.5 DOCK BUMPERS

Dock bumpers shall be mounted to loading dock with 3/4 inch diameter anchor bolts as shown on the drawings.

-- End of Section --

P

SECTION 08710

DOOR 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 the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283 (1991) Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.1 (1997) Butts and Hinges (BHMA 101)  
BHMA A156.3 (1994) Exit Devices (BHMA 701)  
BHMA A156.4 (1992) Door Controls - Closers (BHMA 301)  
BHMA A156.5 (1992) Auxiliary Locks & Associated Products (BHMA 501)  
BHMA A156.6 (1994) Architectural Door Trim (BHMA 1001)  
BHMA A156.7 (1988) Template Hinge Dimensions  
BHMA A156.13 (1994) Mortise Locks & Latches (BHMA 621)  
BHMA A156.15 (1995) Closer Holder Release Devices  
BHMA A156.16 (1997) Auxiliary Hardware  
BHMA A156.18 (1993) Materials and Finishes (BHMA 1301)  
BHMA A156.21 (1996) Thresholds  
BHMA A156.22 (1996) Door Gasketing Systems

DOOR AND HARDWARE INSTITUTE (DHI)

DHI-03 (1989) Keying Systems and Nomenclature

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1999) Fire Doors and Fire Windows  
NFPA 101 (1997) Life Safety Code

STEEL DOOR INSTITUTE (SDOI)

SDI 100 (1991) Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL BMD (1999) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-02 Shop Drawings

Hardware Schedule; G, DO.

Hardware schedule listing all items shall be furnished. The format and content of the schedule shall be as specified.

Keying Schedule; G, DO.

Keying schedule developed in accordance DHI-03 after the keying meeting with the User.

SD-03 Product Data

Hardware Items; G, DO.

Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Spare parts data for locksets, exit devices, and closers to include a complete list of parts and supplies with current unit prices and sources of supply.

SD-10 Operation and Maintenance Data

Hardware Items; G, DO.

Complete maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and trouble shooting guides shall be provided.

SD-11 Closeout Submittals

Key Bitting Chart; G, DO.

Charts shall be submitted prior to completion of the work. The format and content of the charts shall be as specified.

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

	Reference	Mfr.		UL Mark	
Hard-	Publi-	Name	Key	(If fire	BHMA
	cation	and	Con-	rated	Finish

ware Item	Quan- tity	Size	Type No.	Finish	Catalog No.	trol Symbols	and listed)	Designa- tion
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#### 1.4 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts shall include:

- a. Complete listing of all keys (AA1, AA2, etc.).
- b. Complete listing of all key cuts (AA1-123456, AA2-123458).
- c. Tabulation showing which key fits which door.
- d. Copy of floor plan showing doors and door numbers.
- e. Listing of 20 percent more key cuts than are presently required in each master system.

#### 1.5 QUALITY ASSURANCE

##### 1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.

## PART 2 PRODUCTS

### 2.1 TEMPLATE HARDWARE

Hardware to be applied to metal or to prefinished doors shall be made to template. Promptly furnish template information or templates to door and frame manufacturers. Template hinges shall conform to BHMA A156.7. Coordinate hardware items to prevent interference with other hardware.

### 2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements specified, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Such hardware shall bear the label of Underwriters Laboratories, Inc., and be listed in UL BMD or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

### 2.3 HARDWARE ITEMS

Hinges, locks, latches, exit devices, bolts, and closers shall be clearly and permanently marked with the manufacturer's name or trademark where it

will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

#### 2.3.1 Hinges

BHMA A156.1, 4 1/2 by 4 1/2 inches unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.

#### 2.3.2 Locks and Latches

##### 2.3.2.1 Mortise Locks and Latches

BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 7 by 2 1/4 inches with a bushing at least 1/4 inch long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. **Lever handles** of mortise locks shall have screwless shanks and no exposed screws.

##### 2.3.2.2 Electronic Card Reading System (Option No. 4)

System shall be fully compatible with products of the Best Lock Corporation and shall include Electronic Card Reading Units for all sleeping rooms and five exterior doors per building. System shall include door access units with key override, magnetic strip encoder, programming cables, system software, initial lock programming, and door and frame preparation (door and frames shall be prepared in accordance with lock manufacturers specifications).

##### 2.3.2.3 Auxiliary Locks

BHMA A156.5, Grade 1.

##### 2.3.3 Exit Devices

BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Touch bars may be provided in lieu of conventional crossbars and arms. Provide escutcheons, not less than 7 by 2 1/4 inches.

##### 2.3.4 Cylinders and Cores

Provide cylinders for new locks, including locks provided under other sections of this specification. Cylinders shall be fully compatible with products of the Best Lock Corporation and shall have interchangeable cores which are removable by a special control key. The cores shall have seven pin tumblers and shall be factory set using the A4 system and F keyway. Submit a core code sheet with the cores. The cores shall be master keyed in one system for this project. Provide construction interchangeable cores.

##### 2.3.5 Keying System

Provide a grand master keying system an extension of the existing keying system. Provide key cabinet as specified.

##### 2.3.6 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

#### 2.3.6.1 Lever Handles

Provide lever handles **for all hardware sets**. Lever handles for exit devices shall meet the test requirements of BHMA A156.13 for mortise locks.

Lever handle locks shall have a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when a force in excess of that specified in BHMA A156.13 is applied to the lever handle. Lever handles shall return to within 1/2 inch of the door face.

#### 2.3.7 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master and grand master keying system. Furnish one additional working key for each lock of each keyed-alike group. Furnish two additional keys for each sleeping room. Furnish 6 great grand master keys, 6 construction master keys, and 6 control keys for removable cores. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys. Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

#### 2.3.8 Door Bolts

BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: BHMA A156.3, Type 25.

#### 2.3.9 Closers

BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

#### 2.3.9.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

#### 2.3.10 Closer Holder-Release Devices

BHMA A156.15.

#### 2.3.11 Door Protection Plates

BHMA A156.6.

#### 2.3.11.1 Sizes of Mop and Kick Plates

Width for single doors shall be 2 inches less than door width; width for pairs of doors shall be one inch less than door width. Height of kick plates shall be 10 inches for flush doors. Height of mop plates shall be 6 inches.

#### 2.3.12 Door Stops and Silencers

BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

#### 2.3.13 Thresholds

BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

#### 2.3.14 Weather Stripping Gasketing

BHMA A156.22. Provide the type and function designation where specified in paragraph entitled "Hardware Schedule". A set shall include head and jamb seals, sweep strips, and, for pairs of doors, astragals. Air leakage of weather stripped doors shall not exceed 0.5 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E 283. Weather stripping shall be one of the following:

##### 2.3.14.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Aluminum shall be bronze anodized.

#### 2.3.15 Rain Drips

Extruded aluminum, not less than 0.08 inch thick, bronze anodized. Set drips in sealant conforming to Section 07900 JOINT SEALING, and fasten with stainless steel screws.

##### 2.3.15.1 Door Rain Drips

Approximately 1 1/2 inches high by 5/8 inch projection. Align bottom with bottom edge of door.

##### 2.3.15.2 Overhead Rain Drips

Approximately 1 1/2 inches high by 2 1/2 inches projection, with length equal to overall width of door frame. Align bottom with door frame rabbet.

#### 2.3.16 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

### 2.4 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Fasteners exposed to weather shall be of nonferrous metal or stainless steel. Provide fasteners of type necessary to accomplish a permanent installation.

### 2.5 FINISHES

BHMA A156.18. Hardware shall have BHMA 612 finish (satin bronze), unless specified otherwise. Surface door closers shall have bronze paint finish. Steel hinges shall have BHMA 639 finish (satin bronze plated). Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware showing on interior of bathrooms shall have BHMA 629 finish bright

stainless steel or BHMA 625 finish (bright chromium plated).

## 2.6 KEY CABINET AND CONTROL SYSTEM

BHMA A156.5, Type required to yield a capacity (number of hooks) 50 percent greater than the number of key changes used for door locks.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

#### 3.1.1 Weather Stripping Installation

Handle and install weather stripping so as to prevent damage. Provide full contact, weather-tight seals. Doors shall operate without binding.

##### 3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 9 inches o.c. after doors and frames have been finish painted.

#### 3.1.2 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws in expansion sleeves.

### 3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors.

### 3.3 HARDWARE LOCATIONS

SDI 100, unless indicated or specified otherwise.

- a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.
- b. Mop Plates: Bottom flush with bottom of door.

### 3.4 KEY CABINET AND CONTROL SYSTEM

Locate where directed. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

### 3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and

other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.6 HARDWARE SETS

HW-1	1-1/2 pr. 1 ea.  1 ea. 1 ea. 1 ea.	Hinges , A2111 Lockset, F13 (Option 4 - electronic card reading locksets) Electronic Card Reading Lockset ( <b>Option No. 4</b> ) Wallstop, L22251 Threshold, J12190 - anodized dark bronze finish
HW-2	1-1/2 pr. 1 ea. 1 ea.  1 ea.	Hinges, A2111 Lockset, F77 (locked on bathroom side) Mortise Bolt, L14121 (on sleeping room side, mtd. 5'-0" AFF) Stop, L02251
HW-3	3 pr. 1 ea. 1 ea. 1 ea.  2 ea. 1 ea. 2 ea.  2 ea. 1 set	Hinges, A2111, NRP Exit Device, Type 3, NRP, Function 01 Exit Device, Type 6, NRP, Function 04 Electronic Card Reading Lockset, Doors 101,111,116,120 ( <b>Option No. 4</b> ) Closer, C02061, with PT-4G Threshold, J32190 - anodized dark bronze finish Rain Drip, Door, as specified - anodized dark bronze finish Rain Drip, Door, Overhead, as specified - anodized dark bronze finish Sweep, Neoprene/Aluminum, R0Y415 Weatherstripping, R0Y165
HW-4	3 pr. 1 ea. 1 ea. 2 ea. 1 ea. 2 ea. 1 set	Hinges, A2111, NRP Exit Device, Type 3, NRP, Function 01 Exit Device, Type 6, NRP, Function 04 Closer, C02061, with PT-4G Threshold, J32190 - anodized dark bronze finish Sweep, Neoprene/Aluminum, R0Y415 Weatherstripping, R0Y165
HW-5	1-1/2 pr. 1 ea. 1 ea. 1 ea. 1 ea.	Hinges, Full Mortise, A2111 Closer, C02011, with PT-4C and PT-4G Door Pull, J407 - anodized dark bronze finish Door Push, J304 - anodized dark bronze finish Kick Plate, Push Side
HW-6	3 pr. 1 ea. 1 ea. 2 ea. 2 ea.	Hinges, A2111, NRP Exit Device, Type 3, Function 01 Exit Device, Type 6, Function 04 Closer, C02061, with PT-4G Kick Plate, Push Side
HW-7	1-1/2 pr. 1 ea.	Hinges, A2111, NRP Exit Device, Type 1, Function 01

	1 ea.	Closer, C02061, with PT-4G
	1 ea.	Kick Plate, Push Side
HW-8	1-1/2pr.	Hinges, A8111
	1 ea.	Lockset, F02
	1 ea.	Closer, C02061, with PT-4C and PT-4F
	1 ea.	Kickplate, J102
HW-9	1-1/2 pr.	Hinges, A8111
	<b>1 ea.</b>	<b>Exit Device, Type 1, Function 01 at doors 205, 305</b>
	1 ea.	Lockset, F07
	1 ea.	Closer, C02061
	1 ea.	Mop Plate, J103
HW-10	3 pr.	Hinges, A8111
	1 ea.	Lockset, F07
	<b>1 ea.</b>	<b>Exit Device, Type 1, Function 01 at door 118</b>
	1 ea.	Closer, C02061
	2 ea.	Flush bolt, lever extension, L04081 (top & bottom)
HW-11	1-1/2 pr.	Hinges, Full Mortise, A2111
	1 ea.	Closer, C02011, with PT-4C and PT-4G
	1 ea.	Exit Device, Type 1, Function 01
	1 set	Weatherstripping, R0Y165
HW-12	1-1/2 pr.	Hinges, Full Mortise, A2111
	1 ea.	Closer, C02011, with PT-4C and PT-4G
	1 ea.	Exit Device, Type 1, Function 01
	1 set	Weatherstripping, R0Y165
	1 ea.	Rain Drip, Door, as specified - anodized dark bronze finish
	1 ea.	Rain Drip, Door, Overhead, as specified - anodized dark bronze finish
HW-13	1-1/2 pr.	Hinges, Full Mortise, A2111
	1 ea.	Closer, C02011, with PT-4C and PT-4G
	1 ea.	Exit Device, Type 3, Function 05
	1 set	Weatherstripping, R0Y165
	1 ea.	Rain Drip, Door, as specified - anodized dark bronze finish
	1 ea.	Rain Drip, Door, Overhead, as specified - anodized dark bronze finish
HW-14	3 pr.	Hinges, Full Mortise, A2111
	2 ea.	Closer, C02011, with PT-4C and PT-4G
	1 ea.	Exit Device, Type 3, NRP, Function 01
	1 ea.	Exit Device, Type 6, NRP, Function 05
	1 set	Weatherstripping, R0Y165
	1 ea.	Rain Drip, Door, as specified - anodized dark bronze finish
	1 ea.	Rain Drip, Door, Overhead, as specified - anodized dark bronze finish
HW-15	1-1/2 pr.	Hinges, Full Mortise
	2 ea.	Door Pull, J402 - anodized dark bronze finish
	2 ea.	Door Push, J502 - anodized dark bronze finish
	2 ea.	Kick Plates
	2 ea.	Closer, C02011, with PT-4C and PT-4G

HW-16	1-1/2 pr. 1 ea. 1 ea.	Hinges, A8111 Lockset, F13 Stop, L02251
HW-17	3 pr. 4 ea. 4 ea.	Hinges, Door, Single Acting, K81011 Door Push, J502 - anodized dark bronze finish Kick Plates
HW-18	1 pr. 2 ea. 2 ea.	Hinges, Door, Double Acting, A81151 Door Push, J502 - anodized dark bronze finish Kick Plates
HW-19	1-1/2pr. 1 ea. 1 ea.	Hinges, A8111 Lockset, F02 Closer, C02061, with PT-4C and PT-4F
HW-20	3 pr. 2 ea. 2 ea. 2 ea.	Hinges, A2111, NRP Closer, C02061, with PT-4G Door Pull, J402 - anodized dark bronze finish Door Push, J502 - anodized dark bronze finish
HW-21	1-1/2 pr. 1 ea. 1 ea. 1 ea. 1 ea.	Hinges, A8111 Latchset, F01 Closer, C02061, with PT-4C Kickplate, J102 Stop, L22251
HW-22	3 pr. 1 ea. 1 ea. 2 ea.	Hinges, A8161 Lockset, F07 Closer, C02061 Flush bolt, lever extension, L04081 (top & bottom)
HW-23	3 pr. 2 ea. 2 ea. 2 ea. 2 ea.	Hinges, Full Mortise, A2111 Closer, C02011, with PT-4C and PT-4G Door Pull, J407 - anodized dark bronze finish Door Push, J304 - anodized dark bronze finish Kick Plate, Push Side
HW-24	1 pr. 1 ea. 1 ea.	Hinges, A8111 Lockset, F02 Closer, C02061, with PT-4C and PT-4F
HW-25	1 pr.	Hinges, A2312
<b>Option Set</b>	1 ea. Per Door 1 ea. 1 ea. 1 ea. Per Door 2 ea. 1 ea.	Basis G Lockset 35HG-7-FV-14-MS PAT MK-GMK Basis Software BAS-SWS-G Programming Cable BASD-MSE Lock Programming Magnetic Strip Cards (1 Box of 500) Training on Site, One Day, 8hr Min.

Note: This hardware set shall be provided if Option #4 is awarded.

-- 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 864 (1999) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

ASTM C 920 (1998) Elastomeric Joint Sealants

ASTM C 1036 (1991; R 1997) Flat Glass

ASTM C 1172 (1996e1) Laminated Architectural Flat Glass

ASTM D 395 (1998) Rubber Property - Compression Set

ASTM E 119 (1998) Fire Tests of Building Construction and Materials

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

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201 Safety Standard for Architectural Glazing Materials

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 "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-02 Shop Drawings

Installation; G, DO.

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-03 Product Data

Insulating Glass; G, DO.  
Glazing Accessories; G, DO.

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-07 Certificates

Insulating Glass; G, DO.

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

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

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 on site 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 rabbit

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 ROLLED GLASS

### 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 shall be as follows:

#### 2.2.1 Low-E **Laminated** Insulating Glass (Exterior Doors and Windows)

*Interior and exterior glass panes for Low-E insulating units shall be Type I annealed flat glass, Class 2-tinted, Quality q3 - glazing select, conforming to ASTM C 1036. Units shall consist of an interior laminated glass lite, 1/2 inch dehydrated air space, and 1/8 inch thick glass exterior lite with anti-reflective low-emissivity coating on inside surface. Interior laminated glass lite shall consist of two 1/8 inch thick glass panes bonded together with 0.030 inch thick PVB interlayer under pressure, or alternatives such as resin laminates, conforming to requirements of 16 CFR 1201 and ASTM C 1172. Glass performance shall be: 40 STC rating, 0.32 U-Value/Winter Nighttime, and 0.67 shading coefficient. Color shall be tinted.*

#### 2.2.2 **Fire/Safety Rated Insulating Glass (Interior Fire Doors)**

*Interior and exterior glass panes for fire/safety rated insulating glass for use in interior fire doors shall be laminated Type I transparent flat type, Class 1-clear, 1/4 inch thick. Glass shall have a 45 minute rating when tested in accordance with ASTM E 119. Glass shall be permanently labeled with appropriate markings. Glass performance shall be: 40 STC rating and 0.47 U-Value/Winter Nighttime.*

### 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.

##### 2.3.3.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing shall be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

#### 2.3.4 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. 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. 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 --

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SECTION 08850

FRAGMENT RETENTION FILM FOR GLASS

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 1036 (1991; R 1997) Flat Glass  
ASTM C 1048 (1997b) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass  
ASTM D 882 (1997) Tensile Properties of Thin Plastic Sheeting  
ASTM D 1044 (1994) Resistance of Transparent Plastics to Surface Abrasion  
ASTM D 3330 (1996) Peel Adhesion of Pressure-Sensitive Tape at 180 Degree Angle  
ASTM E 84 (1998e1) Surface Burning Characteristics of Building Materials  
ASTM G 26 (1996) Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201 Safety Standard for Architectural Glazing Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-03 Product Data

Fragment Retention Film; G, DO.  
Cleaning; G, DO.

Manufacturer's data consisting of catalog cuts, brochures, circulars, and a list of glazing gaskets known to be incompatible with the fragment retention film.

Manufacturer's application and cleaning instructions for fragment retention film.

A statement that the fragment retention film supplied was manufactured using the same materials and process as the material tested. A statement that the adhesive contains ultraviolet inhibitors which limit ultraviolet transmission to not more than 8 percent of the radiation between 300 and 380 nanometers. A statement that the film manufacturer or manufacturer's representative trained the personnel who will apply the film.

#### SD-04 Samples

Fragment Retention Film; G, DO.

A sample consisting of a minimum 8 inch by 11 inch section of fragment retention film including the adhesive layer.

#### SD-06 Test Reports

Fragment Retention Film; G, DO.

Certified test reports covering tests specified in paragraph FRAGMENT RETENTION FILM including analysis and interpretation of test results. Each report shall identify the manufacturer, the specific product name, the film thickness, the adhesive type and thickness, and the glass type and thickness. Test reports shall clearly identify the methods used and shall include the results recorded.

#### SD-07 Certificates

Fragment Retention Film; G, DO.

On applications where the film will contact the glazing beads or gaskets, a certificate from the Contractor stating that the glazing compounds and gaskets are compatible with the fragment retention film and adhesive.

### 1.3 QUALIFICATIONS

The personnel applying the fragment retention film shall be trained by the film manufacturer or manufacturer's representative.

### 1.4 DELIVERY, STORAGE, AND HANDLING

Fragment retention film shall be delivered, stored, and handled in accordance with the manufacturer's recommendations. Glass, including glass in windows or doors, that has the film factory applied shall be stored in a dry location free of dust, water, and other contaminants. Glass with factory applied film shall be delivered, stored, and handled so that the

film is not damaged, scratched, or abraded and shall be stored in a manner which permits easy access for inspection and handling. Each roll of film must have a tamperproof label containing full details of the roll, the batch number, and sufficient information to enable the Contracting Officer to ensure that the correct film is supplied.

#### 1.5 WARRANTY

A 5 year warranty shall be furnished for fragment retention film material. The warranty shall provide for replacement of film if cracking, crazing, peeling, or inadequate adhesion occurs.

### PART 2 PRODUCTS

#### 2.1 STANDARD PRODUCTS

Fragment retention film shall be the standard product of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

#### 2.2 FRAGMENT RETENTION FILM

Fragment retention film shall be polyester, polyethylene terephthalate, or a composite. Fragment retention film shall be optically clear and free of waves, distortions, impurities, and adhesive lines. The film may be a single layer or laminated. Lamination of the film shall only occur at the factory of the fragment retention film manufacturer. The film shall include an abrasion resistant coating on the surface that does not receive the film adhesive. Fragment retention film shall be a minimum thickness of 0.004 inch (**0.10 mm**) and shall be clear. The film shall be supplied with an optically clear weatherable pressure sensitive adhesive. The adhesive shall contain ultraviolet inhibitors to protect the film for its required life and shall limit ultraviolet transmission to not more than 8 percent of the radiation between 300 and 380 nanometers. The adhesive shall not be water activated. A water soluble detackifier and/or release liner may be incorporated over the adhesive to facilitate film application. The adhesive shall be 90 percent cured within 30 days of installation. The following tests to indicate compliance with specified requirements shall be performed by an independent testing laboratory, and the laboratory reports shall be signed by a responsible official of the laboratory.

##### 2.2.1 Impact Performance

Fragment retention film shall be tested for impact in accordance with ANSI Z97.1 or 16 CFR 1201. Tests shall be conducted on fragment retention film applied to 1/8 to 1/4 inch -thick annealed flat glass which conforms to the requirements of ASTM C 1036, Type I, Class 1, Quality q3. After the impact portion of the test is conducted, satisfactory performance of the test specimens shall be determined using ANSI Z97.1, paragraph 5.1.3 or 16 CFR 1201, paragraph 1201.4 (e)--INTERPRETATION OF RESULTS. To be qualified for use under this specification, the manufacturer shall provide a report that the fragment retention film satisfactorily performed in accordance with ANSI Z97.1, paragraph 5.1.3 (1), (3), or (4) or with 16 CFR 1201, paragraph 1204.4 (e) (1) (i), (iv), or (v). ANSI Z97.1, paragraph 5.1.3 (2) or 16 CFR 1201, paragraph 1204.4 (e) (1) (ii) shall not constitute passing criteria.

##### 2.2.2 Tensile Strength

The fragment retention film samples tested shall exhibit a minimum tensile strength at break of 25,000 pounds per square inch when tested in accordance with ASTM D 882. Method A, Static Weighing, Constant Rate of Grip Separation Test, shall be used to conduct this test. The rate of grip separation shall not exceed 1/2 inch per minute.

#### 2.2.3 Peel Strength

Testing shall be conducted following 1,200 hours accelerated weathering exposure per ASTM G 26 Procedure B. The fragment retention film shall exhibit a minimum peel strength of 5.3 pounds/inch for 0.004 inch thick film when tested in accordance with ASTM D 3330. Method A shall be used to conduct the tests. A glass substrate shall be used and a maximum dwell time of 45 days is permitted.

#### 2.2.4 Surface Abrasion

The fragment retention film shall exhibit a change in haze not to exceed 3.2 percent following 100 turns, using 500-gram weights on a CS 10F abrasive wheel when tested in accordance with ASTM D 1044.

#### 2.2.5 Flame Spread and Smoke Density

The fragment retention film shall exhibit a flame spread index not exceeding 25 and a smoke density index not exceeding 100 when tested in accordance with ASTM E 84. For the test, the specimen shall be mounted to 1/4 inch thick tempered glass which conforms to the requirements of ASTM C 1048, Kind FT, Type I, Class 1, Quality q3.

### PART 3 EXECUTION

#### 3.1 SURFACE PREPARATION

The glass surface to which the fragment retention film is to be applied shall be cleaned of paint, foreign compounds, smears, and spatters. After the initial cleaning, the surface to receive the film shall be further cleaned in accordance with the film manufacturer's instructions.

#### 3.2 APPLICATION

Fragment retention film shall be provided on existing exterior window and door glass. After surface preparation, the fragment retention film shall be applied in accordance with the manufacturer's recommendations and instructions. Film shall be applied to the interior (room) side of the glass for both single and double glazed sheets. Multiple applications of film to achieve specified thicknesses is not allowed. The film shall not be applied if there are visible dust particles in the air, if there is frost on the glazing, or if any room condition such as temperature and humidity do not meet the manufacturer's instructions. After film application, room conditions shall be maintained as required by the manufacturer's instructions to allow for proper curing of the adhesive.

##### 3.2.1 Application to Existing Glass and Frame Without Dismantlement

Fragment retention film shall be applied past the edge of the visible glass and extend onto the frame. Amount of film overlap, edge connection to the frame, and adhesive for adhering film to frame shall be as recommended by the film manufacturer. When contact between the glazing compounds and/or

gaskets and the film occurs, the Contractor shall ensure compatibility.

### 3.3 CLEANING

Cleaning of the fragment retention film shall be in accordance with the manufacturer's instructions.

### 3.4 FIELD INSPECTION

The applied fragment retention film shall be clean and free of peeling, splitting, scratches, creases, wrinkles, discoloration, and foreign particles. The film application shall be free of air bubbles after 30 days. Fragment retention film shall not show signs of waviness and distortion at the time the work is accepted. This determination shall be made by the unaided eye (except for corrective prescription glasses), when the film is viewed from a distance of 10 feet from the interior room side at angles up to 45 degrees when looking at a clear or uniformly overcast sky. Unacceptable fragment retention film applications shall be removed in accordance with manufacturer's instructions and new film applied.

-- End of Section --

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SECTION 10160

TOILET PARTITIONS

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.

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-60003

Partitions, Toilet, Complete

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-02 Shop Drawings

Approved Detail Drawings; G, DO.

Drawings showing plans, elevations, details of construction, hardware, reinforcing, fittings, mountings, and anchorings.

SD-03 Product Data

Toilet Partition System; G, DO.

Manufacturer's technical data and catalog cuts including installation and cleaning instructions.

SD-04 Samples

Toilet Partition System; G, DO.

Manufacturer's standard color charts and color samples.

1.3 SYSTEM DESCRIPTION

Toilet partition system, including toilet enclosures and urinal screens, shall be a complete and usable system of panels, hardware, and support components. The partition system shall be provided by a single manufacturer and shall be a standard product as shown in the most recent catalog data. The partition system shall be as shown on the approved detail drawings.

1.4 DELIVERY, STORAGE, AND HANDLING

Components shall be delivered to the jobsite in the manufacturer's original

packaging with the brand, item identification, and project reference clearly marked. Components shall be stored in a dry location that is adequately ventilated; free from dust, water, or other contaminants; and shall have easy access for inspection and handling.

#### 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 TOILET ENCLOSURES

Toilet enclosures shall conform to CID A-A-60003, Type I, Style A, floor supported. Width, length, and height of toilet enclosures shall be as shown. Finish surface of panels shall be solid high-density polyethylene, Finish 5. Panels indicated to receive toilet paper holders as specified in Section 10800 TOILET ACCESSORIES, shall be prepared for mounting of the items required.

#### 2.2 URINAL SCREENS

Urinal screens shall conform to CID A-A-60003, Type III, Style A, floor supported. Finish surface of screens shall be as specified for the toilet enclosures. Width and height of urinal screens shall be as shown.

#### 2.3 HARDWARE

Hardware for the toilet partition system shall conform to CID A-A-60003 for the specified type and style of partitions. Hardware finish shall be highly resistant to alkalies, urine, and other common toilet room acids.

#### 2.4 COLORS

Color of finish for toilet partition system components shall be Santana, Poly-Marble HD, Graystone No. 175 or equal.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Toilet partitions shall be installed straight and plumb in accordance with approved manufacturer's instructions with horizontal lines level and rigidly anchored to the supporting construction. Where indicated, anchorage to walls shall be by toggle-bolting. Drilling and cutting for installation of anchors shall be at locations that will be concealed in the finished work.

#### 3.2 ADJUSTING AND CLEANING

Doors shall have a uniform vertical edge clearance of approximately 3/16 inch and shall rest open at approximately 30 degrees when unlatched. Toilet partitions shall be cleaned in accordance with approved manufacturer's instructions and shall be protected from damage until accepted.

-- End of Section --

SECTION 13930

WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION

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 135	(2001) Electric-Resistance-Welded Steel Pipe
ASTM A 183	(1998) Carbon Steel Track Bolts and Nuts
ASTM A 47/A 47M	(1999) Ferritic Malleable Iron Castings
ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM A 795	(2000) Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
ASTM F 436	(2000) Hardened Steel Washers

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1015	(1999) Double Check Backflow Prevention Assembly
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AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA B300	(1999) Hypochlorites
AWWA B301	(1992; Addenda B301a - 1999) Liquid Chlorine
AWWA C104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110	(1998) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm through 1200 mm), for Water and Other Liquids
AWWA C111	(2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C151	(1996) Ductile-Iron Pipe, Centrifugally

Cast, for Water or Other Liquids

- AWWA C203 (1997; Addenda C203a - 1999) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied
- AWWA EWW (1999) Standard Methods for the Examination of Water and Wastewater
- AWWA M20 (1973) Manual: Water Chlorination Principles and Practices

ASME INTERNATIONAL (ASME)

- ASME B16.1 (1998) Cast Iron Pipe Flanges and Flanged Fittings
- ASME B16.11 (1996) Forged Fittings, Socket-Welding and Threaded
- ASME B16.21 (1992) Nonmetallic Flat Gaskets for Pipe Flanges
- ASME B16.3 (1998) Malleable Iron Threaded Fittings
- ASME B16.4 (1998) Gray Iron Threaded Fittings
- ASME B16.9 (1993) Factory-Made Wrought Steel Buttwelding Fittings
- ASME B18.2.1 (1996) Square and Hex Bolts and Screws (Inch Series)
- ASME B18.2.2 (1987; R 1993) Square and Hex Nuts (Inch Series)

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

- FM P7825a (1998) Approval Guide Fire Protection
- FM P7825b (1998) Approval Guide Electrical Equipment

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

- MSS SP-71 (1997) Gray Iron Swing Check Valves, Flanges and Threaded Ends

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- NFPA 13 (1999) Installation of Sprinkler Systems
- NFPA 13R (1999) Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height
- NFPA 1963 (1998) Fire Hose Connections

NFPA 230 (1999) Fire Protection of Storage  
NFPA 24 (1995) Installation of Private Fire  
Service Mains and Their Appurtenances

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES  
(NICET)

NICET 1014-7 (1995) Program Detail Manual for  
Certification in the Field of Fire  
Protection Engineering Technology (Field  
Code 003) Subfield of Automatic Sprinkler  
System Layout

UNDERWRITERS LABORATORIES (UL)

UL 668 (1995; Rev thru Dec 1998) Hose Valves for  
Fire Protection Service  
UL Bld Mat Dir (1999) Building Materials Directory  
UL Fire Prot Dir (1999) Fire Protection Equipment Directory

1.2 GENERAL REQUIREMENTS

Wet pipe sprinkler system shall be provided in all areas of **each** building, except the attic areas **which shall have a dry pipe system as specified in Section 13935 DRY PIPE SPRINKLER SYSTEM, FIRE PROTECTION**. **Each** sprinkler system shall provide fire sprinkler protection for the entire area. Except as modified herein, **each** system shall be designed and installed in accordance with NFPA 13 for the common areas and NFPA 13R for the residential areas of the building. Pipe sizes which are not indicated on drawings shall be determined by hydraulic calculation. The Contractor shall design any portions of the sprinkler system that are not indicated on the drawings including locating sprinklers, piping and equipment, and size piping and equipment when this information is not indicated on the drawings or is not specified herein. The design of **each** sprinkler system shall be based on hydraulic calculations, and the other provisions specified herein.

1.2.1 Hydraulic Design

The system for the common areas shall be hydraulically designed to discharge a minimum density of 0.1 gpm per square foot for light hazard areas, and 0.15 gpm per square foot for Ordinary-Hazard group 1 areas over the hydraulically most demanding 3,000 square feet of floor area. The minimum pipe size for branch lines in gridded systems shall be 1-1/4 inch. Hydraulic calculations shall be in accordance with the Area/Density Method of NFPA 13. Water velocity in the piping shall not exceed 20 ft/s. The sprinkler coverage and quantity of water discharge for the residential areas shall be in accordance with the quantity of water discharge for the residential areas shall be in accordance with NFPA 13R.

1.2.1.1 Hose Demand

An allowance for exterior hose streams of 250 gpm with a duration of 45 minutes for light hazard areas and 500 gpm with a duration of 60 minutes for Ordinary-Hazard group 1 areas shall be added to the sprinkler system demand at the fire hydrant shown on the drawings closest to the point where the water service enters **each of** the buildings.

#### 1.2.1.2 Basis for Calculations

The design of **each** system shall be based upon a water supply with a static pressure of 64 psi, and a flow of 1150 gpm at a residual pressure of 50 psi.

Water supply shall be presumed available at the point of connection to existing. Hydraulic calculations shall be based upon the Hazen-Williams formula with a "C" value of 120 for steel piping, 150 for copper tubing, 140 for new cement-lined ductile-iron piping, and 100 for existing underground piping.

#### 1.2.2 Sprinkler Coverage

Sprinklers shall be uniformly spaced on branch lines. Sprinklers shall provide coverage throughout 100 percent of **each** building. This includes, but is not limited to, telephone rooms, electrical equipment rooms, boiler rooms, and other electrical and mechanical spaces. Coverage per sprinkler shall be in accordance with NFPA 13 as specified for light hazard, except for the kitchen areas which shall be as specified for ordinary hazard occupancies.

#### 1.3 COORDINATION OF TRADES

Piping offsets, fittings, and any other accessories required shall be furnished as required to provide a complete installation and to eliminate interference with other construction. Sprinkler shall be installed over and under ducts, piping and platforms when such equipment can negatively effect or disrupt the sprinkler discharge pattern and coverage.

#### 1.4 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be housed in a manner to preclude any damage from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, all pipes shall either be capped or plugged until installed.

#### 1.5 FIELD MEASUREMENTS

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

#### 1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-02 Shop Drawings

Sprinkler System Shop Drawings; G, DO.

Three copies of the Sprinkler System Shop Drawings, no later than 21 days prior to the start of sprinkler system installation. The Sprinkler System Shop Drawings shall conform to the requirements established for working plans as prescribed in NFPA 13. Drawings shall include plan and elevation views demonstrating that the

equipment will fit the allotted spaces with clearance for installation and maintenance. Each set of drawings shall include the following:

a. Descriptive index of drawings in the submittal with drawings listed in sequence by drawing number. A legend identifying device symbols, nomenclature, and conventions used.

b. Floor plans drawn to a scale not less than  $1/8" = 1'-0"$  which clearly show locations of sprinklers, risers, pipe hangers, seismic separation assemblies, sway bracing, inspector's test connections, drains, and other applicable details necessary to clearly describe the proposed arrangement. Each type of fitting used and the locations of bushings, reducing couplings, and welded joints shall be indicated.

c. Actual center-to-center dimensions between sprinklers on branch lines and between branch lines; from end sprinklers to adjacent walls; from walls to branch lines; from sprinkler feed mains, cross-mains and branch lines to finished floor and roof or ceiling. A detail shall show the dimension from the sprinkler and sprinkler deflector to the ceiling in finished areas.

d. Longitudinal and transverse building sections showing typical branch line and cross-main pipe routing as well as elevation of each typical sprinkler above finished floor.

e. Details of each type of riser assembly; inspector's test connection; pipe hanger; sway bracing for earthquake protection, and restraint of underground water main at point-of-entry into the building, and electrical devices and interconnecting wiring.

As-Built Shop Drawings; G, DO.

As-built shop drawings, at least 14 days after completion of the Final Tests. The Sprinkler System Drawings shall be updated to reflect as-built conditions after all related work is completed and shall be on reproducible full-size mylar film.

#### SD-03 Product Data

Fire Protection Related Submittals; G, DO.

A list of the Fire Protection Related Submittals, no later than 7 days after the approval of the Fire Protection Specialist.

Load Calculations for Sizing Sway Bracing; G, DO.

For systems that are required to be protected against damage from earthquakes, load calculations shall be provided for sizing of sway bracing.

Components and Equipment Data; G, DO.

Manufacturer's catalog data included with the Sprinkler System Drawings for all items specified herein. The data shall be highlighted to show model, size, options, etc., that are intended for consideration. Data shall be adequate to demonstrate compliance with all contract requirements. In addition, a complete

equipment list that includes equipment description, model number and quantity shall be provided.

Hydraulic Calculations; G, DO.

Hydraulic calculations, including a drawing showing hydraulic reference points, hydraulically most remote area and pipe segments.

Spare Parts; G, DO.

Spare parts data shall be included for each different item of material and equipment specified. The data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of parts recommended by the manufacturer to be replaced after 1 year and 3 years of service. A list of special tools and test equipment required for maintenance and testing of the products supplied by the Contractor shall be included.

Preliminary Tests Procedures; G, DO.

Proposed procedures for Preliminary Tests, no later than 14 days prior to the proposed start of the tests.

Final Acceptance Test Procedures; G, DO.

Proposed procedures for Final Acceptance Test, no later than 14 days prior to the proposed start of the tests.

On-site Training Schedule; G, DO.

Proposed On-site Training schedule, at least 14 days prior to the start of related training.

Preliminary Tests; G, DO.

Proposed date and time to begin Preliminary Tests, submitted with the Preliminary Tests Procedures.

Final Acceptance Test; G, DO.

Proposed date and time to begin Final Acceptance Test, submitted with the Final Acceptance Test Procedures. Notification shall be provided at least 14 days prior to the proposed start of the test. Notification shall include a copy of the Contractor's Material & Test Certificates.

Fire Protection Specialist Qualifications; G, DO.

The name and documentation of certification of the proposed Fire Protection Specialists, no later than 14 days after the Notice to Proceed and prior to the submittal of the sprinkler system drawings and hydraulic calculations.

Sprinkler System Installer Qualifications; G, DO.

The name and documentation of certification of the proposed Sprinkler System Installer, concurrent with submittal of the Fire Protection Specialist Qualifications.

#### SD-06 Test Reports

Preliminary Tests Report; G, DO.

Three copies of the completed Preliminary Tests Reports, no later than 7 days after the completion of the Preliminary Tests. The Preliminary Tests Report shall include both the Contractor's Material and Test Certificate for Underground Piping and the Contractor's Material and Test Certificate for Aboveground Piping. All items in the Preliminary Tests Report shall be signed by the Fire Protection Specialist.

Final Acceptance Test Report; G, DO.

Three copies of the completed Final Acceptance Tests Reports, no later than 7 days after the completion of the Final Acceptance Tests. All items in the Final Acceptance Report shall be signed by the Fire Protection Specialist.

#### SD-07 Certificates

Fire Protection Specialist Inspection; G, DO.

Concurrent with the Final Acceptance Test Report, certification by the Fire Protection Specialist that the sprinkler system is installed in accordance with the contract requirements, including signed approval of the Preliminary and Final Acceptance Test Reports.

#### SD-10 Operation and Maintenance Data

Wet Pipe Sprinkler System; G, DO.

Six manuals listing step-by-step procedures required for system startup, operation, shutdown, and routine maintenance, at least 14 days prior to field training. The manuals shall include the manufacturer's name, model number, parts list, list of parts and tools that should be kept in stock by the owner for routine maintenance including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization (including address and telephone number) for each item of equipment.

### 1.7 HYDRAULIC CALCULATIONS

Hydraulic calculations shall be as outlined in NFPA 13 except that calculations shall be performed by computer using software intended specifically for fire protection system design using the design data shown on the drawings. Software that uses k-factors for typical branch lines is not acceptable. Calculations shall be based on the water supply data shown on the drawings. Calculations shall substantiate that the design area used in the calculations is the most demanding hydraulically. Water supply curves and system requirements shall be plotted on semi-logarithmic graph paper so as to present a summary of the complete hydraulic calculation. A summary sheet listing sprinklers in the design area and their respective hydraulic reference points, elevations, actual discharge pressures and actual flows shall be provided. Elevations of hydraulic reference points (nodes) shall be indicated. Documentation shall identify each pipe

individually and the nodes connected thereto. The diameter, length, flow, velocity, friction loss, number and type fittings, total friction loss in the pipe, equivalent pipe length and Hazen-Williams coefficient shall be indicated for each pipe. For gridded systems, calculations shall show peaking of demand area friction loss to verify that the hydraulically most demanding area is being used. Also for gridded systems, a flow diagram indicating the quantity and direction of flows shall be included. A minimum of two additional sets of calculations shall be submitted to demonstrate peaking of demand area friction loss when compared to areas immediately adjacent on either side, along the same branch lines. A drawing showing hydraulic reference points (nodes) and pipe designations used in the calculations shall be included and shall be independent of shop drawings.

#### 1.8 FIRE PROTECTION SPECIALIST

Work specified in this section shall be performed under the supervision of and certified by the Fire Protection Specialist. The Fire Protection Specialist shall be an individual who is a registered professional engineer and a Full Member of the Society of Fire Protection Engineers or who is certified as a Level III Technician by National Institute for Certification in Engineering Technologies (NICET) in the Automatic Sprinkler System Layout subfield of Fire Protection Engineering Technology in accordance with NICET 1014-7. The Fire Protection Specialist shall be regularly engaged in the design and installation of the type and complexity of system specified in the Contract documents, and shall have served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 6 months.

#### 1.9 SPRINKLER SYSTEM INSTALLER QUALIFICATIONS

Work specified in this section shall be performed by the Sprinkler System Installer. The Sprinkler System Installer shall be regularly engaged in the installation of the type and complexity of system specified in the Contract documents, and shall have served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 6 months.

#### 1.10 REGULATORY REQUIREMENTS

Compliance with referenced NFPA standards is mandatory. This includes advisory provisions listed in the appendices of such standards, as though the word "shall" had been substituted for the word "should" wherever it appears. In the event of a conflict between specific provisions of this specification and applicable NFPA standards, this specification shall govern. Reference to "authority having jurisdiction" shall be interpreted to mean the Contracting Officer.

### PART 2 PRODUCTS

#### 2.1 STANDARD PRODUCTS

Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

#### 2.2 NAMEPLATES

All equipment shall have a nameplate that identifies the manufacturer's

name, address, type or style, model or serial number, and catalog number.

### 2.3 REQUIREMENTS FOR FIRE PROTECTION SERVICE

Materials and Equipment shall have been tested by Underwriters Laboratories, Inc. and listed in UL Fire Prot Dir or approved by Factory Mutual and listed in FM P7825a and FM P7825b. Where the terms "listed" or "approved" appear in this specification, such shall mean listed in UL Fire Prot Dir or FM P7825a and FM P7825b

### 2.4 UNDERGROUND PIPING COMPONENTS

#### 2.4.1 Pipe

Piping from a point 6 inches above the floor to a point 5 feet outside the building wall shall be ductile iron with a rated working pressure of 150 psi conforming to AWWA C151, with cement mortar lining conforming to AWWA C104. Piping more than 5 feet outside the building walls shall comply with Section 02510 WATER LINES.

#### 2.4.2 Fittings and Gaskets

Fittings shall be ductile iron conforming to AWWA C110. Gaskets shall be suitable in design and size for the pipe with which such gaskets are to be used. Gaskets for ductile iron pipe joints shall conform to AWWA C111.

#### 2.4.3 Gate Valve and Indicator Posts

Gate valves for underground installation shall be of the inside screw type with counter-clockwise rotation to open. Where indicating type valves are shown or required, indicating valves shall be gate valves with an approved indicator post of a length to permit the top of the post to be located 3 feet above finished grade. Gate valves and indicator posts shall be listed in UL Fire Prot Dir or FM P7825a and FM P7825b.

### 2.5 ABOVEGROUND PIPING COMPONENTS

Aboveground piping shall be steel.

#### 2.5.1 Steel Piping Components

##### 2.5.1.1 Steel Pipe

Except as modified herein, steel pipe shall be galvanized as permitted by NFPA 13 and shall conform to applicable provisions of ASTM A 795, ASTM A 53/A 53M, or ASTM A 135. Pipe in which threads or grooves are cut shall be Schedule 40 or shall be listed by Underwriters' Laboratories to have a corrosion resistance ratio (CRR) of 1.0 or greater after threads or grooves are cut. Pipe shall be marked with the name of the manufacturer, kind of pipe, and ASTM designation.

##### 2.5.1.2 Fittings for Non-Grooved Steel Pipe

Fittings shall be cast iron conforming to ASME B16.4, steel conforming to ASME B16.9 or ASME B16.11, or malleable iron conforming to ASME B16.3. Galvanized fittings shall be used for piping systems or portions of piping systems utilizing galvanized piping. Fittings into which sprinklers, drop nipples or riser nipples (sprigs) are screwed shall be threaded type. Plain-end fittings with mechanical couplings, fittings that use steel

gripping devices to bite into the pipe and segmented welded fittings shall not be used.

#### 2.5.1.3 Grooved Mechanical Joints and Fittings

Joints and fittings shall be designed for not less than 175 psi service and shall be the product of the same manufacturer; segmented welded fittings shall not be used. Fitting and coupling houses shall be malleable iron conforming to ASTM A 47/A 47M, Grade 32510; ductile iron conforming to ASTM A 536, Grade 65-45-12. Gasket shall be the flush type that fills the entire cavity between the fitting and the pipe. Nuts and bolts shall be heat-treated steel conforming to ASTM A 183 and shall be cadmium plated or zinc electroplated.

#### 2.5.1.4 Flanges

Flanges shall conform to NFPA 13 and ASME B16.1. Gaskets shall be non-asbestos compressed material in accordance with ASME B16.21, 1/16 inch thick, and full face or self-centering flat ring type.

#### 2.5.1.5 Bolts, Nut, and Washers

Bolts shall be squarehead conforming to ASME B18.2.1 and shall extend no less than three full threads beyond the nut with bolts tightened to the required torque. Nuts shall be hexagon type conforming to ASME B18.2.2. Washers shall meet the requirements of ASTM F 436. Flat circular washers shall be provided under all bolt heads and nuts.

#### 2.5.2 Pipe Hangers

Hangers shall be listed in UL Fire Prot Dir or FM P7825a and FM P7825b and of the type suitable for the application, construction, and pipe type and sized to be supported.

#### 2.5.3 Valves

##### 2.5.3.1 Control Valve and Gate Valve

Manually operated sprinkler control valve and gate valve shall be indicating type outside stem and yoke (OS&Y) type and shall be listed in UL Bld Mat Dir or FM P7825a and FM P7825b.

##### 2.5.3.2 Check Valve

Check valve 2 inches and larger shall be listed in UL Bld Mat Dir or FM P7825a and FM P7825b. Check valves 4 inches and larger shall be of the swing type with flanged cast iron body and flanged inspection plate, shall have a clear waterway and shall meet the requirements of MSS SP-71, for Type 3 or 4.

##### 2.5.3.3 Hose Valve

Valve shall comply with UL 668 and shall have a minimum rating of 300 psi. Valve shall be non-rising stem, all bronze, 90 degree angle type, with 2-1/2 inch American National Standard Fire Hose Screw Thread (NH) male outlet in accordance with NFPA 1963. Hose valve shall be provided with 2-1/2 to 1-1/2 inch reducer. Hose valves shall be equipped with lugged cap with drip drain, cap gasket and chain. Valve finish shall be rough chrome plated.

## 2.6 ALARM CHECK VALVE ASSEMBLY

Assembly shall include an alarm check valve, standard trim piping, pressure gauges, bypass, retarding chamber, testing valves, main drain, and other components as required for a fully operational system.

## 2.7 ALARM INITIATING AND SUPERVISORY DEVICES

### 2.7.1 Sprinkler Waterflow Indicator Switch, Vane Type

Switch shall be vane type with a pipe saddle and cast aluminum housing. The electro-mechanical device shall include a flexible, low-density polyethylene paddle conforming to the inside diameter of the fire protection pipe. The device shall sense water movements and be capable of detecting a sustained flow of 10 gpm or greater. The device shall contain a retard device adjustable from 0 to 90 seconds to reduce the possibility of false alarms caused by transient flow surges. The switch shall be tamper resistant and contain two SPDT (Form C) contacts arranged to transfer upon removal of the housing cover, and shall be equipped with a silicone rubber gasket to assure positive water seal and a dustproof cover and gasket to seal the mechanism from dirt and moisture.

### 2.7.2 Sprinkler Pressure (Waterflow) Alarm Switch

Pressure switch shall include a metal housing with a neoprene diaphragm, SPDT snap action switches and a 1/2 inch NPT male pipe thread. The switch shall have a maximum service pressure rating of 175 psi. There shall be two SPDT (Form C) contacts factory adjusted to operate at 4 to 8 psi. The switch shall be capable of being mounted in any position in the alarm line trim piping of the alarm check valve.

### 2.7.3 Valve Supervisory (Tamper) Switch

Switch shall be suitable for mounting to the type of control valve to be supervised open. The switch shall be tamper resistant and contain one set of SPDT (Form C) contacts arranged to transfer upon removal of the housing cover or closure of the valve of more than two rotations of the valve stem.

## 2.8 FIRE DEPARTMENT CONNECTION

Fire department connection shall be single Storz projecting type with cast brass body, matching wall escutcheon lettered "Auto Spkr" with a chromium plated finish. The connection shall have one inlet with self-closing clapper, cap with drip drain and chain. Female inlets shall have 2-1/2 inch diameter American National Fire Hose Connection Screw Threads (NH) per NFPA 1963.

## 2.9 SPRINKLERS

Sprinklers with internal O-rings shall not be used. Sprinklers shall be used in accordance with their listed coverage limitations. Temperature classification shall be ordinary. Sprinklers in high heat areas including attic spaces or in close proximity to unit heaters shall have temperature classification in accordance with NFPA 13. Extended coverage sprinklers shall not be used.

### 2.9.1 Concealed Sprinkler

Concealed sprinkler shall be used for Hallways and Bedroom locations and shall be white polyester and shall have a nominal 1/2 inch or 17/32 inch orifice.

#### 2.9.2 Pendent Sprinkler

Pendent sprinkler shall be of the fusible strut or glass bulb type, type with nominal 1/2 inch orifice. Pendent sprinklers shall have a white polyester finish.

#### 2.10 DISINFECTING MATERIALS

##### 2.10.1 Liquid Chlorine

Liquid chlorine shall conform to AWWA B301.

##### 2.10.2 Hypochlorites

Calcium hypochlorite and sodium hypochlorite shall conform to AWWA B300.

#### 2.11 ACCESSORIES

##### 2.11.1 Sprinkler Cabinet

Spare sprinklers shall be provided in accordance with NFPA 13 and shall be packed in a suitable metal or plastic cabinet. Spare sprinklers shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. At least one wrench of each type required shall be provided.

##### 2.11.2 Pendent Sprinkler Escutcheon

Escutcheon shall be one-piece metallic type with a depth of less than 3/4 inch and suitable for installation on pendent sprinklers. The escutcheon shall have a factory finish that matches the pendent sprinkler heads.

##### 2.11.3 Pipe Escutcheon

Escutcheon shall be polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or set screw.

##### 2.11.4 Identification Sign

Valve identification sign shall be minimum 6 inches wide x 2 inches high with enamel baked finish on minimum 18 gauge steel or 0.024 inch aluminum with red letters on a white background or white letters on red background. Wording of sign shall include, but not be limited to "main drain," "auxiliary drain," "inspector's test," "alarm test," "alarm line," and similar wording as required to identify operational components.

#### 2.12 DOUBLE-CHECK VALVE BACKFLOW PREVENTION ASSEMBLY

Double-check backflow prevention assembly shall comply with ASSE 1015. The assembly shall have a bronze, cast-iron or stainless steel body with flanged ends. The assembly shall include pressure gauge test ports and OS&Y shutoff valves on the inlet and outlet, 2-positive-seating check valve for continuous pressure application, and four test cocks. Assemblies shall be rated for working pressure of 150 psi. The maximum pressure loss shall

be 6 psi at a flow rate equal to the sprinkler water demand, at the location of the assembly. A test port for a pressure gauge shall be provided both upstream and downstream of the double check backflow prevention assembly valves.

### PART 3 EXECUTION

#### 3.1 FIRE PROTECTION RELATED SUBMITTALS

The Fire Protection Specialist shall prepare a list of the submittals from the Contract Submittal Register that relate to the successful installation of the sprinkler systems(s). The submittals identified on this list shall be accompanied by a letter of approval signed and dated by the Fire Protection Specialist when submitted to the Government.

#### 3.2 INSTALLATION REQUIREMENTS

The installation shall be in accordance with the applicable provisions of NFPA 13, NFPA 24 and publications referenced therein. Installation of in-rack sprinklers shall comply with applicable provisions of NFPA 230.

#### 3.3 INSPECTION BY FIRE PROTECTION SPECIALIST

The Fire Protection Specialist shall inspect the sprinkler system periodically during the installation to assure that the sprinkler system is being provided and installed in accordance with the contract requirements. The Fire Protection Specialist shall witness the preliminary and final tests, and shall sign the test results. The Fire Protection Specialist, after completion of the system inspections and a successful final test, shall certify in writing that the system has been installed in accordance with the contract requirements. Any discrepancy shall be brought to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.

#### 3.4 ABOVEGROUND PIPING INSTALLATION

##### 3.4.1 Protection of Piping Against Earthquake Damage

The system piping shall be protected against damage from earthquakes. Seismic protection shall include flexible and rigid couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints, and other features as required by NFPA 13 for protection of piping against damage from earthquakes.

##### 3.4.2 Piping in Exposed Areas

Exposed piping shall be installed so as not to diminish exit access widths, corridors or equipment access. Exposed horizontal piping, including drain piping, shall be installed to provide maximum headroom.

##### 3.4.3 Piping in Finished Areas

In areas with suspended or dropped ceilings and in areas with concealed spaces above the ceiling, piping shall be concealed above ceilings. Piping shall be inspected, tested and approved before being concealed. Risers and similar vertical runs of piping in finished areas shall be concealed.

##### 3.4.4 Pendent Sprinklers

Drop nipples to pendent sprinklers shall consist of minimum 1 inch pipe with a reducing coupling into which the sprinkler shall be threaded. Hangers shall be provided on arm-overs to drop nipples supplying pendent sprinklers when the arm-over exceeds 12 inches. Where sprinklers are installed below suspended or dropped ceilings, drop nipples shall be cut such that sprinkler ceiling plates or escutcheons are of a uniform depth throughout the finished space. The outlet of the reducing coupling shall not extend more than 1 inch below the underside of the ceiling. On pendent sprinklers installed below suspended or dropped ceilings, the distance from the sprinkler deflector to the underside of the ceiling shall not exceed 4 inches. Recessed pendent sprinklers shall be installed such that the distance from the sprinkler deflector to the underside of the ceiling shall not exceed the manufacturer's listed range and shall be of uniform depth throughout the finished area.

#### 3.4.4.1 Pendent Sprinkler Locations

Pendent sprinklers in suspended ceilings shall be a minimum of 6 inches from ceiling grid.

#### 3.4.5 Pipe Joints

Pipe joints shall conform to NFPA 13, except as modified herein. Not more than four threads shall show after joint is made up. Welded joints will be permitted, only if welding operations are performed as required by NFPA 13 at the Contractor's fabrication shop, not at the project construction site.

Flanged joints shall be provided where indicated or required by NFPA 13. Grooved pipe and fittings shall be prepared in accordance with the manufacturer's latest published specification according to pipe material, wall thickness and size. Grooved couplings, fittings and grooving tools shall be products of the same manufacturer. For copper tubing, pipe and groove dimensions shall comply with the tolerances specified by the coupling manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, narrow-land micrometer, or other method specifically approved by the coupling manufacturer for the intended application. Groove width and dimension of groove from end of pipe shall be measured and recorded for each change in grooving tool setup to verify compliance with coupling manufacturer's tolerances. Grooved joints shall not be used in concealed locations, such as behind solid walls or ceilings, unless an access panel is shown on the drawings for servicing or adjusting the joint.

#### 3.4.6 Reducers

Reductions in pipe sizes shall be made with one-piece tapered reducing fittings. The use of grooved-end or rubber-gasketed reducing couplings will not be permitted. When standard fittings of the required size are not manufactured, single bushings of the face type will be permitted. Where used, face bushings shall be installed with the outer face flush with the face of the fitting opening being reduced. Bushings shall not be used in elbow fittings, in more than one outlet of a tee, in more than two outlets of a cross, or where the reduction in size is less than 1/2 inch.

#### 3.4.7 Pipe Penetrations

Cutting structural members for passage of pipes or for pipe-hanger fastenings will not be permitted. Pipes that must penetrate concrete or masonry walls or concrete floors shall be core-drilled and provided with pipe sleeves. Each sleeve shall be Schedule 40 galvanized steel, ductile

iron or cast iron pipe and shall extend through its respective wall or floor and be cut flush with each wall surface. Sleeves shall provide required clearance between the pipe and the sleeve per NFPA 13. The space between the sleeve and the pipe shall be firmly packed with mineral wool insulation. Where pipes penetrate fire walls, fire partitions, or floors, pipes shall be fire stopped in accordance with Section 07840 FIRESTOPPING. In penetrations that are not fire-rated or not a floor penetration, the space between the sleeve and the pipe shall be sealed at both ends with plastic waterproof cement that will dry to a firm but pliable mass or with a mechanically adjustable segmented elastomer seal.

#### 3.4.8 Escutcheons

Escutcheons shall be provided for pipe penetration of ceilings and walls. Escutcheons shall be securely fastened to the pipe at surfaces through which piping passes.

#### 3.4.9 Inspector's Test Connection

Unless otherwise indicated, test connection shall consist of 1 inch pipe connected to the remote branch line; a test valve located approximately 7 feet above the floor; a smooth bore brass outlet equivalent to the smallest orifice sprinkler used in the system; and a painted metal identification sign affixed to the valve with the words "Inspector's Test." The discharge orifice shall be located outside the building wall directed so as not to cause damage to adjacent construction or landscaping during full flow discharge.

#### 3.4.10 Drains

Main drain piping shall be provided to discharge at the location indicated. Auxiliary drains shall be provided as indicated and as required by NFPA 13. When the capacity of trapped sections of pipe is less than 3 gallons, the auxiliary drain shall consist of a valve not smaller than 1/2 inch and a plug or nipple and cap. When the capacity of trapped sections of piping is more than 3 gallons, the auxiliary drain shall consist of two 1 inch valves and one 2 x 12 inch condensate nipple or equivalent, located in an accessible location. Tie-in drains shall be provided for multiple adjacent trapped branch pipes and shall be a minimum of 1 inch in diameter. Tie-in drain lines shall be pitched a minimum of 1/2 inch per 10 feet.

#### 3.4.11 Installation of Fire Department Connection

Connection shall be mounted as shown. The piping between the connection and the check valve shall be provided with an automatic drip in accordance with NFPA 13 and arranged to drain to the outside.

#### 3.4.12 Identification Signs

Signs shall be affixed to each control valve, inspector test valve, main drain, auxiliary drain, test valve, and similar valves as appropriate or as required by NFPA 13. Hydraulic design data nameplates shall be permanently affixed to each sprinkler riser as specified in NFPA 13.

### 3.5 UNDERGROUND PIPING INSTALLATION

The fire protection water main shall be laid, and joints anchored, in accordance with NFPA 24. Minimum depth of cover shall be 3 feet. The supply line shall terminate inside the building with a flanged piece, the

bottom of which shall be set not less than 6 inches above the finished floor. A blind flange shall be installed temporarily on top of the flanged piece to prevent the entrance of foreign matter into the supply line. A concrete thrust block shall be provided at the elbow where the pipe turns up toward the floor. In addition, joints shall be anchored in accordance with NFPA 24 using pipe clamps and steel rods from the elbow to the flange above the floor and from the elbow to a pipe clamp in the horizontal run of pipe. Buried steel components shall be provided with a corrosion protective coating in accordance with AWWA C203. Piping more than 5 feet outside the building walls shall meet the requirements of Section 02510 WATER LINES.

### 3.6 EARTHWORK

Earthwork shall be performed in accordance with applicable provisions of Section 02315 EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS.

### 3.7 ELECTRICAL WORK

Except as modified herein, electric equipment and wiring shall be in accordance with Section 16415 ELECTRICAL WORK, INTERIOR. Alarm signal wiring connected to the building fire alarm control system shall be in accordance with Section 13851 FIRE DETECTION AND ALARM SYSTEM, ADDRESSABLE. All wiring for supervisory and alarm circuits shall be minimum #16 AWG solid copper installed in metallic tubing or conduit. Wiring color code shall remain uniform throughout the system.

### 3.8 DISINFECTION

After all system components are installed and hydrostatic test(s) are successfully completed, each portion of the sprinkler system to be disinfected shall be thoroughly flushed with potable water until all entrained dirt and other foreign materials have been removed before introducing chlorinating material. Flushing shall be conducted by removing the flushing fitting of the cross mains and of the grid branch lines, and then back-flushing through the sprinkler main drains. The chlorinating material shall be hypochlorites or liquid chlorine. Water chlorination procedure shall be in accordance with AWWA M20. The chlorinating material shall be fed into the sprinkler piping at a constant rate of 50 parts per million (ppm). A properly adjusted hypochlorite solution injected into the system with a hypochlorinator, or liquid chlorine injected into the system through a solution-fed chlorinator and booster pump shall be used. Chlorination application shall continue until the entire system is filled. The water shall remain in the system for a minimum of 24 hours. Each valve in the system shall be opened and closed several times to ensure its proper disinfection. Following the 24-hour period, no less than 25 ppm chlorine residual shall remain in the system. The system shall then be flushed with clean water until the residual chlorine is reduced to less than one part per million. Samples of water in disinfected containers for bacterial examination will be taken from several system locations which are approved by the Contracting Officer. Samples shall be tested for total coliform organisms (coliform bacteria, fecal coliform, streptococcal, and other bacteria) in accordance with AWWA EWW. The testing method shall be either the multiple-tube fermentation technique or the membrane-filter technique. The disinfection shall be repeated until tests indicate the absence of coliform organisms (zero mean coliform density per 100 milliliters) in the samples for at least 2 full days. The system will not be accepted until satisfactory bacteriological results have been obtained. After successful completion, verify installation of all sprinklers and plugs and pressure

test the system.

### 3.9 PIPE COLOR CODE MARKING

Color code marking of piping shall be as specified in Section 09900 PAINTS AND COATINGS.

### 3.10 PRELIMINARY TESTS

The system, including the underground water mains, and the aboveground piping and system components, shall be tested to assure that equipment and components function as intended. The underground and aboveground interior piping systems and attached appurtenances subjected to system working pressure shall be tested in accordance with NFPA 13 and NFPA 24. Upon completion of specified tests, the Contractor shall complete certificates as specified in paragraph SUBMITTALS.

#### 3.10.1 Underground Piping

##### 3.10.1.1 Flushing

Underground piping shall be flushed in accordance with NFPA 24. This includes the requirement to flush the lead-in connection to the fire protection system at a flow rate not less than the calculated maximum water demand rate of the system.

##### 3.10.1.2 Hydrostatic Testing

New underground piping shall be hydrostatically tested in accordance with NFPA 24. The allowable leakage shall be measured at the specified test pressure by pumping from a calibrated container. The amount of leakage at the joints shall not exceed 2 quarts per hour per 100 gaskets or joints, regardless of pipe diameter.

#### 3.10.2 Aboveground Piping

##### 3.10.2.1 Hydrostatic Testing

Aboveground piping shall be hydrostatically tested in accordance with NFPA 13 at not less than 200 psi or 50 psi in excess of maximum system operating pressure and shall maintain that pressure without loss for 2 hours. There shall be no drop in gauge pressure or visible leakage when the system is subjected to the hydrostatic test. The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested.

##### 3.10.2.2 Backflow Prevention Assembly Forward Flow Test

Each backflow prevention assembly shall be tested at system flow demand, including all applicable hose streams, as specified in NFPA 13. The Contractor shall provide all equipment and instruments necessary to conduct a complete forward flow test, including 2.5 inch diameter hoses, playpipe nozzles, calibrated pressure gauges, and pitot tube gauge. The Contractor shall provide all necessary supports to safely secure hoses and nozzles during the test. At the system demand flow, the pressure readings and pressure drop (friction) across the assembly shall be recorded. A metal placard shall be provided on the backflow prevention assembly that lists the pressure readings both upstream and downstream of the assembly, total pressure drop, and the system test flow rate. The pressure drop shall be

compared to the manufacturer's data.

### 3.10.3 Testing of Alarm Devices

Each alarm switch shall be tested by flowing water through the inspector's test connection. Each water-operated alarm devices shall be tested to verify proper operation.

### 3.10.4 Main Drain Flow Test

Following flushing of the underground piping, a main drain test shall be made to verify the adequacy of the water supply. Static and residual pressures shall be recorded on the certificate specified in paragraph SUBMITTALS. In addition, a main drain test shall be conducted each time after a main control valve is shut and opened.

### 3.11 FINAL ACCEPTANCE TEST

Final Acceptance Test shall begin only when the Preliminary Test Report has been approved. The Fire Protection Specialist shall conduct the Final Acceptance Test and shall provide a complete demonstration of the operation of the system. This shall include operation of control valves and flowing of inspector's test connections to verify operation of associated waterflow alarm switches. After operation of control valves has been completed, the main drain test shall be repeated to assure that control valves are in the open position. In addition, the representative shall have available copies of as-built drawings and certificates of tests previously conducted. The installation shall not be considered accepted until identified discrepancies have been corrected and test documentation is properly completed and received.

### 3.12 ON-SITE TRAINING

The Fire Protection Specialist shall conduct a training course for operating and maintenance personnel as designated by the Contracting Officer. Training shall be provided for a period of 8 hours of normal working time and shall start after the system is functionally complete but prior to the Preliminary Tests and Final Acceptance Test. The On-Site Training shall cover all of the items contained in the approved Operating and Maintenance Instructions.

-- End of Section --

SECTION 13935

DRY PIPE SPRINKLER SYSTEM, FIRE PROTECTION

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 135	(2001) Electric-Resistance-Welded Steel Pipe
ASTM A 183	(1998) Carbon Steel Track Bolts and Nuts
ASTM A 47/A 47M	(1999) Ferritic Malleable Iron Castings
ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM A 795	(2000) Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
ASTM F 436	(2000) Hardened Steel Washers

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1015	(1999) Double Check Backflow Prevention Assembly
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AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA B300	(1999) Hypochlorites
AWWA B301	(1992; Addenda B301a - 1999) Liquid Chlorine
AWWA EWW	(1999) Standard Methods for the Examination of Water and Wastewater
AWWA M20	(1973) Manual: Water Chlorination Principles and Practices

ASME INTERNATIONAL (ASME)

ASME B16.1	(1998) Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.11	(1996) Forged Fittings, Socket-Welding and

Threaded

ASME B16.21	(1992) Nonmetallic Flat Gaskets for Pipe Flanges
ASME B16.9	(1993) Factory-Made Wrought Steel Buttwelding Fittings
ASME B18.2.1	(1996) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(1987; R 1993) Square and Hex Nuts (Inch Series)

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P7825a	(1998) Approval Guide Fire Protection
FM P7825b	(1998) Approval Guide Electrical Equipment

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-71	(1997) Gray Iron Swing Check Valves, Flanges and Threaded Ends
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13	(1999) Installation of Sprinkler Systems
NFPA 24	(1995) Installation of Private Fire Service Mains and Their Appurtenances

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET)

NICET 1014-7	(1995) Program Detail Manual for Certification in the Field of Fire Protection Engineering Technology (Field Code 003) Subfield of Automatic Sprinkler System Layout
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UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(1999) Building Materials Directory
UL Fire Prot Dir	(1999) Fire Protection Equipment Directory

1.2 GENERAL REQUIREMENTS

Dry pipe sprinkler system shall be provided in **the attic area of each building**. The sprinkler system shall provide fire sprinkler protection for the entire area. Except as modified herein, the system shall be designed and installed in accordance with NFPA 13. Pipe sizes which are not indicated on the drawings shall be determined by hydraulic calculation. Gridded systems shall not be used. The Contractor shall design any portion of the sprinkler system that are not indicated on the drawings including locating sprinklers, piping, and equipment, and size piping and equipment when this information is not indicated on the drawings or is not specified

herein. The design of the sprinkler system shall be based on hydraulic calculations, and the other provisions specified herein.

#### 1.2.1 Hydraulic Design

The system shall be hydraulically designed to discharge a minimum density of 0.1 gpm per square foot for light hazard areas over the hydraulically most demanding 3000 square feet of **attic** area. Hydraulic calculations shall be provided in accordance with the Area\Density Method of NFPA 13. Water velocity in the piping shall not exceed 20 ft/s.

##### 1.2.1.1 Basis for Calculations

The design of the system shall be based upon a water supply with a static pressure of 64 psi, and a flow of 1150 gpm at a residual pressure of 50 psi. Water supply shall be presumed available at the point of connection to existing. Hydraulic calculations shall be based upon the Hazen-Williams formula with a "C" value of 120 for galvanized steel piping, 140 for new cement-lined ductile-iron piping, and 100 for existing underground piping.

#### 1.2.2 Sprinkler Coverage

Sprinklers shall be uniformly spaced on branch lines. Sprinklers shall provide coverage throughout 100 percent of the **attic area of each** building. Coverage per sprinkler shall be in accordance with NFPA 13 as specified for light hazard.

#### 1.2.3 System Volume Limitations

Where the volume of any individual system piping volume exceeds 500 gallons the dry pipe valve shall be provided with a quick-opening device. The maximum system capacity controlled by one dry pipe valve shall not exceed 750 gallons. The calculated volume of each system shall be indicated on the Sprinkler System Shop Drawings.

### 1.3 COORDINATION OF TRADES

Piping offsets, fittings, and any other accessories required shall be furnished as required to provide a complete installation and to eliminate interference with other construction. Sprinkler shall be installed over and under ducts, piping and platforms when such equipment can negatively effect or disrupt the sprinkler discharge pattern and coverage.

### 1.4 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be housed in a manner to preclude any damage from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, all pipes shall either be capped or plugged until installed.

### 1.5 FIELD MEASUREMENTS

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

### 1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-02 Shop Drawings

Shop Drawings; G, DO

Three copies of the Sprinkler System Drawings, no later than 21 days prior to the start of sprinkler system installation. The Sprinkler System Drawings shall conform to the requirements established for working plans as prescribed in NFPA 13. Drawings shall include plan and elevation views demonstrating that the equipment will fit the allotted spaces with clearance for installation and maintenance. Each set of drawings shall include the following:

a. Descriptive index of drawings in the submittal with drawings listed in sequence by drawing number. A legend identifying device symbols, nomenclature, and conventions used.

b. Floor plans drawn to a scale not less than 1/8" = 1'-0" which clearly show locations of sprinklers, risers, pipe hangers, seismic separation assemblies, sway bracing, inspector's test connections, drains, and other applicable details necessary to clearly describe the proposed arrangement. Each type of fitting used and the locations of bushings, reducing couplings, and welded joints shall be indicated.

c. Actual center-to-center dimensions between sprinklers on branch lines and between branch lines; from end sprinklers to adjacent walls; from walls to branch lines; from sprinkler feed mains, cross-mains and branch lines to finished floor and roof or ceiling. A detail shall show the dimension from the sprinkler and sprinkler deflector to the ceiling in finished areas.

d. Longitudinal and transverse building sections showing typical branch line and cross-main pipe routing as well as elevation of each typical sprinkler above finished floor.

e. Details of each type of riser assembly; inspector's test connection; air supply system and piping; pipe hanger; sway bracing for earthquake protection, and restraint of underground water main at point-of-entry into the building, and electrical devices and interconnecting wiring.

As-Built Drawings; G, DO

As-built shop drawings, at least 14 days after completion of the Final Tests. The Sprinkler System Drawings shall be updated to reflect as-built conditions after all related work is completed and shall be on reproducible full-size mylar film.

SD-03 Product Data

Fire Protection Related Submittals; G, DO

A list of the Fire Protection Related Submittals, no later than 7

days after the approval of the Fire Protection Specialist.

Sway Bracing; G, DO

For systems that are required to be protected against damage from earthquakes, load calculations for sizing of sway bracing.

Materials and Equipment; G, DO

Manufacturer's catalog data included with the Sprinkler System Drawings for all items specified herein. The data shall be highlighted to show model, size, options, etc., that are intended for consideration. Data shall be adequate to demonstrate compliance with all contract requirements. In addition, a complete equipment list that includes equipment description, model number and quantity shall be provided.

Hydraulic Calculations; G, DO

Hydraulic calculations, including a drawing showing hydraulic reference points, hydraulically most remote area and pipe segments.

Spare Parts; G, DO

Spare parts data shall be included for each different item of material and equipment specified. The data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of parts recommended by the manufacturer to be replaced after 1 year and 3 years of service. A list of special tools and test equipment required for maintenance and testing of the products supplied by the Contractor shall be included.

Preliminary Tests; G, DO

Proposed procedures for Preliminary Tests, no later than 14 days prior to the proposed start of the tests.

Proposed date and time to begin Preliminary Tests, submitted with the Preliminary Tests Procedures.

Final Acceptance Test; G, DO

Proposed procedures for Final Acceptance Test, no later than 14 days prior to the proposed start of the tests.

Proposed date and time to begin Final Acceptance Test, submitted with the Final Acceptance Test Procedures. Notification shall be provided at least 14 days prior to the proposed start of the test.

Notification shall include a copy of the Contractor's Material & Test Certificates.

Fire Protection Specialist; G, DO

The name and documentation of certification of the proposed Fire Protection Specialists, no later than 14 days after the Notice to Proceed and prior to the submittal of the sprinkler system shop drawings and hydraulic calculations.

Sprinkler System Installer Qualifications; G, DO

The name and documentation of certification of the proposed Sprinkler System Installer, concurrent with submittal of the Fire Protection Specialist Qualifications.

Onsite Training; G, DO

Proposed On-site Training schedule, at least 14 days prior to the start of related training.

SD-06 Test Reports

Preliminary Tests; G, DO

Three copies of the completed Preliminary Tests Reports, no later than 7 days after the completion of the Preliminary Tests. The Preliminary Tests Report shall include both the Contractor's Material and Test Certificate for Underground Piping and the Contractor's Material and Test Certificate for Aboveground Piping.

All items in the Preliminary Tests Report shall be signed by the Fire Protection Specialist.

Final Acceptance Test; G, DO

Three copies of the completed Final Acceptance Tests Reports, no later than 7 days after the completion of the Final Acceptance Tests. All items in the Final Acceptance Report shall be signed by the Fire Protection Specialist.

SD-07 Certificates

Inspection by Fire Protection Specialist; G, DO

Concurrent with the Final Acceptance Test Report, certification by the Fire Protection Specialist that the sprinkler system is installed in accordance with the contract requirements, including signed approval of the Preliminary and Final Acceptance Test Reports.

SD-10 Operation and Maintenance Data

Operating and Maintenance Instructions; G, DO

Six manuals listing step-by-step procedures required for system startup, operation, shutdown, and routine maintenance, at least 14 days prior to field training. The manuals shall include the manufacturer's name, model number, parts list, list of parts and tools that should be kept in stock by the owner for routine maintenance including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization (including address and telephone number) for each item of equipment.

1.7 HYDRAULIC CALCULATIONS

Hydraulic calculations shall be as outlined in NFPA 13 except that calculations shall be performed by computer using software intended

specifically for fire protection system design using the design data shown on the drawings. Software that uses k-factors for typical branch lines is not acceptable. Calculations shall be based on the water supply data shown on the drawings. Calculations shall substantiate that the design area used in the calculations is the most demanding hydraulically. Water supply curves and system requirements shall be plotted on semi-logarithmic graph paper so as to present a summary of the complete hydraulic calculation. A summary sheet listing sprinklers in the design area and their respective hydraulic reference points, elevations, actual discharge pressures and actual flows shall be provided. Elevations of hydraulic reference points (nodes) shall be indicated. Documentation shall identify each pipe individually and the nodes connected thereto. The diameter, length, flow, velocity, friction loss, number and type fittings, total friction loss in the pipe, equivalent pipe length and Hazen-Williams coefficient shall be indicated for each pipe. For gridded systems, calculations shall show peaking of demand area friction loss to verify that the hydraulically most demanding area is being used. Also for gridded systems, a flow diagram indicating the quantity and direction of flows shall be included. A minimum of two additional sets of calculations shall be submitted to demonstrate peaking of demand area friction loss when compared to areas immediately adjacent on either side, along the same branch lines. A drawing showing hydraulic reference points (nodes) and pipe designations used in the calculations shall be included and shall be independent of shop drawings.

#### 1.8 FIRE PROTECTION SPECIALIST

Work specified in this section shall be performed under the supervision of and certified by the Fire Protection Specialist. The Fire Protection Specialist shall be an individual who is a registered professional engineer and a Full Member of the Society of Fire Protection Engineers or who is certified as a Level III Technician by National Institute for Certification in Engineering Technologies (NICET) in the Automatic Sprinkler System Layout subfield of Fire Protection Engineering Technology in accordance with NICET 1014-7. The Fire Protection Specialist shall be regularly engaged in the design and installation of the type and complexity of system specified in the Contract documents, and shall have served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 6 months.

#### 1.9 SPRINKLER SYSTEM INSTALLER QUALIFICATIONS

Work specified in this section shall be performed by the Sprinkler System Installer. The Sprinkler System Installer shall be regularly engaged in the installation of the type and complexity of system specified in the Contract documents, and shall have served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 6 months.

#### 1.10 REGULATORY REQUIREMENTS

Compliance with referenced NFPA standards is mandatory. This includes advisory provisions listed in the appendices of such standards, as though the word "shall" had been substituted for the word "should" wherever it appears. In the event of a conflict between specific provisions of this specification and applicable NFPA standards, this specification shall govern. Reference to "authority having jurisdiction" shall be interpreted to mean the Contracting Officer.

### PART 2 PRODUCTS

## 2.1 STANDARD PRODUCTS

Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

## 2.2 NAMEPLATES

All equipment shall have a nameplate that identifies the manufacturer's name, address, type or style, model or serial number, and catalog number.

## 2.3 REQUIREMENTS FOR FIRE PROTECTION SERVICE

Materials and Equipment shall have been tested by Underwriters Laboratories, Inc. and listed in UL Fire Prot Dir or approved by Factory Mutual and listed in FM P7825a and FM P7825b. Where the terms "listed" or "approved" appear in this specification, such shall mean listed in UL Fire Prot Dir or FM P7825a and FM P7825b.

## 2.4 ABOVEGROUND PIPING COMPONENTS

### 2.4.1 Steel Pipe

Except as modified herein, steel pipe shall be galvanized conforming to the applicable requirements of NFPA 13, and ASTM A 795, ASTM A 53/A 53M, or ASTM A 135. Pipe in which threads or grooves are cut shall be Schedule 40 or shall be listed by Underwriters' Laboratories to have a corrosion resistance ratio (CRR) of 1.0 or greater after threads or grooves are cut. Pipe shall be marked with the name of the manufacturer, kind of pipe, and ASTM designation.

### 2.4.2 Fittings for Non-Grooved Steel Pipe

Fittings shall be galvanized steel conforming to ASME B16.9 or ASME B16.11. Fittings that use sprinklers, drop nipples or riser nipples (sprigs) are screwed into shall be threaded type. Plain-end fittings with mechanical couplings, fittings that use steel gripping devices to bite into the pipe and segmented welded fittings shall not be used.

### 2.4.3 Grooved Mechanical Joints and Fittings

Joints and fittings shall be designed for not less than 175 psi service and shall be the product of the same manufacturer; segmented welded fittings shall not be used. Fitting and coupling houses shall be malleable iron conforming to ASTM A 47/A 47M, Grade 32510; ductile iron conforming to ASTM A 536, Grade 65-45-12. Gaskets shall be of silicon compound and approved for dry fire protection systems. Gasket shall be the flush type that fills the entire cavity between the fitting and the pipe. Nuts and bolts shall be heat-treated steel conforming to ASTM A 183 and shall be cadmium plated or zinc electroplated.

### 2.4.4 Flanges

Flanges shall conform to NFPA 13 and ASME B16.1. Gaskets shall be non-asbestos compressed material in accordance with ASME B16.21, 1/16 inch thick, and full face or self-centering flat ring type.

#### 2.4.4.1 Bolts

Bolts shall be squarehead conforming to ASME B18.2.1 and shall extend no less than three full threads beyond the nut with bolts tightened to the required torque.

#### 2.4.4.2 Nuts

Nuts shall be hexagon type conforming to ASME B18.2.2.

#### 2.4.4.3 Washers

Washers shall meet the requirements of ASTM F 436. Flat circular washers shall be provided under all bolt heads and nuts.

#### 2.4.5 Pipe Hangers

Hangers shall be listed in UL Fire Prot Dir or FM P7825a and FM P7825b and of the type suitable for the application, construction, and pipe type and size to be supported.

#### 2.4.6 Valves

##### 2.4.6.1 Control Valve and Gate Valve

Manually operated sprinkler control valve and gate valve shall be indicating type outside stem and yoke (OS&Y) type and shall be listed in UL Bld Mat Dir or FM P7825a and FM P7825b.

##### 2.4.6.2 Check Valve

Check valve 2 inches and larger shall be listed in UL Bld Mat Dir or FM P7825a and FM P7825b. Check valves 4 inches and larger shall be of the swing type with flanged cast iron body and flanged inspection plate, shall have a clear waterway and shall meet the requirements of MSS SP-71, for Type 3 or 4.

#### 2.5 DRY PIPE VALVE ASSEMBLY

The dry pipe valve shall be a latching differential type listed in UL Fire Prot Dir or FM P7825a and FM P7825b and shall be complete with trim piping, valves, fittings, pressure gauges, priming water fill cup, velocity drip check, drip cup, and other ancillary components as required for proper operation. The assembly shall include a quick-opening device by the same manufacturer as the dry pipe valve for systems over 500 gallons in capacity.

#### 2.6 SUPERVISORY AIR SYSTEM

Air supply system shall be in accordance with NFPA 13. The connection pipe from the air compressor shall not be less than 1/2 inch in diameter and shall enter the system above the priming water level of the dry pipe valve.

A check valve shall be installed in the system supply air piping from the compressor. A shutoff valve of the renewable disc type shall be installed upstream of this check valve. The air supply system shall be sized to pressurize the sprinkler system to 40 psi within 20 minutes.

##### 2.6.1 Air Compressor

Compressor shall be single stage oil-free type, air-cooled, electric-motor

driven, equipped with a check valve, shutoff valve and pressure switch for automatic starting and stopping. Pressure switch shall be factory set to start the compressor at 30 psi and stop it at 40 psi. A safety relief valve, set to operate at 65 psi, shall be provided.

#### 2.6.2 Air Pressure Maintenance Device

Device shall be a pressure regulator that automatically reduces supply air to provide the pressure required to be maintained in the piping system. The device shall have a cast bronze body and valve housing complete with diaphragm assembly, spring, filter, ball check to prevent backflow, 1/16 inch restriction to prevent rapid pressurization of the system, and adjustment screw. The device shall be capable of reducing an inlet pressure of up to 100 psig to a fixed outlet pressure adjustable to 10 psig.

#### 2.6.3 Air Supply Piping System

System shall be configured so that each dry pipe system is equipped with a separate pressure maintenance device, air compressor, shutoff valve, bypass valve and pressure gauge. Piping shall be galvanized steel in accordance with ASTM A 795 or ASTM A 53/A 53M.

#### 2.6.4 Low Air Pressure Alarm Device

Each dry pipe valve trim shall be provided with a local alarm device consisting of a metal enclosure containing an alarm horn or bell, silence switch, green power-on light, red low-air alarm light and amber trouble light. The alarm device shall be activated by the low air pressure switch. Upon reduction of sprinkler system pressure to approximately 10 psig above the dry valve trip point pressure, the low air pressure switch shall actuate the audible alarm device and a red low-air alarm light. Restoration of system pressure shall cause the low-air alarm light to be extinguished and the audible alarm to be silenced. An alarm silence switch shall be provided to silence the audible alarm. An amber trouble light shall be provided which will illuminate upon operation of the silence switch and shall be extinguished upon return to its normal position.

### 2.7 ALARM INITIATING AND SUPERVISORY DEVICES

#### 2.7.1 Sprinkler Pressure (Waterflow) Alarm Switch

Pressure switch shall include a metal housing with a neoprene diaphragm, SPDT snap action switches and a 1/2 inch NPT male pipe thread. The switch shall have a maximum service pressure rating of 175 psi. There shall be two SPDT (Form C) contacts factory adjusted to operate at 4 to 8 psi. The switch shall be capable of being mounted in any position in the alarm line trim piping of the dry pipe valve.

#### 2.7.2 Low Air Pressure Supervisory Switch

The pressure switch shall supervise the air pressure in system and shall be set to activate at 10 psi above the dry pipe valve trip point pressure. The switch shall have an adjustable range between 5 psi and 80 psi. The switch shall have screw terminal connection and shall be capable of being wired for normally open or normally closed circuit.

#### 2.7.3 Valve Supervisory (Tamper) Switch

Switch shall be suitable for mounting to the type of control valve to be

supervised open. The switch shall be tamper resistant and contain one set of SPDT (Form C) contacts arranged to transfer upon removal of the housing cover or closure of the valve of more than two rotations of the valve stem.

## 2.8 SPRINKLERS

Sprinklers with internal O-rings shall not be used. Sprinklers shall be used in accordance with their listed coverage limitations. Areas where sprinklers are connected to or are a part of the dry pipe system shall be considered unheated and subject to freezing. Temperature classification shall be ordinary. Sprinklers in high heat areas including attic spaces or in close proximity to unit heaters shall have temperature classification in accordance with NFPA 13. Extended coverage sprinklers shall not be used.

### 2.8.1 Pendent Sprinkler

Pendent sprinkler heads shall be the dry pendent type, unless otherwise indicated. Pendent sprinkler shall be of the fusible strut or glass bulb type, type with nominal 1/2 inch orifice. Pendent sprinklers shall have a white polyester finish. Assembly shall include an integral escutcheon. Maximum length shall not exceed the maximum length indicated in UL Fire Prot Dir.

## 2.9 DISINFECTING MATERIALS

### 2.9.1 Liquid Chlorine

Liquid chlorine shall conform to AWWA B301.

### 2.9.2 Hypochlorites

Calcium hypochlorite and sodium hypochlorite shall conform to AWWA B300.

## 2.10 ACCESSORIES

### 2.10.1 Sprinkler Cabinet

Spare sprinklers shall be provided in accordance with NFPA 13 and shall be packed in a suitable metal or plastic cabinet. Spare sprinklers shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. At least one wrench of each type required shall be provided.

### 2.10.2 Pendent Sprinkler Escutcheon

Escutcheon shall be one-piece metallic type with a depth of less than 3/4 inch and suitable for installation on pendent sprinklers. The escutcheon shall have a factory finish that matches the pendent sprinkler heads.

### 2.10.3 Pipe Escutcheon

Escutcheon shall be polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or set screw.

### 2.10.4 Identification Sign

Valve identification sign shall be minimum 6 inches wide by 2 inches high with enamel baked finish on minimum 18 gauge steel or 0.024 inch aluminum

with red letters on a white background or white letters on red background. Wording of sign shall include, but not be limited to "main drain," "auxiliary drain," "inspector's test," "alarm test," "alarm line," and similar wording as required to identify operational components.

#### 2.11 DOUBLE-CHECK VALVE BACKFLOW PREVENTION ASSEMBLY

Double-check backflow prevention assembly shall comply with ASSE 1015. The assembly shall have a bronze, cast-iron or stainless steel body with flanged ends. The assembly shall include pressure gauge test ports and OS&Y shutoff valves on the inlet and outlet, 2-positive-seating check valve for continuous pressure application, and four test cocks. Assemblies shall be rated for working pressure of 150 psi. The maximum pressure loss shall be 6 psi at a flow rate equal to the sprinkler water demand, at the location of the assembly. A test port for a pressure gauge shall be provided both upstream and downstream of the double check backflow prevention assembly valves.

### PART 3 EXECUTION

#### 3.1 FIRE PROTECTION RELATED SUBMITTALS

The Fire Protection Specialist shall prepare a list of the submittals from the Contract Submittal Register that relate to the successful installation of the sprinkler systems(s). The submittals identified on this list shall be accompanied by a letter of approval signed and dated by the Fire Protection Specialist when submitted to the Government.

#### 3.2 INSTALLATION REQUIREMENTS

The installation shall be in accordance with the applicable provisions of NFPA 13, NFPA 24 and publications referenced therein.

#### 3.3 INSPECTION BY FIRE PROTECTION SPECIALIST

The Fire Protection Specialist shall inspect the sprinkler system periodically during the installation to assure that the sprinkler system installed in accordance with the contract requirements. The Fire Protection Specialist shall witness the preliminary and final tests, and shall sign the test results. The Fire Protection Specialist, after completion of the system inspections and a successful final test, shall certify in writing that the system has been installed in accordance with the contract requirements. Any discrepancy shall be brought to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.

#### 3.4 ABOVEGROUND PIPING INSTALLATION

##### 3.4.1 Protection of Piping Against Earthquake Damage

The system piping shall be protected against damage from earthquakes. Seismic protection shall include flexible and rigid couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints, and other features as required by NFPA 13 for protection of piping against damage from earthquakes.

##### 3.4.2 Piping in Exposed Areas

Exposed piping shall be installed so as not diminish exit access widths,

corridors, or equipment access. Exposed horizontal piping, including drain piping, shall be installed to provide maximum headroom.

#### 3.4.3 Pendent Sprinklers Locations

Sprinklers installed in the pendent position shall be of the listed dry pendent type, unless otherwise indicated. Dry pendent sprinklers shall be of the required length to permit the sprinkler to be threaded directly into a branch line tee. Hangers shall be provided on arm-overs exceeding 12 inches in length. Dry pendent sprinkler assemblies shall be such that sprinkler ceiling plates or escutcheons are of the uniform depth throughout the finished space. Pendent sprinklers in suspended ceilings shall be a minimum of 6 inches from ceiling grid. Recessed pendent sprinklers shall be installed such that the distance from the sprinkler deflector to the underside of the ceiling shall not exceed the manufacturer's listed range and shall be of uniform depth throughout the finished area.

#### 3.4.4 Pipe Joints

Pipe joints shall conform to NFPA 13, except as modified herein. Not more than four threads shall show after joint is made up. Welded joints will be permitted, only if welding operations are performed as required by NFPA 13 at the Contractor's fabrication shop, not at the project construction site.

Flanged joints shall be provided where indicated or required by NFPA 13. Grooved pipe and fittings shall be prepared in accordance with the manufacturer's latest published specification according to pipe material, wall thickness and size. Grooved couplings and fittings shall be from the same manufacturer. Grooved joints shall not be used in concealed locations, such as behind solid walls or ceilings, unless an access panel is shown on the drawings for servicing or adjusting the joint.

#### 3.4.5 Reducers

Reductions in pipe sizes shall be made with one-piece tapered reducing fittings. The use of grooved-end or rubber-gasketed reducing couplings will not be permitted. When standard fittings of the required size are not manufactured, single bushings of the face type will be permitted. Where used, face bushings shall be installed with the outer face flush with the face of the fitting opening being reduced. Bushings shall not be used in elbow fittings, in more than one outlet of a tee, in more than two outlets of a cross, or where the reduction in size is less than 1/2 inch.

#### 3.4.6 Pipe Penetrations

Cutting structural members for passage of pipes or for pipe-hanger fastenings will not be permitted. Pipes that must penetrate concrete or masonry walls or concrete floors shall be core-drilled and provided with pipe sleeves. Each sleeve shall be Schedule 40 galvanized steel, ductile iron or cast iron pipe and shall extend through its respective wall or floor and be cut flush with each wall surface. Sleeves shall provide required clearance between the pipe and the sleeve per NFPA 13. The space between the sleeve and the pipe shall be firmly packed with mineral wool insulation. Where pipes penetrate fire walls, fire partitions, or floors, pipes shall be fire stopped in accordance with Section 07840 FIRESTOPPING. In penetrations that are not fire-rated or not a floor penetration, the space between the sleeve and the pipe shall be sealed at both ends with plastic waterproof cement that will dry to a firm but pliable mass or with a mechanically adjustable segmented elastomer seal.

#### 3.4.7 Escutcheons

Escutcheons shall be provided for pipe penetration of ceilings and walls. Escutcheons shall be securely fastened to the pipe at surfaces through which piping passes.

#### 3.4.8 Inspector's Test Connection

Unless otherwise indicated, test connection shall consist of 1 inch pipe connected to the remote branch line; a test valve located approximately 7 feet above the floor; a smooth bore brass outlet equivalent to the smallest orifice sprinkler used in the system; and a painted metal identification sign affixed to the valve with the words "Inspector's Test." The discharge orifice shall be located outside the building wall directed so as not to cause damage to adjacent construction or landscaping during full flow discharge.

#### 3.4.9 Drains

Main drain piping shall be provided to discharge at a safe point outside the building. Auxiliary drains shall be provided as indicated and as required by NFPA 13. When the capacity of trapped sections of pipe is less than 3 gallons, the auxiliary drain shall consist of a valve not smaller than 1/2 inch and a plug or nipple and cap. When the capacity of trapped sections of piping is more than 3 gallons, the auxiliary drain shall consist of two 1 inch valves and one 2 x 12 inch condensate nipple or equivalent, located in an accessible location. Tie-in drains shall be provided for multiple adjacent trapped branch pipes and shall be a minimum of 1 inch in diameter. Tie-in drain lines shall be pitched a minimum of 1/2 inch per 10 feet.

#### 3.4.10 Identification Signs

Signs shall be affixed to each control valve, inspector test valve, main drain, auxiliary drain, test valve, and similar valves as appropriate or as required by NFPA 13. Hydraulic design data nameplates shall be permanently affixed to each sprinkler riser as specified in NFPA 13.

### 3.5 ELECTRICAL WORK

Except as modified herein, electric equipment and wiring shall be in accordance with Section 16415 ELECTRICAL WORK, INTERIOR. Alarm signal wiring connected to the building fire alarm control system shall be in accordance with Section 13851 FIRE DETECTION AND ALARM SYSTEM, ADDRESSABLE. All wiring for supervisory and alarm circuits shall be minimum #16 AWG solid copper installed in metallic tubing or conduit. Wiring color code shall remain uniform throughout the system.

### 3.6 DISINFECTION

After all system components are installed and hydrostatic test(s) are successfully completed, each portion of the sprinkler system to be disinfected shall be thoroughly flushed with potable water until all entrained dirt and other foreign materials have been removed before introducing chlorinating material. Flushing shall be conducted by removing the flushing fitting of the cross mains and of the grid branch lines, and then back-flushing through the sprinkler main drains. The chlorinating material shall be hypochlorites or liquid chlorine. Water chlorination procedure shall be in accordance with AWWA M20. The chlorinating material

shall be fed into the sprinkler piping at a constant rate of 50 parts per million (ppm). A properly adjusted hypochlorite solution injected into the system with a hypochlorinator, or liquid chlorine injected into the system through a solution-fed chlorinator and booster pump shall be used. Chlorination application shall continue until the entire system is filled. The water shall remain in the system for a minimum of 24 hours. Each valve in the system shall be opened and closed several times to ensure its proper disinfection. Following the 24-hour period, no less than 25 ppm chlorine residual shall remain in the system. The system shall then be flushed with clean water until the residual chlorine is reduced to less than one part per million. Samples of water in disinfected containers for bacterial examination will be taken from several system locations which are approved by the Contracting Officer. Samples shall be tested for total coliform organisms (coliform bacteria, fecal coliform, streptococcal, and other bacteria) in accordance with AWWA EWW. The testing method shall be either the multiple-tube fermentation technique or the membrane-filter technique. The disinfection shall be repeated until tests indicate the absence of coliform organisms (zero mean coliform density per 100 milliliters) in the samples for at least 2 full days. The system will not be accepted until satisfactory bacteriological results have been obtained. After the successful completion, all sprinklers or plugs and gravity flush all drops or trapped piping.

### 3.7 PIPE COLOR CODE MARKING

Color code marking of piping shall be as specified in Section 09900 PAINTS AND COATINGS.

### 3.8 PRELIMINARY TESTS

The system, including the underground water mains, and the aboveground piping and system components, shall be tested to assure that equipment and components function as intended. The underground and aboveground interior piping systems and attached appurtenances subjected to system working pressure shall be tested in accordance with NFPA 13 and NFPA 24. Upon completion of specified tests, the Contractor shall complete certificates as specified in paragraph SUBMITTALS.

#### 3.8.1 Aboveground Piping

##### 3.8.1.1 Hydrostatic Testing

Aboveground piping shall be hydrostatically tested in accordance with NFPA 13 at not less than 200 psi or 50 psi in excess of maximum system operating pressure and shall maintain that pressure without loss for 2 hours. There shall be no drop in gauge pressure or visible leakage when the system is subjected to the hydrostatic test. The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested.

##### 3.8.1.2 Air Pressure Test

As specified in NFPA 13, an air pressure leakage test at 50 psi shall be conducted for 24 hours. There shall be no drop in gauge pressure in excess of 1.5 psi for the 24 hours. This air pressure test is in addition to the required hydrostatic test.

##### 3.8.1.3 Backflow Prevention Assembly Forward Flow Test

Each backflow prevention assembly shall be tested at system flow demand, including all applicable hose streams, as specified in NFPA 13. The Contractor shall provide all equipment and instruments necessary to conduct a complete forward flow test, including 2.5 inch diameter hoses, playpipe nozzles, calibrated pressure gauges, and pitot tube gauge. The Contractor shall provide all necessary supports to safely secure hoses and nozzles during the test. At the system demand flow, the pressure readings and pressure drop (friction) across the assembly shall be recorded. A metal placard shall be provided on the backflow prevention assembly that lists the pressure readings both upstream and downstream of the assembly, total pressure drop, and the system test flow rate. The pressure drop shall be compared to the manufacturer's data.

### 3.8.2 Testing of Alarm Devices

Each alarm initiating device, including pressure alarm switch, low air pressure switch, valve supervisory switch, and electrically-operated switch shall be tested for proper operation. Water motor alarm shall be tested. The connecting circuit to the building fire alarm system shall be inspected and tested.

### 3.8.3 Trip Tests of Dry Pipe Valves

Each dry pipe valve shall be trip-tested by reducing normal system air pressure through operation the inspector's test connection. Systems equipped with quick opening devices shall be first tested without the operation of the quick opening device and then with it in operation. Test results will be witnessed and recorded. Test results shall include the number of seconds elapsed between the time the test valve is opened and tripping of the dry valve; trip-point air pressure of the dry pipe valve; water pressure prior to valve tripping; and number of seconds elapsed between time the inspector's test valve is opened and water reaches the orifice.

### 3.8.4 Main Drain Flow Test

Following flushing of the underground piping, a main drain test shall be made to verify the adequacy of the water supply. Static and residual pressures shall be recorded on the certificate specified in paragraph SUBMITTALS. In addition, a main drain test shall be conducted each time after a main control valve is shut and opened.

## 3.9 FINAL ACCEPTANCE TEST

Final Acceptance Test shall begin only when the Preliminary Test Report has been approved. The Fire Protection Specialist shall conduct the Final Acceptance Test and shall provide a complete demonstration of the operation of the system. This shall include operation of control valves and flowing of inspector's test connections to verify operation of associated waterflow alarm switches. After operation of control valves has been completed, the main drain test shall be repeated to assure that control valves are in the open position. Each system shall be completely drained after each trip test. The system air supply system shall be tested to verify that system pressure is restored in the specified time. In addition, the Fire Protection Specialist shall have available copies of as-built drawings and certificates of tests previously conducted. The installation shall not be considered accepted until identified discrepancies have been corrected and test documentation is properly completed and received. After the system has been tested and drained, the system shall be drained periodically for

at least 2 weeks until it can be assured that water from the system has been removed.

### 3.10 ONSITE TRAINING

The Fire Protection Specialist and Manufacturer's Representative shall conduct a training course for operating and maintenance personnel as designated by the Contracting Officer. Training shall be provided for a period of 8 hours of normal working time and shall start after the system is functionally complete but prior to the Preliminary Tests and Final Acceptance Test. The Onsite Training shall cover all of the items contained in the approved Operating and Maintenance Instructions.

-- End of Section --

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SECTION 15400

PLUMBING, GENERAL PURPOSE

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.

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

- |          |                                                                         |
|----------|-------------------------------------------------------------------------|
| ARI 1010 | (1994) Self-Contained, Mechanically Refrigerated Drinking-Water Coolers |
| ARI 700  | (1999) Specifications for Fluorocarbon and Other Refrigerants           |

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- |               |                                                                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| ANSI Z21.10.3 | (1998) Gas Water Heaters Vol.III, Storage Water Heaters With Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous Water Heaters |
| ANSI Z21.22   | (1999) Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems                                                               |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- |                   |                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------|
| ASTM A 105/A 105M | (2001) Carbon Steel Forgings for Piping Applications                                                  |
| ASTM A 183        | (1998) Carbon Steel Track Bolts and Nuts                                                              |
| ASTM A 193/A 193M | (2001a) Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service                |
| ASTM A 47/A 47M   | (1999) Ferritic Malleable Iron Castings                                                               |
| ASTM A 515/A 515M | (1989; R 1997) Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service |
| ASTM A 516/A 516M | (1990; R 1996) Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service      |
| ASTM A 53/A 53M   | (2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless                            |
| ASTM A 536        | (1984; R 1999e1) Ductile Iron Castings                                                                |

ASTM A 733	(1999) Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
ASTM A 74	(1998) Cast Iron Soil Pipe and Fittings
ASTM A 888	(1998el) Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
ASTM B 152	(1997a) Copper Sheet, Strip, Plate, and Rolled Bar
ASTM B 152M	(1997a) Copper Sheet, Strip, Plate, and Rolled Bar (Metric)
ASTM B 306	(1999) Copper Drainage Tube (DWV)
ASTM B 32	(1996) Solder Metal
ASTM B 370	(1998) Copper Sheet and Strip for Building Construction
ASTM B 42	(1998) Seamless Copper Pipe, Standard Sizes
ASTM B 43	(1998) Seamless Red Brass Pipe, Standard Sizes
ASTM B 584	(2000a) Copper Alloy Sand Castings for General Applications
ASTM B 75	(1999) Seamless Copper Tube
ASTM B 813	(2000) Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube
ASTM B 828	(2000) Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings
ASTM B 88	(1999) Seamless Copper Water Tube
ASTM B 88M	(1999) Seamless Copper Water Tube (Metric)
ASTM C 564	(1997) Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM D 1785	(1999) Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2000	(1999) Rubber Products in Automotive Applications
ASTM D 2241	(2000) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

ASTM D 2464	(1999) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(1999) Poly(Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	(1996a) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2665	(2000) Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D 2672	(1996a) Joints for IPS PVC Pipe Using Solvent Cement
ASTM D 2822	(1991; R 1997e1) Asphalt Roof Cement
ASTM D 2855	(1996) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 2996	(1995) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 3138	(1995) Solvent Cements for Transition Joints Between Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Non-Pressure Piping Components
ASTM D 3139	(1998) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 3308	(1997) PTFE Resin Skived Tape
ASTM D 3311	(1994) Drain, Waste, and Vent (DWV) Plastic Fittings Patterns
ASTM E 1	(1998) ASTM Thermometers
ASTM F 1760	(1997) Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content
ASTM F 409	(1999a) Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings
ASTM F 477	(1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 891	(2000) Coextruded Poly (Vinyl chloride)

(PVC) Plastic Pipe with a Cellular Core

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING  
ENGINEERS (ASHRAE)

- ASHRAE 34 (1997) Number Designation and Safety  
Classification of Refrigerants
- ASHRAE 90.1 (1989; 90.1b; 90.1c; 90.1d; 90.1e; 90.1g;  
90.1i; 90.1l-1995; 90.1m-1995; 90.1n-1997)  
Energy Efficient Design of New Buildings  
Except Low-Rise Residential Buildings

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

- ASSE 1001 (1990) Pipe Applied Atmospheric Type  
Vacuum Breakers
- ASSE 1002 (1986) Water Closet Flush Tank Ball Cocks
- ASSE 1003 (1995) Water Pressure Reducing Valves for  
Domestic Water Supply Systems
- ASSE 1005 (1986) Water Heater Drain Valves -  
3/4-Inch Iron Pipe Size
- ASSE 1011 (1995) Hose Connection Vacuum Breakers
- ASSE 1012 (1995) Backflow Preventers with  
Intermediate Atmospheric Vent
- ASSE 1013 (1999) Reduced Pressure Principle Backflow  
Preventers
- ASSE 1020 (1998) Pressure Vacuum Breaker Assembly  
(Recommended for Outdoor Usage)

AMERICAN WATER WORKS ASSOCIATION(AWWA)

- AWWA B300 (1999) Hypochlorites
- AWWA B301 (1992; Addenda B301a - 1999) Liquid  
Chlorine
- AWWA C105 (1999) Polyethylene Encasement for  
Ductile-Iron Pipe Systems
- AWWA C203 (1997; Addenda C203a - 1999) Coal-Tar  
Protective Coatings and Linings for Steel  
Water Pipelines - Enamel and Tape -  
Hot-Applied
- AWWA C606 (1997) Grooved and Shouldered Joints
- AWWA D100 (1996) Welded Steel Tanks for Water Storage
- AWWA EWW (1999) Standard Methods for the  
Examination of Water and Wastewater

AWWA M20

(1973) Manual: Water Chlorination  
Principles and Practices

AMERICAN WELDING SOCIETY (AWS)

AWS A5.8

(1992) Filler Metals for Brazing and Braze  
Welding

AWS B2.2

(1991) Brazing Procedure and Performance  
Qualification

ASME INTERNATIONAL (ASME)

ASME A112.1.2

(1991; R 1998) Air Gaps in Plumbing Systems

ASME A112.14.1

(1975; R 1998) Backwater Valves

ASME A112.18.1M

(1996) Plumbing Fixture Fittings

ASME A112.19.1M

(1994; R 1999) Enameled Cast Iron Plumbing  
Fixtures

ASME A112.19.2M

(1998) Vitreous China Plumbing Fixtures

ASME A112.21.1M

(1991; R 1998) Floor Drains

ASME A112.36.2M

(1991; R 1998) Cleanouts

ASME A112.6.1M

(1997) Supports for Off-the-Floor Plumbing  
Fixtures for Public Use

ASME B1.20.1

(1983; R 1992) Pipe Threads, General  
Purpose (Inch)

ASME B16.12

(1998) Cast Iron Threaded Drainage Fittings

ASME B16.15

(1985; R 1994) Cast Bronze Threaded  
Fittings Classes 125 and 250

ASME B16.18

(1984; R 1994) Cast Copper Alloy Solder  
Joint Pressure Fittings

ASME B16.21

(1992) Nonmetallic Flat Gaskets for Pipe  
Flanges

ASME B16.22

(1995; B16.22a1998) Wrought Copper and  
Copper Alloy Solder Joint Pressure Fittings

ASME B16.23

(1992; Errata Jan 1994) Cast Copper Alloy  
Solder Joint Drainage Fittings - DWV

ASME B16.24

(1991; R 1998) Cast Copper Alloy Pipe  
Flanges, Class 150, 300, 400, 600, 900,  
1500, and 2500, and Flanged Fittings,  
Class 150 and 300

ASME B16.29

(1994) Wrought Copper and Wrought Copper  
Alloy Solder Joint Drainage Fittings - DWV

ASME B16.3 (1998) Malleable Iron Threaded Fittings

ASME B16.34 (1997) Valves - Flanged, Threaded, and Welding End

ASME B16.39 (1998) Malleable Iron Threaded Pipe Unions Classes 150, 250, and 300

ASME B16.4 (1998) Gray Iron Threaded Fittings

ASME B16.5 (1996; B16.5a) Pipe Flanges and Flanged Fittings NPS 1/2 thru NPS 24

ASME B31.1 (1998) Power Piping

ASME B31.5 (1992; B31.5a1994) Refrigeration Piping

ASME B40.1 (1991) Gauges - Pressure Indicating Dial Type - Elastic Element

ASME BPVC SEC IX (1998) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

ASME BPVC SEC VIII D1 (1998) Boiler and Pressure Vessel Code; Section VIII, Pressure Vessels Division 1 - Basic Coverage

ASME CSD-1 (1998) Controls and Safety Devices for Automatically Fired Boilers

CAST IRON SOIL PIPE INSTITUTE (CISPI)

CISPI 301 (1997) Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications

CISPI 310 (1997) Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications

CISPI HSN-85 (1985) Neoprene Rubber Gaskets for Hub and Spigot Cast Iron Soil Pipe and Fittings

COPPER DEVELOPMENT ASSOCIATION (CDA)

CDA Tube Handbook (1995) Copper Tube Handbook

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR-CCC (1993) Manual of Cross-Connection Control

HYDRAULIC INSTITUTE (HI)

HI 1.1-1.5 (1994) Centrifugal Pumps

INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS

(IAPMO)

IAPMO Z124.5 (1997) Plastic Toilet (Water Closets) Seats  
IAPMO Z124.9 (1994) Plastic Urinal Fixtures

INTERNATIONAL CODE COUNCIL (ICC)

CABO A117.1 (1998) Accessible and Usable Buildings and  
Facilities  
ICC Plumbing Code (2000)International Plumbing Code (IPA)

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS  
INDUSTRY (MSS)

MSS SP-110 (1996) Ball Valves Threaded,  
Socket-Welding, Solder Joint, Grooved and  
Flared Ends  
MSS SP-25 (1998) Standard Marking System for Valves,  
Fittings, Flanges and Unions  
MSS SP-44 (1996) Steel Pipe line Flanges  
MSS SP-58 (1993) Pipe Hangers and Supports -  
Materials, Design and Manufacture  
MSS SP-69 (1996) Pipe Hangers and Supports -  
Selection and Application  
MSS SP-70 (1998) Cast Iron Gate Valves, Flanged and  
Threaded Ends  
MSS SP-71 (1997) Gray Iron Swing Check Valves,  
Flanges and Threaded Ends  
MSS SP-72 (1999) Ball Valves with Flanged or  
Butt-Welding Ends for General Service  
MSS SP-73 (1991; R 1996) Brazing Joints for Copper  
and Copper Alloy Pressure Fittings  
MSS SP-78 (1998) Cast Iron Plug Valves, Flanged and  
Threaded Ends  
MSS SP-80 (1997) Bronze Gate, Globe, Angle and Check  
Valves  
MSS SP-83 (1995) Class 3000 Steel Pipe Unions  
Socket-Welding and Threaded  
MSS SP-85 (1994) Cast Iron Globe & Angle Valves,  
Flanged and Threaded Ends

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (1997) Enclosures for Electrical Equipment  
(1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 54	(1999) National Fuel Gas Code
NFPA 90A	(1999) Installation of Air Conditioning and Ventilating Systems
NFPA 211	(2000) Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances

NSF INTERNATIONAL (NSF)

NSF 14	(1999) Plastics Piping Components and Related Materials
NSF 61	(1999) Drinking Water System Components - Health Effects (Sections 1-9)

PLASTIC PIPE AND FITTINGS ASSOCIATION (PPFA)

PPFA-01	(1998) Plastic Pipe in Fire Resistive Construction
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PLUMBING AND DRAINAGE INSTITUTE (PDI)

PDI WH 201	(1992) Water Hammer Arresters
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PLUMBING-HEATING-COOLING CONTRACTORS NATIONAL ASSOCIATION (NAPHCC)

NAPHCC Plumbing Code	(1996) National Standard Plumbing Code
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SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J 1508	(1997) Hose Clamps
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U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-240	(Rev A; Canc. Notice 1) Shower Head, Ball Joint
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

PL 93-523	(1974; Amended 1986) Safe Drinking Water Act
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1.2 STANDARD PRODUCTS

Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products. Specified equipment shall essentially duplicate equipment that has performed satisfactorily at least two years prior to bid opening.

1.3 ELECTRICAL WORK

Motors, motor controllers and motor efficiencies shall conform to the requirements of Section 16415 ELECTRICAL WORK, INTERIOR. Electrical motor-driven equipment specified herein shall be provided complete with

motors. Equipment shall be rated at 60 Hz, single phase, ac unless otherwise indicated. Where a motor controller is not provided in a motor-control center on the electrical drawings, a motor controller shall be as indicated. Motor controllers shall be provided complete with properly sized thermal-overload protection in each ungrounded conductor, auxiliary contact, and other equipment, at the specified capacity, and including an allowable service factor.

#### 1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" 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-02 Shop Drawings

Plumbing System; G, DO.

Detail drawings consisting of illustrations, schedules, performance charts, instructions, brochures, diagrams, and other information to illustrate the requirements and operations of each system. Detail drawings for the complete plumbing system including piping layouts and locations of connections; dimensions for roughing-in, foundation, and support points; schematic diagrams and wiring diagrams or connection and interconnection diagrams. Detail drawings shall indicate clearances required for maintenance and operation. Where piping and equipment are to be supported other than as indicated, details shall include loadings and proposed support methods. Mechanical drawing plans, elevations, views, and details, shall be drawn to scale.

Electrical Schematics; G, DO.

Complete electrical schematic lineless or full line interconnection and connection diagram for each piece of mechanical equipment having more than one automatic or manual electrical control device.

##### SD-03 Product Data

Welding; G, DO.

A copy of qualified procedures and a list of names and identification symbols of qualified welders and welding operators.

Plumbing Fixture Schedule; G, DO.

Catalog cuts of specified plumbing fixtures, system and system location where installed.

Plumbing System; G, DO.

Diagrams, instructions, and other sheets proposed for posting. Manufacturer's recommendations for the installation of bell and spigot and hubless joints for cast iron soil pipe.

##### SD-06 Test Reports

Tests, Flushing and Disinfection; G, DO.

Test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, completion and testing of the installed system. Each test report shall indicate the final position of controls.

Backflow Prevention Assembly Tests; G, DO..

Certification of proper operation shall be as accomplished in accordance with state regulations by an individual certified by the state to perform such tests. If no state requirement exists, the Contractor shall have the manufacturer's representative test the device, to ensure the unit is properly installed and performing as intended. The Contractor shall provide written documentation of the tests performed and signed by the individual performing the tests.

#### SD-07 Certificates

Materials and Equipment; G, DO.

Where materials or equipment are specified to comply with requirements of AGA, ASME, or NSF proof of such compliance shall be included. The label or listing of the specified agency will be acceptable evidence. In lieu of the label or listing, a written certificate may be submitted from an approved, nationally recognized testing organization equipped to perform such services, stating that the items have been tested and conform to the requirements and testing methods of the specified agency. Where equipment is specified to conform to requirements of the ASME Boiler and Pressure Vessel Code, the design, fabrication, and installation shall conform to the code.

Bolts; G, DO.

Written certification by the bolt manufacturer that the bolts furnished comply with the specified requirements. The certification shall include illustrations of product-required markings, the date of manufacture, and the number of each type of bolt to be furnished based on this certification.

#### SD-10 Operation and Maintenance Data

Plumbing System; G, DO.

Six copies of the operation manual outlining the step-by-step procedures required for system startup, operation and shutdown. The manual shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Six copies of the maintenance manual listing routine maintenance procedures, possible breakdowns and repairs. The manual shall include piping and equipment layout and simplified wiring and control diagrams of the system as installed.

### 1.5 PERFORMANCE REQUIREMENTS

### 1.5.1 Welding

Piping shall be welded in accordance with qualified procedures using performance-qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME BPVC SEC IX. Welding procedures qualified by others, and welders and welding operators qualified by another employer, may be accepted as permitted by ASME B31.1. The Contracting Officer shall be notified 24 hours in advance of tests, and the tests shall be performed at the work site if practicable. Welders or welding operators shall apply their assigned symbols near each weld they make as a permanent record.

### 1.6 REGULATORY REQUIREMENTS

Plumbing work shall be in accordance with ICC Plumbing Code.

### 1.7 PROJECT/SITE CONDITIONS

The Contractor shall become familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

## PART 2 PRODUCTS

### 2.1 MATERIALS

Materials for various services shall be in accordance with TABLES I and II.

Pipe schedules shall be selected based on service requirements. Pipe fittings shall be compatible with the applicable pipe materials. Plastic pipe, fittings, and solvent cement shall meet NSF 14 and shall be NSF listed for the service intended. Plastic pipe, fittings, and solvent cement used for potable hot and cold water service shall bear the NSF seal "NSF-PW." Polypropylene pipe and fittings shall conform to dimensional requirements of Schedule 40, Iron Pipe size. Pipe threads (except dry seal) shall conform to ASME B1.20.1. Grooved pipe couplings and fittings shall be from the same manufacturer. Material or equipment containing lead shall not be used in any potable water system. In line devices such as building valves, check valves, valves, fittings and back flow preventers shall comply with PL 93-523 and NSF 61, Section 8. End point devices such as drinking water fountains, lavatory faucets, kitchen faucets, supply stops and end point control valves used to dispense water for drinking must meet the requirements of NSF 61, Section 9. Hubless cast-iron soil pipe shall not be installed underground, under concrete floor slabs, or in crawl spaces below kitchen floors. Plastic pipe shall not be installed in air plenums.

#### 2.1.1 Pipe Joint Materials

Grooved pipe and hubless cast-iron soil pipe shall not be used under ground. Joints and gasket materials shall conform to the following:

- a. Coupling for Cast-Iron Pipe: for hub and spigot type ASTM A 74, AWWA C606. For hubless type: CISPI 310
- b. Coupling for Steel Pipe: AWWA C606.
- c. Couplings for Grooved Pipe: Ductile Iron ASTM A 536 (Grade 65-45-12) or Malleable Iron ASTM A 47/A 47M, Grade 32510. Copper

ASTM A 536.

- d. Flange Gaskets: Gaskets shall be made of non-asbestos material in accordance with ASME B16.21. Gaskets shall be flat, 1/16 inch thick, and contain Aramid fibers bonded with Styrene Butadiene Rubber (SBR) or Nitro Butadiene Rubber (NBR). Gaskets shall be the full face or self centering flat ring type. Gaskets used for hydrocarbon service shall be bonded with NBR.
- e. Neoprene Gaskets for Hub and Cast-Iron Pipe and Fittings: CISPI HSN-85.
- f. Brazing Material: Brazing material shall conform to AWS A5.8, BCuP-5.
- g. Brazing Flux: Flux shall be in paste or liquid form appropriate for use with brazing material. Flux shall be as follows: lead-free; have a 100 percent flushable residue; contain slightly acidic reagents; contain potassium borides; and contain fluorides.
- h. Solder Material: Solder metal shall conform to ASTM B 32.
- i. Solder Flux: Flux shall be liquid form, non-corrosive, and conform to ASTM B 813, Standard Test 1.
- j. PTFE Tape: PTFE Tape, for use with Threaded Metal or Plastic Pipe, ASTM D 3308.
- k. Rubber Gaskets for Cast-Iron Soil-Pipe and Fittings (hub and spigot type and hubless type): ASTM C 564.
- l. Rubber Gaskets for Grooved Pipe: ASTM D 2000, maximum temperature 230 degrees F.
- m. Flexible Elastomeric Seals: ASTM D 3139, ASTM D 3212 or ASTM F 477.
- n. Bolts and Nuts for Grooved Pipe Couplings: Heat-treated carbon steel, ASTM A 183.
- o. Solvent Cement for Transition Joints between ABS and PVC Nonpressure Piping Components: ASTM D 3138.
- p. Plastic Solvent Cement for PVC Plastic Pipe: ASTM D 2564 and ASTM D 2855.
- q. Flanged fittings including flanges, bolts, nuts, bolt patterns, etc., shall be in accordance with ASME B16.5 class 150 and shall have the manufacturer's trademark affixed in accordance with MSS SP-25. Flange material shall conform to ASTM A 105/A 105M. Blind flange material shall conform to ASTM A 516/A 516M cold service and ASTM A 515/A 515M for hot service. Bolts shall be high strength or intermediate strength with material conforming to ASTM A 193/A 193M.

#### 2.1.2 Miscellaneous Materials

Miscellaneous materials shall conform to the following:

- a. Water Hammer Arrester: PDI WH 201.
- b. Copper, Sheet and Strip for Building Construction: ASTM B 370.
- c. Asphalt Roof Cement: ASTM D 2822.
- d. Hose Clamps: SAE J 1508.
- e. Supports for Off-The-Floor Plumbing Fixtures: ASME A112.6.1M.
- f. Metallic Cleanouts: ASME A112.36.2M.
- g. Plumbing Fixture Setting Compound: A preformed flexible ring seal molded from hydrocarbon wax material. The seal material shall be nonvolatile nonasphaltic and contain germicide and provide watertight, gastight, odorproof and verminproof properties.
- h. Coal-Tar Protective Coatings and Linings for Steel Water Pipelines:  
AWWA C203.
  - i. Hypochlorites: AWWA B300.
  - j. Liquid Chlorine: AWWA B301.
  - k. Polyethylene Encasement for Ductile-Iron Piping: AWWA C105.
  - l. Gauges - Pressure and Vacuum Indicating Dial Type - Elastic Element: ASME B40.1.
  - m. Thermometers: ASTM E 1. Mercury shall not be used in thermometers.

### 2.1.3 Pipe Insulation Material

Insulation shall be as specified in Section 15080 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

## 2.2 PIPE HANGERS, INSERTS, AND SUPPORTS

Pipe hangers, inserts, and supports shall conform to MSS SP-58 and MSS SP-69.

## 2.3 VALVES

Valves shall be provided on supplies to equipment and fixtures. Valves 2-1/2 inches and smaller shall be bronze with threaded bodies for pipe and solder-type connections for tubing. Valves 3 inches and larger shall have flanged iron bodies and bronze trim. Pressure ratings shall be based upon the application. Grooved end valves may be provided if the manufacturer certifies that the valves meet the performance requirements of applicable MSS standard. Valves shall conform to the following standards:

Description	Standard
Cast-Iron Gate Valves, Flanged and Threaded Ends	MSS SP-70
Cast-Iron Swing Check Valves, Flanged and	

Description	Standard
Threaded Ends	MSS SP-71
Ball Valves with Flanged Butt-Welding Ends for General Service	MSS SP-72
Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends	MSS SP-110
Cast-Iron Plug Valves, Flanged and Threaded Ends	MSS SP-78
Bronze Gate, Globe, Angle, and Check Valves	MSS SP-80
Steel Valves, Socket Welding and Threaded Ends	ASME B16.34
Cast-Iron Globe and Angle Valves, Flanged and Threaded Ends	MSS SP-85
Backwater Valves	ASME A112.14.1
Vacuum Relief Valves	ANSI Z21.22
Water Pressure Reducing Valves	ASSE 1003
Water Heater Drain Valves	ASSE 1005
Temperature and Pressure Relief Valves for Hot Water Supply Systems	ANSI Z21.22
Temperature and Pressure Relief Valves for Automatically Fired Hot Water Boilers	ASME CSD-1 Safety Code No., Part CW, Article 5

### 2.3.1 Backwater Valves

Backwater valves shall be either separate from the floor drain or a combination floor drain, P-trap, and backwater valve, as shown. Valves shall have cast-iron bodies with cleanouts large enough to permit removal of interior parts. Valves shall be of the flap type, hinged or pivoted, with revolving disks. Hinge pivots, disks, and seats shall be nonferrous metal. Disks shall be slightly open in a no-flow no-backwater condition. Cleanouts shall extend to finished floor and be fitted with threaded countersunk plugs.

### 2.3.2 Wall Hydrants

Wall hydrants with vacuum-breaker backflow preventer shall have a nickel-brass or nickel-bronze wall plate or flange with nozzle and detachable key handle. A brass or bronze operating rod shall be provided within a galvanized iron casing of sufficient length to extend through the wall so that the valve is inside the building, and the portion of the hydrant between the outlet and valve is self-draining. A brass or bronze valve with coupling and union elbow having metal-to-metal seat shall be provided. Valve rod and seat washer shall be removable through the face of the hydrant. The hydrant shall have 3/4 inch exposed hose thread on spout and 3/4 inch male pipe thread on inlet.

### 2.3.3 Relief Valves

Water heaters and hot water storage tanks shall have a combination pressure and temperature (P&T) relief valve. The pressure relief element of a P&T relief valve shall have adequate capacity to prevent excessive pressure buildup in the system when the system is operating at the maximum rate of heat input. The temperature element of a P&T relief valve shall have a relieving capacity which is at least equal to the total input of the heaters when operating at their maximum capacity. Relief valves shall be rated according to ANSI Z21.22. Relief valves shall have 1 inch minimum inlets, and 1 inch outlets. The discharge pipe from the relief valve shall be the size of the valve outlet.

### 2.3.4 Thermostatic Mixing Valves

Mixing valves, thermostatic type, pressure-balanced or combination thermostatic and pressure-balanced shall be line size and shall be constructed with rough or finish bodies either with or without plating. Each valve shall be constructed to control the mixing of hot and cold water and to deliver water at a desired temperature regardless of pressure or input temperature changes. The control element shall be of an approved type. The body shall be of heavy cast bronze, and interior parts shall be brass, bronze, corrosion-resisting steel or copper. The valve shall be equipped with necessary stops, check valves, unions, and sediment strainers on the inlets. Mixing valves shall maintain water temperature within 5 degrees F of any setting.

## 2.4 FIXTURES

Fixtures shall be water conservation type, in accordance with ICC Plumbing Code. Fixtures for use by the physically handicapped shall be in accordance with CABO A117.1. Vitreous china, nonabsorbent, hard-burned, and vitrified throughout the body shall be provided. No fixture will be accepted that shows cracks, crazes, blisters, thin spots, or other flaws. Fixtures shall be equipped with appurtenances such as traps, faucets, stop valves, and drain fittings. Each fixture and piece of equipment requiring connections to the drainage system, shall be equipped with a trap. Brass expansion or toggle bolts capped with acorn nuts shall be provided for supports, and polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Fixtures with the supply discharge below the rim shall be equipped with backflow preventers. Internal parts of flush valves, shower mixing valves, shower head face plates, pop-up stoppers of lavatory waste drains, and may contain acetal resin, fluorocarbon, nylon, acrylonitrile-butadiene-styrene (ABS) or other plastic material, if the material has provided satisfactory service under actual commercial or industrial operating conditions for not less than 2 years. Plastic in contact with hot water shall be suitable for 180 degrees F water temperature. Plumbing fixtures shall be as indicated in paragraph PLUMBING FIXTURE SCHEDULE.

### 2.4.1 Lavatories

Wall mounted vitreous china lavatories shall be provided with two integral molded lugs on the back-underside of the fixture and drilled for bolting to the wall in a manner similar to the hanger plate.

## 2.5 BACKFLOW PREVENTERS

Backflow preventers shall be approved and listed by the Foundation For Cross-Connection Control & Hydraulic Research. Reduced pressure principle assemblies, double check valve assemblies, atmospheric (nonpressure) type vacuum breakers, and pressure type vacuum breakers shall be tested, approved, and listed in accordance with FCCCHR-CCC. Backflow preventers with intermediate atmospheric vent shall conform to ASSE 1012. Reduced pressure principle backflow preventers shall conform to ASSE 1013. Hose connection vacuum breakers shall conform to ASSE 1011. Pipe applied atmospheric type vacuum breakers shall conform to ASSE 1001. Pressure vacuum breaker assembly shall conform to ASSE 1020. Air gaps in plumbing systems shall conform to ASME A112.1.2.

## 2.6 DRAINS

### 2.6.1 Floor and Shower Drains

Floor and shower drains shall consist of a galvanized body, integral seepage pan, and adjustable perforated or slotted chromium-plated bronze, nickel-bronze, or nickel-brass strainer, consisting of grate and threaded collar. Floor drains shall be cast iron except where metallic waterproofing membrane is installed. Drains shall be of double drainage pattern for embedding in the floor construction. The seepage pan shall have weep holes or channels for drainage to the drainpipe. The strainer shall be adjustable to floor thickness. A clamping device for attaching flashing or waterproofing membrane to the seepage pan without damaging the flashing or waterproofing membrane shall be provided when required. Drains shall be provided with threaded connection. Between the drain outlet and waste pipe, a neoprene rubber gasket conforming to ASTM C 564 may be installed, provided that the drain is specifically designed for the rubber gasket compression type joint. Floor and shower drains shall conform to ASME A112.21.1M.

## 2.7 TRAPS

Unless otherwise specified, traps shall be plastic per ASTM F 409 or copper-alloy adjustable tube type with slip joint inlet and swivel. Traps shall be without a cleanout. Tubes shall be copper alloy with walls not less than 0.032 inch thick within commercial tolerances, except on the outside of bends where the thickness may be reduced slightly in manufacture by usual commercial methods. Inlets shall have rubber washer and copper alloy nuts for slip joints above the discharge level. Swivel joints shall be below the discharge level and shall be of metal-to-metal or metal-to-plastic type as required for the application. Nuts shall have flats for wrench grip. Outlets shall have internal pipe thread, except that when required for the application, the outlets shall have sockets for solder-joint connections. The depth of the water seal shall be not less than 2 inches. The interior diameter shall be not more than 1/8 inch over or under the nominal size, and interior surfaces shall be reasonably smooth throughout. A copper alloy "P" trap assembly consisting of an adjustable "P" trap and threaded trap wall nipple with cast brass wall flange shall be provided for lavatories. The assembly shall be a standard manufactured unit and may have a rubber-gasketed swivel joint.

## 2.8 WATER HEATERS

Water heater types and capacities shall be as indicated. Each water heater shall have replaceable anodes. Each primary water heater shall have controls with an adjustable range that includes 90 to 160 degrees F. Each gas-fired water heater shall have controls with an adjustable range that

includes 120 to 180 degrees F. Hot water systems utilizing recirculation systems shall be tied into building off-hour controls. The thermal efficiency shall be a minimum of 85 percent. Standby heat losses shall conform ASHRAE 90.1, Addendum 90.1b.. The only exception is that hot water storage tanks having more than 500 gallons storage capacity need not meet the standard loss requirement if the tank surface area is insulated to R-12.5 and if a standing light is not used. Plastic materials polyetherimide (PEI) and polyethersulfone (PES) are forbidden to be used for vent piping of combustion gases. Gas-fired water heaters shall conform to ANSI Z21.10.3.

## 2.8.1 Conventional Breeching and Stacks

### 2.8.1.1 Breeching

Each hot water heater shall be connected to the stack or flue by breeching constructed of black steel sheets not less than 0.0478 inch thick nor less than thickness of stack, whichever is larger. Plastic materials polyetherimide (PEI) and polyethersulfone (PES) are forbidden to be used for vent piping of combustion gases. The clear distance between any portion of the breeching surface and any combustible material shall not be less than that specified in NFPA 211. Joints and seams shall be securely fastened and made airtight. Suitable hinged and gasketed cleanouts shall be provided, which will permit cleaning the entire smoke connection without dismantling. Flexible-type expansion joints shall be provided as required and shall not require packing.

### 2.8.1.2 Stacks

Prefabricated double wall stacks system shall extend above the roof to the height indicated. The inner stack shall be 304 stainless steel having a thickness of not less than 0.035 inch. The outer stack shall be sheet steel having a thickness of not less than 0.025 inch. A method of maintaining concentricity between the inner and outer stacks shall be incorporated. The joints between the stack sections shall be sealed to prevent flue gas leakage. A 0.3125 inch diameter hole shall be provided in the stack not greater than 6 inches from the furnace flue outlet for sampling of the exit gases. A method shall be provided to seal the hole to prevent exhaust gases from entering the boiler room when samples are not being taken. Each stack shall be provided complete with rain hood. Plastic materials polyetherimide (PEI) and polyethersulfone (PES) are forbidden to be used for vent piping of combustion gases.

## 2.9 HOT-WATER STORAGE TANKS

Hot-water storage tanks shall be constructed by one manufacturer, ASME stamped for the working pressure, and shall have the National Board (ASME) registration. The tank shall be cement-lined or glass-lined steel type in accordance with AWWA D100. The heat loss shall conform to the requirements of ASHRAE 90.1. Each tank shall be equipped with a thermometer, conforming to ASTM E 1, Type I, Class 3, Range C, style and form as required for the installation, and with 7 inch scale. Thermometer shall have a separable socket suitable for a 3/4 inch tapped opening. Tanks shall be equipped with a pressure gauge 6 inch minimum diameter face. Insulation shall be as specified in Section 15080 THERMAL INSULATION FOR MECHANICAL SYSTEMS. Storage tank capacity shall be as shown.

## 2.10 PUMPS

### 2.10.1 Sump Pumps

Sump pumps shall be of capacities indicated. The pumps shall be of the automatic, electric motor-driven, submerged type, complete with necessary control equipment and with a split or solid cast-iron or steel cover plate. The pumps shall be direct-connected by an approved flexible coupling to a vertical electric motor having a continuous oiling device or packed bearings sealed against dirt and moisture. Motors shall be totally enclosed, fan-cooled of sizes as indicated and shall be equipped with an across-the-line magnetic controller in a NEMA 250, Type 1 enclosure. Each pump shall be fitted with a high-grade thrust bearing mounted above the floor. Each shaft shall have an alignment bearing at each end, and the suction inlet shall be between 3 and 6 inches above the sump bottom. The suction side of each pump shall have a strainer of ample capacity. A float switch assembly, with the switch completely enclosed in a NEMA 250, Type 1 enclosure, shall start and stop each motor at predetermined water levels.

### 2.10.2 Circulating Pumps

Domestic hot water circulating pumps shall be electrically driven, single-stage, centrifugal, with mechanical seals, suitable for the intended service. Pump capacities, efficiencies, motor sizes, speeds, and impeller types shall be as shown. Pump and motor shall be supported by the piping on which it is installed. The shaft shall be one-piece, heat-treated, corrosion-resisting steel with impeller and smooth-surfaced housing of bronze. Motor shall be totally enclosed, fan-cooled and shall have sufficient horsepower for the service required. Pump shall conform to HI 1.1-1.5. Each pump motor shall be equipped with an across-the-line magnetic controller in a NEMA 250, Type 1 enclosure with "START-STOP" switch in cover. Pump motors smaller than Fractional horsepower pump motors shall have integral thermal overload protection in accordance with Section 16415 ELECTRICAL WORK, INTERIOR. Guards shall shield exposed moving parts.

### 2.11 Expansion Tank

The domestic hot water system shall include a bladder-type expansion tank which will accommodate the expanded water of the system generated within the normal operating temperature range, limiting the pressure increase at all components in the system to the maximum allowable pressure at those components. The only air in the system shall be the permanent sealed-in air cushion contained in the bladder-type tank. The sizes shall be as indicated. The expansion tank shall be welded steel, constructed, tested, and stamped in accordance with ASME BPVC SEC VIII D1 for a working pressure of 125 psi and precharged to the minimum operating pressure. The tank's air chamber shall be fitted with an air charging valve and pressure gauge. The tank shall be vertical type supported by steel legs. The tank shall have lifting rings and a drain connection. All components shall be suitable for a maximum operating temperature of 250 degrees F. All components in contact with water shall be designed for potable water applications, and shall be of FDA approved materials.

## PART 3 EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

Piping located in air plenums shall conform to NFPA 90A requirements. Plastic pipe shall not be installed in air plenums. Piping located in

shafts that constitute air ducts or that enclose air ducts shall be noncombustible in accordance with NFPA 90A. Installation of plastic pipe where in compliance with NFPA may be installed in accordance with PPFA-01. The plumbing system shall be installed complete with necessary fixtures, fittings, traps, valves, and accessories. Water and drainage piping shall be extended 5 feet outside the building, unless otherwise indicated. A gate valve or full port ball valve and drain shall be installed on the water service line inside the building approximately 6 inches above the floor from point of entry. Piping shall be connected to the exterior service lines or capped or plugged if the exterior service is not in place.

Sewer and water pipes shall be laid in separate trenches, except when otherwise shown. Exterior underground utilities shall be at least 12 inches below the average local frost depth or as indicated on the drawings.

If trenches are closed or the pipes are otherwise covered before being connected to the service lines, the location of the end of each plumbing utility shall be marked with a stake or other acceptable means. Valves shall be installed with control no lower than the valve body.

### 3.1.1 Water Pipe, Fittings, and Connections

#### 3.1.1.1 Utilities

The piping shall be extended to fixtures, outlets, and equipment. The hot-water and cold-water piping system shall be arranged and installed to permit draining. The supply line to each item of equipment or fixture, except faucets, flush valves, or other control valves which are supplied with integral stops, shall be equipped with a shutoff valve to enable isolation of the item for repair and maintenance without interfering with operation of other equipment or fixtures. Supply piping to fixtures, faucets, hydrants, shower heads, and flushing devices shall be anchored to prevent movement.

#### 3.1.1.2 Cutting and Repairing

The work shall be carefully laid out in advance, and unnecessary cutting of construction shall be avoided. Damage to building, piping, wiring, or equipment as a result of cutting shall be repaired by mechanics skilled in the trade involved.

#### 3.1.1.3 Protection of Fixtures, Materials, and Equipment

Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, chemicals, and mechanical injury. Upon completion of the work, the fixtures, materials, and equipment shall be thoroughly cleaned, adjusted, and operated. Safety guards shall be provided for exposed rotating equipment.

#### 3.1.1.4 Mains, Branches, and Runouts

Piping shall be installed as indicated. Pipe shall be accurately cut and worked into place without springing or forcing. Structural portions of the building shall not be weakened. Aboveground piping shall run parallel with the lines of the building, unless otherwise indicated. Branch pipes from service lines may be taken from top, bottom, or side of main, using crossover fittings required by structural or installation conditions. Supply pipes, valves, and fittings shall be kept a sufficient distance from other work and other services to permit not less than 1/2 inch between finished covering on the different services. Bare and insulated water

lines shall not bear directly against building structural elements so as to transmit sound to the structure or to prevent flexible movement of the lines. Water pipe shall not be buried in or under floors unless specifically indicated or approved. Changes in pipe sizes shall be made with reducing fittings. Use of bushings will not be permitted except for use in situations in which standard factory fabricated components are furnished to accommodate specific accepted installation practice. Change in direction shall be made with fittings, except that bending of pipe 4 inches and smaller will be permitted, provided a pipe bender is used and wide sweep bends are formed. The center-line radius of bends shall be not less than six diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations will not be acceptable.

#### 3.1.1.5 Pipe Drains

Pipe drains indicated shall consist of 3/4 inch hose bibb with renewable seat and gate or full port ball valve ahead of hose bibb. At other low points, 3/4 inch brass plugs or caps shall be provided. Disconnection of the supply piping at the fixture is an acceptable drain.

#### 3.1.1.6 Expansion and Contraction of Piping

Allowance shall be made throughout for expansion and contraction of water pipe. Each hot-water and hot-water circulation riser shall have expansion loops or other provisions such as offsets, changes in direction, etc., where indicated and/or required. Risers shall be securely anchored as required or where indicated to force expansion to loops. Branch connections from risers shall be made with ample swing or offset to avoid undue strain on fittings or short pipe lengths. Horizontal runs of pipe over 50 feet in length shall be anchored to the wall or the supporting construction about midway on the run to force expansion, evenly divided, toward the ends. Sufficient flexibility shall be provided on branch runouts from mains and risers to provide for expansion and contraction of piping. Flexibility shall be provided by installing one or more turns in the line so that piping will spring enough to allow for expansion without straining. If mechanical grooved pipe coupling systems are provided, the deviation from design requirements for expansion and contraction may be allowed pending approval of Contracting Officer.

#### 3.1.1.7 Commercial-Type Water Hammer Arresters

Commercial-type water hammer arresters shall be provided on hot- and cold-water supplies and shall be located as generally indicated, with precise location and sizing to be in accordance with PDI WH 201. Water hammer arresters, where concealed, shall be accessible by means of access doors or removable panels. Commercial-type water hammer arresters shall conform to PDI WH 201. Vertical capped pipe columns will not be permitted.

#### 3.1.2 Joints

Installation of pipe and fittings shall be made in accordance with the manufacturer's recommendations. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted. Joints shall be made up with fittings of compatible material and made for the specific purpose intended.

##### 3.1.2.1 Threaded

Threaded joints shall have American Standard taper pipe threads conforming

to ASME B1.20.1. Only male pipe threads shall be coated with graphite or with an approved graphite compound, or with an inert filler and oil, or shall have a polytetrafluoroethylene tape applied.

#### 3.1.2.2 Mechanical Couplings

Grooved mechanical joints shall be prepared according to the coupling manufacturer's instructions. Pipe and groove dimensions shall comply with the tolerances specified by the coupling manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, or narrow-land micrometer. Groove width and dimension of groove from end of the pipe shall be measured and recorded for each change in grooving tool setup to verify compliance with coupling manufacturer's tolerances. Grooved joints shall not be used in concealed locations, such as behind solid walls or ceilings, unless an access panel is shown on the drawings for servicing or adjusting the joint.

#### 3.1.2.3 Unions and Flanges

Unions, flanges and mechanical couplings shall not be concealed in walls, ceilings, or partitions. Unions shall be used on pipe sizes 2-1/2 inches and smaller; flanges shall be used on pipe sizes 3 inches and larger.

#### 3.1.2.4 Cast Iron Soil, Waste and Vent Pipe

Bell and spigot compression and hubless gasketed clamp joints for soil, waste and vent piping shall be installed per the manufacturer's recommendations.

#### 3.1.2.5 Copper Tube and Pipe

The tube or fittings shall not be annealed when making connections.

- a. Brazed. Brazed joints shall be made in conformance with AWS B2.2, MSS SP-73, and CDA Tube Handbook with flux and are acceptable for all pipe sizes. Copper to copper joints shall include the use of copper-phosphorus or copper-phosphorus-silver brazing metal without flux. Brazing of dissimilar metals (copper to bronze or brass) shall include the use of flux with either a copper-phosphorus, copper-phosphorus-silver or a silver brazing filler metal.
- b. Soldered. Soldered joints shall be made with flux and are only acceptable for piping 2 inches and smaller. Soldered joints shall conform to ASME B31.5 and CDA Tube Handbook.
- c. Copper Tube Extracted Joint. An extracted mechanical joint may be made in copper tube. Joint shall be produced with an appropriate tool by drilling a pilot hole and drawing out the tube surface to form a collar having a minimum height of three times the thickness of the tube wall. To prevent the branch tube from being inserted beyond the depth of the extracted joint, dimpled depth stops shall be provided. Branch tube shall be notched for proper penetration into fitting to assure a free flow joint. Extracted joints shall be brazed in accordance with NAPHCC Plumbing Code using B-cup series filler metal in accordance with MSS SP-73. Soldered extracted joints will not be permitted.

#### 3.1.2.6 Plastic Pipe

PVC pipe shall have joints made with solvent cement elastomeric, threading, (threading of Schedule 80 Pipe is allowed only where required for disconnection and inspection; threading of Schedule 40 Pipe is not allowed), or mated flanged.

### 3.1.3 Dissimilar Pipe Materials

Connections between ferrous and non-ferrous copper water pipe shall be made with dielectric unions or flange waterways. Dielectric waterways shall have temperature and pressure rating equal to or greater than that specified for the connecting piping. Waterways shall have metal connections on both ends suited to match connecting piping. Dielectric waterways shall be internally lined with an insulator specifically designed to prevent current flow between dissimilar metals. Dielectric flanges shall meet the performance requirements described herein for dielectric waterways. Connecting joints between plastic and metallic pipe shall be made with transition fitting for the specific purpose.

### 3.1.4 Corrosion Protection for Buried Pipe and Fittings

#### 3.1.4.1 Cast Iron and Ductile Iron

Pressure pipe shall have protective coating, a cathodic protection system, and joint bonding. Pipe, fittings, and joints shall have a protective coating. The protective coating shall be completely encasing polyethylene tube or sheet in accordance with AWWA C105. Joints and fittings shall be cleaned, coated with primer, and wrapped with tape. The pipe shall be cleaned, coated, and wrapped prior to pipe tightness testing. Joints and fittings shall be cleaned, coated, and wrapped after pipe tightness testing. Tape shall conform to AWWA C203 and shall be applied with a 50 percent overlap. Primer shall be as recommended by the tape manufacturer.

#### 3.1.4.2 Steel

Steel pipe, joints, and fittings shall be cleaned, coated with primer, and wrapped with tape. Pipe shall be cleaned, coated, and wrapped prior to pipe tightness testing. Joints and fittings shall be cleaned, coated, and wrapped after pipe tightness testing. Tape shall conform to AWWA C203 and shall be applied with a 50 percent overlap. Primer shall be as recommended by the tape manufacturer.

### 3.1.5 Pipe Sleeves and Flashing

Pipe sleeves shall be furnished and set in their proper and permanent location.

#### 3.1.5.1 Sleeve Requirements

Pipes passing through concrete or masonry walls or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction. Sleeves are not required for supply, drainage, waste and vent pipe passing through concrete slab on grade. A modular mechanical type sealing assembly may be installed in lieu of a waterproofing clamping flange and caulking and sealing of annular space between pipe and sleeve. The seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve using galvanized steel bolts, nuts, and pressure plates. The links shall be loosely assembled with bolts to form a continuous rubber belt around the

pipe with a pressure plate under each bolt head and each nut. After the seal assembly is properly positioned in the sleeve, tightening of the bolt shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe and the sleeve. Each seal assembly shall be sized as recommended by the manufacturer to fit the pipe and sleeve involved. Sleeves shall not be installed in structural members, except where indicated or approved. Rectangular and square openings shall be as detailed. Each sleeve shall extend through its respective floor, or roof, and shall be cut flush with each surface, except for special circumstances. Pipe sleeves passing through floors in wet areas such as mechanical equipment rooms, lavatories, kitchens, and other plumbing fixture areas shall extend a minimum of 4 inches above the finished floor. Unless otherwise indicated, sleeves shall be of a size to provide a minimum of 1/4 inch clearance between bare pipe or insulation and inside of sleeve or between insulation and inside of sleeve. Sleeves in bearing walls and concrete slab on grade floors shall be steel pipe or cast-iron pipe. Sleeves in nonbearing walls or ceilings may be steel pipe, cast-iron pipe, galvanized sheet metal with lock-type longitudinal seam, or plastic. Except as otherwise specified, the annular space between pipe and sleeve, or between jacket over insulation and sleeve, shall be sealed as indicated with sealants conforming to ASTM C 920 and with a primer, backstop material and surface preparation as specified in Section 07900 JOINT SEALING. The annular space between pipe and sleeve, between bare insulation and sleeve or between jacket over insulation and sleeve shall not be sealed for interior walls which are not designated as fire rated. Sleeves through below-grade walls in contact with earth shall be recessed 1/2 inch from wall surfaces on both sides. Annular space between pipe and sleeve shall be filled with backing material and sealants in the joint between the pipe and concrete wall as specified above. Sealant selected for the earth side of the wall shall be compatible with dampproofing/waterproofing materials that are to be applied over the joint sealant. Pipe sleeves in fire-rated walls shall conform to the requirements in Section 07840 FIRESTOPPING.

#### 3.1.5.2 Flashing Requirements

Pipes passing through roof shall be installed through a 16 ounce copper flashing, each within an integral skirt or flange. Flashing shall be suitably formed, and the skirt or flange shall extend not less than 8 inches from the pipe and shall be set over the roof or floor membrane in a solid coating of bituminous cement. The flashing shall extend up the pipe a minimum of 10 inches. For cleanouts, the flashing shall be turned down into the hub and caulked after placing the ferrule. Pipes passing through pitched roofs shall be flashed, using lead or copper flashing, with an adjustable integral flange of adequate size to extend not less than 8 inches from the pipe in all directions and lapped into the roofing to provide a watertight seal. The annular space between the flashing and the bare pipe or between the flashing and the metal-jacket-covered insulation shall be sealed as indicated. Flashing for dry vents shall be turned down into the pipe to form a waterproof joint. Pipes, up to and including 10 inches in diameter, passing through roof may be installed through a cast-iron sleeve with caulking recess, anchor lugs, flashing-clamp device, and pressure ring with brass bolts. Flashing shield shall be fitted into the sleeve clamping device. A waterproofing clamping flange shall be installed.

#### 3.1.5.3 Waterproofing

Waterproofing at floor-mounted water closets shall be accomplished by forming a flashing guard from soft-tempered sheet copper. The center of

the sheet shall be perforated and turned down approximately 1-1/2 inches to fit between the outside diameter of the drainpipe and the inside diameter of the cast-iron or steel pipe sleeve. The turned-down portion of the flashing guard shall be embedded in sealant to a depth of approximately 1-1/2 inches; then the sealant shall be finished off flush to floor level between the flashing guard and drainpipe. The flashing guard of sheet copper shall extend not less than 8 inches from the drainpipe and shall be lapped between the floor membrane in a solid coating of bituminous cement. If cast-iron water closet floor flanges are used, the space between the pipe sleeve and drainpipe shall be sealed with sealant and the flashing guard shall be upturned approximately 1-1/2 inches to fit the outside diameter of the drainpipe and the inside diameter of the water closet floor flange. The upturned portion of the sheet fitted into the floor flange shall be sealed.

#### 3.1.5.4 Optional Counterflashing

Instead of turning the flashing down into a dry vent pipe, or caulking and sealing the annular space between the pipe and flashing or metal-jacket-covered insulation and flashing, counterflashing may be accomplished by utilizing the following:

- a. A standard roof coupling for threaded pipe up to 6 inches in diameter.
- b. A tack-welded or banded-metal rain shield around the pipe.

#### 3.1.5.5 Pipe Penetrations of Slab on Grade Floors

Where pipes, fixture drains, floor drains, cleanouts or similar items penetrate slab on grade floors, a groove 1/4 to 1/2 inch wide by 1/4 to 3/8 inch deep shall be formed around the pipe, fitting or drain. The groove shall be filled with a sealant as specified in Section 07900 JOINT SEALING.

#### 3.1.6 Fire Seal

Where pipes pass through fire walls, fire-partitions, fire-rated pipe chase walls or floors above grade, a fire seal shall be provided as specified in Section 07840 FIRESTOPPING.

#### 3.1.7 Supports

##### 3.1.7.1 General

Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while still supporting the load. Pipe guides and anchors shall be installed to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying, and undue strain. Piping subjected to vertical movement when operating temperatures exceed ambient temperatures shall be supported by variable spring hangers and supports or by constant support hangers. In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for an individual pipe in the multiple pipe run. Threaded sections of rods shall not be formed or bent.

##### 3.1.7.2 Pipe Supports and Structural Bracing, Seismic Requirements

Piping and attached valves shall be supported and braced to resist seismic loads as specified in Sections 13080 SEISMIC PROTECTION FOR MISCELLANEOUS EQUIPMENT and 15070 SEISMIC PROTECTION FOR MECHANICAL EQUIPMENT. Structural steel required for reinforcement to properly support piping, headers, and equipment, but not shown, shall be provided. Material used for supports shall be as specified in Section 05120 STRUCTURAL STEEL.

### 3.1.7.3 Pipe Hangers, Inserts, and Supports

Installation of pipe hangers, inserts and supports shall conform to MSS SP-58 and MSS SP-69, except as modified herein.

- a. Types 5, 12, and 26 shall not be used.
- b. Type 3 shall not be used on insulated pipe.
- c. Type 18 inserts shall be secured to concrete forms before concrete is placed. Continuous inserts which allow more adjustment may be used if they otherwise meet the requirements for type 18 inserts.
- d. Type 19 and 23 C-clamps shall be torqued per MSS SP-69 and shall have both locknuts and retaining devices furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.
- e. Type 20 attachments used on angles and channels shall be furnished with an added malleable-iron heel plate or adapter.
- f. Type 24 may be used only on trapeze hanger systems or on fabricated frames.
- g. Type 39 saddles shall be used on insulated pipe 4 inches and larger when the temperature of the medium is 60 degrees F or higher. Type 39 saddles shall be welded to the pipe.
- h. Type 40 shields shall:
  - (1) Be used on insulated pipe less than 4 inches.
  - (2) Be used on insulated pipe 4 inches and larger when the temperature of the medium is 60 degrees F or less.
  - (3) Have a high density insert for all pipe sizes. High density inserts shall have a density of 8 pcf or greater.
- i. Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves. Operating temperatures in determining hanger spacing for PVC pipe shall be 120 degrees F. Horizontal pipe runs shall include allowances for expansion and contraction.
- j. Vertical pipe shall be supported at each floor, except at slab-on-grade, at intervals of not more than 15 feet nor more than 8 feet from end of risers, and at vent terminations. Vertical pipe risers shall include allowances for expansion and contraction.

- k. Type 35 guides using steel, reinforced polytetrafluoroethylene (PTFE) or graphite slides shall be provided to allow longitudinal pipe movement. Slide materials shall be suitable for the system operating temperatures, atmospheric conditions, and bearing loads encountered. Lateral restraints shall be provided as needed. Where steel slides do not require provisions for lateral restraint the following may be used:
- (1) On pipe 4 inches and larger when the temperature of the medium is 60 degrees F or higher, a Type 39 saddle, welded to the pipe, may freely rest on a steel plate.
  - (2) On pipe less than 4 inches a Type 40 shield, attached to the pipe or insulation, may freely rest on a steel plate.
  - (3) On pipe 4 inches and larger carrying medium less than 60 degrees F a Type 40 shield, attached to the pipe or insulation, may freely rest on a steel plate.
- l. Pipe hangers on horizontal insulated pipe shall be the size of the outside diameter of the insulation. The insulation shall be continuous through the hanger on all pipe sizes and applications.
- m. Where there are high system temperatures and welding to piping is not desirable, the type 35 guide shall include a pipe cradle, welded to the guide structure and strapped securely to the pipe. The pipe shall be separated from the slide material by at least 4 inches or by an amount adequate for the insulation, whichever is greater.
- n. Hangers and supports for plastic pipe shall not compress, distort, cut or abrade the piping, and shall allow free movement of pipe except where otherwise required in the control of expansion/contraction.

### 3.1.8 Welded Installation

Plumbing pipe weldments shall be as indicated. Changes in direction of piping shall be made with welding fittings only; mitering or notching pipe to form elbows and tees or other similar type construction will not be permitted. Branch connection may be made with either welding tees or forged branch outlet fittings. Branch outlet fittings shall be forged, flared for improvement of flow where attached to the run, and reinforced against external strains. Beveling, alignment, heat treatment, and inspection of weld shall conform to ASME B31.1. Weld defects shall be removed and repairs made to the weld, or the weld joints shall be entirely removed and rewelded. After filler metal has been removed from its original package, it shall be protected or stored so that its characteristics or welding properties are not affected. Electrodes that have been wetted or that have lost any of their coating shall not be used.

### 3.1.9 Pipe Cleanouts

Pipe cleanouts shall be the same size as the pipe except that cleanout plugs larger than 4 inches will not be required. A cleanout installed in connection with cast-iron soil pipe shall consist of a long-sweep 1/4 bend or one or two 1/8 bends extended to the place shown. An extra-heavy

cast-brass or cast-iron ferrule with countersunk cast-brass head screw plug shall be caulked into the hub of the fitting and shall be flush with the floor. Cleanouts in connection with other pipe, where indicated, shall be T-pattern, 90-degree branch drainage fittings with cast-brass screw plugs, except plastic plugs shall be installed in plastic pipe. Plugs shall be the same size as the pipe up to and including 4 inches. Cleanout tee branches with screw plug shall be installed at the foot of soil and waste stacks, at the foot of interior downspouts, on each connection to building storm drain where interior downspouts are indicated, and on each building drain outside the building. Cleanout tee branches may be omitted on stacks in single story buildings with slab-on-grade construction or where less than 18 inches of crawl space is provided under the floor. Cleanouts on pipe concealed in partitions shall be provided with chromium plated bronze, nickel bronze, nickel brass or stainless steel flush type access cover plates. Round access covers shall be provided and secured to plugs with securing screw. Square access covers may be provided with matching frames, anchoring lugs and cover screws. Cleanouts in finished walls shall have access covers and frames installed flush with the finished wall. Cleanouts installed in finished floors subject to foot traffic shall be provided with a chrome-plated cast brass, nickel brass, or nickel bronze cover secured to the plug or cover frame and set flush with the finished floor. Heads of fastening screws shall not project above the cover surface. Where cleanouts are provided with adjustable heads, the heads shall be cast iron.

### 3.2 WATER HEATERS AND HOT WATER STORAGE TANKS

#### 3.2.1 Relief Valves

No valves shall be installed between a relief valve and its water heater or storage tank. The P&T relief valve shall be installed where the valve actuator comes in contact with the hottest water in the heater. Whenever possible, the relief valve shall be installed directly in a tapping in the tank or heater; otherwise, the P&T valve shall be installed in the hot-water outlet piping. A vacuum relief valve shall be provided on the cold water supply line to the hot-water storage tank or water heater and mounted above and within 6 inches above the top of the tank or water heater.

#### 3.2.2 Installation of Gas-Fired Water Heater

Installation shall conform to NFPA 54 for gas fired heaters. Circulating systems need not have heat traps installed. An acceptable heat trap may be a piping arrangement such as elbows connected so that the inlet and outlet piping make vertically upward runs of not less than 24 inches just before turning downward or directly horizontal into the water heater's inlet and outlet fittings. Commercially available heat traps, specifically designed by the manufacturer for the purpose of effectively restricting the natural tendency of hot water to rise through vertical inlet and outlet piping during standby periods may also be approved. Stacks shall be installed in accordance with NFPA 54 and the hot water heater manufacturer's recommendations.

#### 3.2.3 Heat Traps

Piping to and from each water heater and hot water storage tank shall be routed horizontally and downward a minimum of 2 feet before turning in an upward direction.

#### 3.2.4 Connections to Water Heaters

Connections of metallic pipe to water heaters shall be made with dielectric unions or flanges.

### 3.3 FIXTURES AND FIXTURE TRIMMINGS

Polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Angle stops, straight stops, stops integral with the faucets, or concealed type of lock-shield, and loose-key pattern stops for supplies with threaded, sweat or solvent weld inlets shall be furnished and installed with fixtures. Where connections between copper tubing and faucets are made by rubber compression fittings, a beading tool shall be used to mechanically deform the tubing above the compression fitting. Exposed traps and supply pipes for fixtures and equipment shall be connected to the rough piping systems at the wall, unless otherwise specified under the item. Floor and wall escutcheons shall be as specified. Drain lines and hot water lines of fixtures for handicapped personnel shall be insulated and do not require polished chrome finish. Plumbing fixtures and accessories shall be installed within the space shown.

#### 3.3.1 Fixture Connections

Where space limitations prohibit standard fittings in conjunction with the cast-iron floor flange, special short-radius fittings shall be provided. Connections between earthenware fixtures and flanges on soil pipe shall be made gastight and watertight with a closet-setting compound or neoprene gasket and seal. Use of natural rubber gaskets or putty will not be permitted. Fixtures with outlet flanges shall be set the proper distance from floor or wall to make a first-class joint with the closet-setting compound or gasket and fixture used.

#### 3.3.2 Height of Fixture Rims Above Floor

Lavatories shall be mounted with rim 31 inches above finished floor. Wall-hung drinking fountains and water coolers shall be installed with rim 42 inches above floor. Wall-hung service sinks shall be mounted with rim 28 inches above the floor. Installation of fixtures for use by the physically handicapped shall be in accordance with CABO A117.1.

#### 3.3.3 Shower Bath Outfits

The area around the water supply piping to the mixing valves and behind the escutcheon plate shall be made watertight by caulking or gasketing.

#### 3.3.4 Fixture Supports

Fixture supports for off-the-floor lavatories, **urinals** and other fixtures of similar size, design, and use, shall be of the chair-carrier type. The carrier shall provide the necessary means of mounting the fixture, with a foot or feet to anchor the assembly to the floor slab. Adjustability shall be provided to locate the fixture at the desired height and in proper relation to the wall. Support plates, in lieu of chair carrier, shall be fastened to the wall structure only where it is not possible to anchor a floor-mounted chair carrier to the floor slab.

##### 3.3.4.1 Support for Steel Stud Frame Partitions

Chair carrier shall be used. The anchor feet and tubular uprights shall be of the heavy duty design; and feet (bases) shall be steel and welded to a

square or rectangular steel tube upright. Wall plates, in lieu of floor-anchored chair carriers, shall be used only if adjoining steel partition studs are suitably reinforced to support a wall plate bolted to these studs.

### 3.3.5 Backflow Prevention Devices

Plumbing fixtures, equipment, and pipe connections shall not cross connect or interconnect between a potable water supply and any source of nonpotable water. Backflow preventers shall be installed where indicated and in accordance with ICC Plumbing Code at all other locations necessary to preclude a cross-connect or interconnect between a potable water supply and any nonpotable substance. In addition backflow preventers shall be installed at all locations where the potable water outlet is below the flood level of the equipment, or where the potable water outlet will be located below the level of the nonpotable substance. Backflow preventers shall be located so that no part of the device will be submerged. Backflow preventers shall be of sufficient size to allow unrestricted flow of water to the equipment, and preclude the backflow of any nonpotable substance into the potable water system. Bypass piping shall not be provided around backflow preventers. Access shall be provided for maintenance and testing. Each device shall be a standard commercial unit.

### 3.3.6 Access Panels

Access panels shall be provided for concealed valves and controls, or any item requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced, maintained, or replaced. Access panels shall be as specified in Section 05500 MISCELLANEOUS METAL.

### 3.3.7 Traps

Each trap shall be placed as near the fixture as possible, and no fixture shall be double-trapped. Traps installed on cast-iron soil pipe shall be cast iron. Traps installed on steel pipe or copper tubing shall be recess-drainage pattern, or brass-tube type. Traps installed on plastic pipe may be plastic conforming to ASTM D 3311.

## 3.4 IDENTIFICATION SYSTEMS

### 3.4.1 Identification Tags

Identification tags made of brass, engraved laminated plastic, or engraved anodized aluminum, indicating service and valve number shall be installed on valves, except those valves installed on supplies at plumbing fixtures. Tags shall be 1-3/8 inch minimum diameter, and marking shall be stamped or engraved. Indentations shall be black, for reading clarity. Tags shall be attached to valves with No. 12 AWG, copper wire, chrome-plated beaded chain, or plastic straps designed for that purpose.

### 3.4.2 Pipe Color Code Marking

Color code marking of piping shall be as specified in Section 09900 PAINTING, GENERAL.

## 3.5 ESCUTCHEONS

Escutcheons shall be provided at finished surfaces where bare or insulated

piping, exposed to view, passes through floors, walls, or ceilings, except in boiler, utility, or equipment rooms. Escutcheons shall be fastened securely to pipe or pipe covering and shall be satin-finish, corrosion-resisting steel, polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or setscrew.

### 3.6 PAINTING

Painting of pipes, hangers, supports, and other iron work, either in concealed spaces or exposed spaces, is specified in Section 09900 PAINTING, GENERAL.

### 3.7 TESTS, FLUSHING AND DISINFECTION

#### 3.7.1 Plumbing System

The following tests shall be performed on the plumbing system in accordance with ICC Plumbing Code.

- a. Drainage and Vent Systems Test. The final test shall include a smoke test.
- b. Building Sewers Tests.
- c. Water Supply Systems Tests.

##### 3.7.1.1 Test of Backflow Prevention Assemblies

Backflow prevention assembly shall be tested using gauges specifically designed for the testing of backflow prevention assemblies. Gauges shall be tested annually for accuracy in accordance with the University of Southern California's Foundation of Cross Connection Control and Hydraulic Research or the American Water Works Association Manual of Cross Connection (Manual M-14). Report form for each assembly shall include, as a minimum, the following:

Data on Device	Data on Testing Firm
Type of Assembly	Name
Manufacturer	Address
Model Number	Certified Tester
Serial Number	Certified Tester No.
Size	Date of Test
Location	
Test Pressure Readings	Serial Number and Test Data of
Gauges	

If the unit fails to meet specified requirements, the unit shall be repaired and retested.

#### 3.7.2 Defective Work

If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated. Repairs to piping shall be made with new materials. Caulking of screwed joints or holes will not be acceptable.

#### 3.7.3 System Flushing

#### 3.7.3.1 During Flushing

Before operational tests or disinfection, potable water piping system shall be flushed with potable water. Sufficient water shall be used to produce a water velocity that is capable of entraining and removing debris in all portions of the piping system. This requires simultaneous operation of all fixtures on a common branch or main in order to produce a flushing velocity of approximately 4 fps through all portions of the piping system. In the event that this is impossible due to size of system, the Contracting Officer (or the designated representative) shall specify the number of fixtures to be operated during flushing. Contractor shall provide adequate personnel to monitor the flushing operation and to ensure that drain lines are unobstructed in order to prevent flooding of the facility. Contractor shall be responsible for any flood damage resulting from flushing of the system. Flushing shall be continued until entrained dirt and other foreign materials have been removed and until discharge water shows no discoloration.

#### 3.7.3.2 After Flushing

System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced. After flushing and cleaning, systems shall be prepared for testing by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building due to the Contractor's failure to properly clean the piping system shall be repaired by the Contractor. When the system flushing is complete, the hot-water system shall be adjusted for uniform circulation. Flushing devices and automatic control systems shall be adjusted for proper operation.

#### 3.7.4 Operational Test

Upon completion of flushing and prior to disinfection procedures, the Contractor shall subject the plumbing system to operating tests to demonstrate satisfactory functional and operational efficiency. Such operating tests shall cover a period of not less than 8 hours for each system and shall include the following information in a report with conclusion as to the adequacy of the system:

- a. Time, date, and duration of test.
- b. Water pressures at the most remote and the highest fixtures.
- c. Operation of each fixture and fixture trim.
- d. Operation of each valve, hydrant, and faucet.
- e. Pump suction and discharge pressures.
- f. Temperature of each domestic hot-water supply.
- g. Operation of each floor drain by flooding with water.
- h. Operation of each vacuum breaker and backflow preventer.

#### 3.7.5 Disinfection

After operational tests are complete, the entire domestic hot- and

cold-water distribution system shall be disinfected. System shall be flushed as specified, before introducing chlorinating material. The chlorinating material shall be hypochlorites or liquid chlorine. Water chlorination procedure shall be in accordance with AWWA M20. The chlorinating material shall be fed into the water piping system at a constant rate at a concentration of at least 50 parts per million (ppm). A properly adjusted hypochlorite solution injected into the main with a hypochlorinator, or liquid chlorine injected into the main through a solution-feed chlorinator and booster pump, shall be used. The chlorine residual shall be checked at intervals to ensure that the proper level is maintained. Chlorine application shall continue until the entire main is filled. The water shall remain in the system for a minimum of 24 hours. Each valve in the system being disinfected shall be opened and closed several times during the contact period to ensure its proper disinfection. Following the 24-hour period, no less than 25 ppm chlorine residual shall remain in the system. Water tanks shall be disinfected by the addition of chlorine directly to the filling water. Following a 6 hour period, no less than 50 ppm chlorine residual shall remain in the tank. If after the 24 hour and 6 hour holding periods, the residual solution contains less than 25 ppm and 50 ppm chlorine respectively, flush the piping and tank with potable water, and repeat the above procedures until the required residual chlorine levels are satisfied. The system including the tanks shall then be flushed with clean water until the residual chlorine level is reduced to less than one part per million. During the flushing period each valve and faucet shall be opened and closed several times. Samples of water in disinfected containers shall be obtained from several locations selected by the Contracting Officer. The samples of water shall be tested for total coliform organisms (coliform bacteria, fecal coliform, streptococcal, and other bacteria) in accordance with AWWA EWW. The testing method used shall be either the multiple-tube fermentation technique or the membrane-filter technique. Disinfection shall be repeated until tests indicate the absence of coliform organisms (zero mean coliform density per 100 milliliters) in the samples for at least 2 full days. The system will not be accepted until satisfactory bacteriological results have been obtained.

### 3.7.6 Flushing of Potable Water System

As an option to the system flushing specified above, the potable water system shall be flushed and conditioned until the residual level of lead is less than that specified by the base industrial hygienist. The water supply to the building shall be tested separately to ensure that any lead contamination found during potable water system testing is due to work being performed inside the building.

### 3.8 PLUMBING FIXTURE SCHEDULE

#### P-1 WATER CLOSET:

Low-consumption, 1.6 gallons per flush, round front, ASME A112.19.2M, floor mounted. Floor flange shall be copper alloy, cast iron, or plastic.

Gasket shall be wax type.

Seat - IAPMO Z124.5, Type A, white plastic, round, closed front with cover.

Flush Tank - An adequate quantity of water shall be provided to flush and clean the fixture served. The water supply to flush tanks equipped for manual flushing shall be controlled by a float valve or other automatic device designed to refill the tank after each discharge, and to completely

shut off the water flow to the tank when the tank is filled to operational capacity. Water closets having their flush valve seat located below the flood level rim of the closet bowl shall have a ballcock installed within a sheath or in a separate and isolated compartment of the tank, both to have visible discharge onto the floor in case of failure. Provision shall be made to automatically supply water to the fixture so as to refill the trap seal after each flushing. Ballcocks shall meet ASSE 1002.

Flush Valve in Flush Tank - Flush valve seats in tanks for flushing water closets shall be at least 1 inch above the flood level rim of the bowl connected thereto, except in approved water closet and flush tank combinations designed so that when the tank is flushed and the fixture is clogged or partially clogged, the flush valve shall close tightly so that water will not spill continuously over the rim of the bowl or back flow from the bowl to the tank.

**P-1A WATER CLOSET HANDICAPPED:**

Height of top rim of bowl shall be in accordance with CABO A117.1; elongated bowl and seat; other features are the same as P-1.

**P-2 SHOWER:** Shower heads, CID A-A-240 other than emergency showers, shall be adjustable spray type and shall include a non-removable, tamperproof device to limit water flow to 2.5 gpm when tested in accordance with ASME A112.18.1M.

**Cabinet Showers:** Free standing cabinet, single unit with receptor; 36 inches wide by 36 inches deep, acrylic fiber construction. Cabinet shall include curtain rod, trim, and concealed fittings.

**Shower Light Fixture:** Light fixture shall be furnished from the shower unit manufacturer. Refer to Electrical drawings for specification.

**P-3 URINAL:**

**Wall hanging, with integral trap and extended shields, ASME A112.19.2M siphon jet. Top supply connection, back outlet.**

**Flushometer Valve - Similar to Flushometer Valve for P-1. The maximum water use shall be 1 gallon per flush.**

**Wall hanging urinal shall be in accordance with IAPMO Z124.9 and be a waterless, non-flushing type, with replaceable trap insert having circular outer rim opening for flow. The replaceable trap insert shall contain a low specific gravity immiscible barrier liquid. The liquid shall be biodegradable. The urinal shall not require chair carrier. The urinal and trap assembly shall maintain a sufficient barrier of immiscible liquid necessary to inhibit backflow of sewer gases.**

**P-3 LAVATORY:**

Manufacturer's standard sink depth, vitreous china ASME A112.19.2M, countertop, oval.

**Faucet - Faucets shall meet the requirements of NSF 61, Section 9. Faucets shall be center set type. Faucets shall have metal replaceable cartridge control unit or metal cartridge units with diaphragm which can be replaced**

without special tools. Valves and handles shall be copper alloy. Connection between valve and spout for center-set faucet shall be of rigid metal tubing. Flow shall be limited to 2.5 gpm at a flowing pressure of 80 psi.

Handles - Crown type. Cast, formed, or drop forged copper alloy.

Drain - Pop-up drain shall include stopper, lift rods, jam nut, washer, and tail piece. See paragraph FIXTURES for optional plastic accessories.

**P-3A WHEELCHAIR LAVATORY:**

Vitreous china, ASME A112.19.2M, wheelchair lavatory with wrist or elbow controls 20 inches wide x 27 inches deep with gooseneck spout. Flow shall be limited to 2.5 gpm at a flowing water pressure of 80 psi.

Drain - Strainer shall be copper alloy or stainless steel.

**P-3B LAVATORY:**

***Vitreous china, ASME A112.19.2M, lavatory with hand controls 20 inches wide x 18 inches deep with gooseneck spout. Flow shall be limited to 2.5 gpm at a flowing water pressure of 80 psi.***

***Drain - Strainer shall be copper alloy or stainless steel.***

**P-4 MOP SINK:**

Floor mounted. Sides = 36 inches by 36 inches; Inside depth = 6 inches. One piece precast terrazzo of black and white marble chips in 3000 psi gray portland cement. Drain body shall be stainless steel cast integral, caulked lead connection for 3 inch pipe. Stainless steel caps on all curbs. Removable stainless steel strainer plate. Chrome plated brass faucet with vacuum breaker, integral stops, adjustable wall brace, pail hook, 3/4 inch hose thread on spout, four arm handles, center of spout outlet from back of wall to be 8 inches. Faucet shall have replaceable seats and stems shall rotate onto seat. 30 in long flexible heavy duty 5/8 inch rubber hose, cloth reinforced, with 3/4 inch chrome coupling at one end. 18 gauge no. 302 stainless steel hose bracket, with rubber grip, 5 in long by 3 in wide. 24 in long by 3 in wide, 18 gauge no 302 stainless steel mop hanger with flat head, slotted machine screws.

**P-5 WASHING MACHINE (ROUGH-IN ONLY)**

Washing machine outlet box shall be one piece high-impact plastic with separate hot and cold brass ball valves, and 2 in plastic drain pipe. Box shall be designed for recessed wall installation.

**P-6 WATER COOLER DRINKING FOUNTAINS:**

Drinking fountains shall meet the requirements of NSF 61, Section 9. Water cooler drinking fountains shall: be self contained, conform to ARI 1010, use one of the fluorocarbon gases conforming to ARI 700 and ASHRAE 34 which has an Ozone Depletion Potential of less than or equal to 0.05, have a capacity to deliver 8 gph of water at 50 degrees F with an inlet water temperature of 80 degrees F while residing in a room environment of 90 degrees F, and have self-closing valves. Self-closing valves shall have automatic stream regulators, have a flow control capability, have a push button actuation or have a cross-shaped index metal turn handle without a

hood. Exposed surfaces of stainless steel shall have No. 4 general polish finish. Spouts shall provide a flow of water at least 4 inches high so as to allow the insertion of a cup or glass under the flow of water.

Surface Wall-Mounted - Surface wall-mounted units shall be handicapped accessible 18 inches wide, 18 3/4 inches deep, and have a back height of 23 inches. The bowl shall be 7 inches high and made of stainless steel. The unit shall have concealed fasteners and be for interior installation. A clear knee space shall exist between the bottom of the unit and the floor or ground of at least 27 inches. The spout height shall be no more than 36 inches above the floor or ground to the outlet. The spout shall be at the front of the unit and direct the water flow in a trajectory that is parallel or nearly parallel to the front of the unit. The unit shall have front and side push bars.

P-7 LAUNDRY SINK:

Single bowl, countertop self-rimming 25 x 22 inches enameled cast iron ASME A112.19.1M.

Faucet and Spout - Cast copper alloy, wrought copper alloy, cast iron, or stainless steel, with backflow preventer. Spout shall be "L" shaped type. Faucets shall have replaceable seat and the stem shall rotate onto the seat. Strainers shall have internal threads. Combination faucets shall be mounted on the tub back. Spouts shall be externally threaded for hose connection.

Handles - Cast copper alloy, wrought copper alloy, or stainless steel, lever type.

Traps - Copper alloy, or cast iron.

### 3.9 POSTED INSTRUCTIONS

Framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the systems.

3.10 TABLES

TABLE I  
 PIPE AND FITTING MATERIALS FOR  
 DRAINAGE, WASTE, AND VENT PIPING SYSTEMS

Item #	Pipe and Fitting Materials	SERVICE			
		A	B	C	D
1	Cast iron soil pipe and fittings, hub and spigot, ASTM A 74 with compression gaskets	X	X	X	X
2	Cast iron soil pipe and fittings hubless, CISPI 301 and ASTM A 888		X	X	X
3	Cast iron drainage fittings, threaded, ASME B16.12 for use with Item 10	X		X	X
4	Cast iron screwed fittings (threaded) ASME B16.4 for use with Item 10				X
5	Grooved pipe couplings, ferrous and non-ferrous pipe ASTM A 536 and ASTM A 47/A 47M	X	X		X
6	Ductile iron grooved joint fittings for ferrous pipe ASTM A 536 and ASTM A 47/A 47M for use with Item 5	X	X		X
7	Bronze sand casting grooved joint pressure fittings for non-ferrous pipe ASTM B 584, for use with Item 5	X	X		X
8	Wrought copper grooved joint pressure fittings for non-ferrous pipe ASTM B 75 C12200, ASTM B 152, ASTM B 152M, C11000, ASME B16.22 ASME B16.22 for use with Item 5	X	X		
9	Malleable-iron threaded fittings, galvanized ASME B16.3 for use with Item 10				X
10	Steel pipe, seamless galvanized, ASTM A 53/A 53M, Type S, Grade B	X			X
11	Seamless red brass pipe, ASTM B 43		X	X	
12	Bronzed flanged fittings, ASME B16.24 for use with Items 11 and 14				X

TABLE I  
 PIPE AND FITTING MATERIALS FOR  
 DRAINAGE, WASTE, AND VENT PIPING SYSTEMS

Item #	Pipe and Fitting Materials	SERVICE			
		A	B	C	D
13	Cast copper alloy solder joint pressure fittings, ASME B16.18 for use with Item 14				X
14	Seamless copper pipe, ASTM B 42				X
15	Cast bronze threaded fittings, ASME B16.15				X
16	Copper drainage tube, (DWV), ASTM B 306	X*	X	X*	X
17	Wrought copper and wrought alloy solder-joint drainage fittings. ASME B16.29	X	X	X	X
18	Cast copper alloy solder joint drainage fittings, DWV, ASME B16.23	X	X	X	X
19	Polyvinyl Chloride plastic drain, waste and vent pipe and fittings, ASTM D 2665, ASTM F 891, (Sch 40) ASTM F 1760	X	X	X	X

SERVICE:

- A - Underground Building Soil, Waste and Storm Drain
- B - Aboveground Soil, Waste, Drain In Buildings
- C - Underground Vent
- D - Aboveground Vent

\* - Hard Temper

TABLE II  
 PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS

Item No.	Pipe and Fitting Materials	SERVICE			
		A	B	C	D
1	Malleable-iron threaded fittings, a. Galvanized, ASME B16.3 for use with Item 4a	X	X	X	X
	b. Same as "a" but not galvanized for use with Item 4b			X	
2	Grooved pipe couplings, ferrous pipe ASTM A 536 and ASTM A 47/A 47M, non-ferrous pipe, ASTM A 536 and ASTM A 47/A 47M,	X	X	X	
3	Ductile iron grooved joint fittings for ferrous pipe ASTM A 536 and ASTM A 47/A 47M, for use with Item 2	X	X	X	
4	Steel pipe: a. Seamless, galvanized, ASTM A 53/A 53M, Type S, Grade B	X	X	X	X
	b. Seamless, black, ASTM A 53/A 53M, Type S, Grade B			X	
5	Seamless red brass pipe, ASTM B 43	X	X		X
6	Bronze flanged fittings, ASME B16.24 for use with Items 5 and 7	X	X		X
7	Seamless copper pipe, ASTM B 42	X	X		X
8	Seamless copper water tube, ASTM B 88, ASTM B 88M	X**	X**	X**	X***
9	Cast bronze threaded fittings, ASME B16.15 for use with Items 5 and 7	X	X		X
10	Wrought copper and bronze solder-joint pressure fittings, ASME B16.22 for use with Items 5 and 7	X	X	X	X
11	Cast copper alloy solder-joint pressure fittings,	X	X	X	X

TABLE II  
 PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS

Item No.	Pipe and Fitting Materials	SERVICE			
		A	B	C	D
	ASME B16.18 for use with Items 8 and 9				
12	Bronze and sand castings grooved joint pressure fittings for non-ferrous pipe ASTM B 584, for use with Item 2	X	X	X	
13	Polyvinyl chloride (PVC) plastic pipe, Schedules 40, 80, and 120, ASTM D 1785	X			X
14	Polyvinyl chloride (PVC) pressure-rated pipe (SDR Series), ASTM D 2241	X			X
15	Polyvinyl chloride (PVC) plastic pipe fittings, Schedule 40, ASTM D 2466	X			X
16	Socket-type polyvinyl chloride (PVC) plastic pipe fittings, schedule 80, ASTM D 2467 for use with Items 14 and 15	X			X
17	Threaded polyvinyl chloride (PVC) plastic pipe fittings, schedule 80, ASTM D 2464	X			X
18	Joints for IPS pvs pipe using solvent cement, ASTM D 2672	X			X
19	Filament-wound reinforced thermosetting resin (RTRP) pipe, ASTM D 2996	X	X		
20	Steel pipeline flanges, MSS SP-44	X	X		
21	Fittings: brass or bronze; ASME B16.15, and ASME B16.18 ASTM B 828	X	X		
22	Carbon steel pipe unions, socket-welding and threaded, MSS SP-83	X	X	X	
23	Malleable-iron threaded pipe unions ASME B16.39	X	X		
24	Nipples, pipe threaded	X	X	X	

TABLE II  
 PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS

Item No.	Pipe and Fitting Materials	SERVICE			
		A	B	C	D

ASTM A 733

A - Cold Water Aboveground

B - Hot Water 180 degrees F Maximum Aboveground

C - NOT USED

D - Cold Water Service Belowground

Indicated types are minimum wall thicknesses.

\*\* - Type L - Hard

\*\*\* - Type K - Hard temper with brazed joints only or type K-soft temper without joints in or under floors

\*\*\*\* - In or under slab floors only brazed joints

-- End of Section --

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