

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE OF PAGES

1

2. AMENDMENT/MODIFICATION NO.
0005

3. EFFECTIVE DATE
7/02/03

4. REQUISITION/PURCHASE REQ. NO.

5. PROJECT NO. (If applicable)

6. ISSUED BY CODE

7. ADMINISTERED BY (If other than Item 6) CODE

US Army Corps of Engineers, Philadelphia
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Michelle Bertoline, 215-656-6914

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

(√)

9A. AMENDMENT OF SOLICITATION NO.

DACW61-03-B-0011

X

9B. DATED (SEE ITEM 11)

6/4/03

10A. MODIFICATION OF CONTRACTS/ORDER NO.

10B. DATED (SEE ITEM 13)

CODE

FACILITY CODE

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.

Offers 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 _____ 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 ACCESS ROAD, F.E. WALTER DAM, WHITE HAVEN, PENNSYLVANIA

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 is not, 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.)

THIS AMENDMENT DOES NOT EXTEND THE BID OPENING DATE OF 10 JULY 2003 AT 11:00 A.M.

(CONTINUED ON NEXT PAGE)

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)

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)

14. DESCRIPTION OF AMENDMENT (continued)

a. CAUTION TO BIDDERS: Please delete the "CAUTION TO BIDDERS" page in its entirety and substitute the revised page, annotated Amendment No. 0005, attached hereto.

b. INVITATION PAGE (Page 5): Please delete the INVITATION PAGE (Page 5) in its entirety and substitute the revised page, annotated Amendment No. 0005, attached hereto

c. SF 1442 AND BIDDING SCHEDULE: Section 00010, Page 3 - Please delete page 00010-3 in its entirety and substitute the new pages, 00010-3 and 00010-4, annotated Amendment No. 0005, attached hereto.

d. SPECIFICATIONS:

NOTE: The changes in the following specification pages are indicated in ***bold italics***.

1. Section 02630: Please delete pages 02630-3 thru 02630-5 in their entirety and substitute the new pages of the same number, annotated Amendment No. 0005, attached hereto.

2. Section 16375: Please delete this section in its entirety and substitute the new section, annotated Amendment No. 0005, attached hereto.

e. CONTRACT DRAWINGS: Drawing Nos. 61868, 61879, and 61882: Please delete these drawings in their entirety and substitute the revised sheets, of the same Drawing Numbers, with a revision date of 1 July 2003.

f. Please indicate receipt of this amendment on Standard Form 1442 (SOLICITATION, OFFER, AND AWARD) as Amendment No. 0005. Failure to acknowledge all amendments may be cause for rejection of the bid.

CAUTION TO BIDDERS

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

- Are you registered in the Central Contractor Database? See DFARS Clause 252.204-7004 "Required Central Contractor Registration" in Section 00700 of this solicitation?
- Are in compliance with the VETS-100 reporting requirement? See FAR 52. 52.222-37 "Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans in Section" in Section 00700 of this solicitation?
- Have you acknowledged all amendments? Have you submitted your bid on the latest amended bid schedule?
- Have you completed the "Representations and Certifications" {Section 00600} portion of the Solicitation? Is your Contractor Establishment Code listed on the Standard Form 1442?
- Is your bid properly signed by an officer of your company?
- If a bid guarantee is required, is it included with your bid and is it in the proper amount? {Usually 20 percent of the total bid price, including any options or additives.} If your bid guarantee is in the form of a bid bond, is the bond properly signed by both the bidder and surety (BONDING DOCUMENTS, INCLUDING THE POWER OF ATTORNEY, SHOULD BEAR AN ORIGINAL SIGNATURE BY AN OFFICER OF THE SURETY) and are all required seals affixed? A bid guarantee is required when your bid exceeds \$100,000.00. A late bid guarantee is treated the same as a late bid.
- Is the name in which you submitted the bid the same on your bid as on the bid bond?
- If required, have you entered a unit price for each bid item? {The solicitation will specifically state when this is necessary.}
- The Government may reject a bid as nonresponsive if it is materially and mathematically unbalanced as to price for any bid item or combination of items. A bid is unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.
- Are decimals in unit prices in the proper places? Are your figures legible?
- Are the extensions of your unit prices, and your total bid price correct?
- Are all erasures or corrections initialed by the person signing the bid?
- Have you restricted your bid by altering the provisions of the solicitation?
- If you are a large business and your bid is greater than \$500,000 for service or \$1,000,000.00 for construction have you included your Sub-Contracting Plan in your bid package? (NOTE: PLEASE REFER TO SUBCONTRACTING PLAN IN SOLICITATION FOR GOALS).
- Is the envelope containing your bid properly identified that it is a sealed bid and does it contain the correct solicitation number and bid opening time?
- Will your bid arrive on time? See paragraph entitled "Late Submissions, Modifications, and Withdrawals of Bids" in the Instructions to Bidders {Section 00100} of the solicitation.

July 1, 2003

This page was intentionally left blank for duplex printing.

INVITATION NO. DACW61-03-B-0011

PHILADELPHIA DISTRICT
CORPS OF ENGINEERS

INVITATION FOR BIDS
FOR

UPGRADE ACCESS ROAD

F.E. WALTER DAM
WHITE HAVEN, PA

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

II. BIDDERS ARE REQUIRED TO COMPLETE THE REPRESENTATION AND CERTIFICATIONS PORTION OF SECTION 00600 OF THIS SOLICITATION AND SUBMIT THIS WITH THEIR BID.

This page was intentionally left blank for duplex printing.

BID SCHEDULE
 (To be attached to SF 1442)

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
1.	Common Excavation	34,250	CY	\$	\$
2.	Rock Excavation	6,203	CY	\$	\$
3.	Seismic Monitoring	1	JOB	LS	\$
4.	Select Fill	7,650	CY	\$	\$
5.	Aggregate Subbase Course	2,610	CY	\$	\$
6.	Rapid-Draining Material (RDM) Drainage Layer	1	JOB	LS	\$
7.	Dense-Graded Aggregate (DGA) Base Course	1	JOB	LS	\$
8.	Bituminous Concrete Wearing Course	1,894	TON	\$	\$
9.	Bituminous Surface Treatment	1	JOB	LS	\$
10.	Pavement Base Drains	1	JOB	LS	\$
11.	Storm Drainage	1	JOB	LS	\$
12.	Turf Reinforcement Mat	1	JOB	LS	\$
13.	Riprap	580	TON	\$	\$
14.	Guide Rail	1	JOB	LS	\$
15.	Pavement Markings/ Traffic Control Signs	1	JOB	LS	\$
16.	Modifications to Piezometers	1	JOB	LS	\$
17.	Modifications to Settlement Pipes	1	JOB	LS	\$
18.	Modifications to Electrical And Telephone Systems	1	JOB	LS	\$
19.	Stone-Lined Storm Drainage Ditch	60	TON	\$	\$
20.	Bituminous Concrete Binder Course	2,323	TON	\$	\$
21.	Crash Beam Barrier Gates	1	JOB	LS	\$

22. Work Completed by
Pennsylvania Power
and Light

1	JOB	LS	\$
---	-----	----	----

TOTAL ESTIMATED BID: \$ _____

Section 01720 SURVEY REQUIREMENTS.

PART 2 PRODUCTS

2.1 STORM DRAIN PIPE

Storm drain pipe shall be of the sizes indicated and shall conform to the requirements specified. Storm drain pipe shall be corrugated steel pipe, in accordance with AASHTO M 190 Type A (fully bituminous coated) and ASTM A 760/A 760M zinc or aluminum coated pipe, Type I (full circular cross section), pipe with annular or helical 2-2/3 by 1/2 inch corrugations. **Corrugated Metal Pipe shall have a minimum wall thickness of .064".**
Corrugated Metal Pipe-Arch shall have a minimum wall thickness of .109".

2.2 ENDWALLS

Endwalls shall be precast and/or cast-in-place concrete meeting the specifications in Section 03307 CONCRETE FOR MINOR STRUCTURES.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Mortar

Mortar for pipe connections to the endwalls, and, for use as leveling layer under the endwalls, shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water.

2.3.2 Pipe Joints

2.3.2.1 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877.

2.3.3 Bedding for Endwalls

Bedding for endwalls shall be rapid-draining material as specified in Section 02721 RAPID DRAINING MATERIAL (RDM) DRAINAGE LAYER.

2.4 STONE-LINED DITCH

The stone-lined ditch shall be lined with coarse aggregate. The coarse aggregate shall be in accordance with the material requirements of PennDOT Specifications, Section 703.2 with a gradation as specified for an AASHTO Number 1 as indicated in Table C of that same section. Geotextile shall be as specified in Section 02373 GEOTEXTILE.

PART 3 EXECUTION

3.1 DIVERSION OF STREAM

Stream shall be diverted around the work site, to maintain flow continuously, during all culvert installation activities.

3.2 REMOVAL OF EXISTING STORM DRAINS

The Contractor shall remove existing storm drains in the locations indicated on the contract drawings.

3.3 EXCAVATION, BACKFILLING, AND COMPACTION FOR STORM DRAIN PIPE

Excavation, backfilling, and compaction for storm drains shall be in accordance with the applicable portions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.4 BEDDING FOR STORM DRAIN PIPE

The Contractor shall form a cradle in the bedding material by means of a template conforming to the curvature of the outside surface of the bottom of the pipe to provide uniform contact under and around the pipe. Bedding shall be placed as specified in Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.5 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (%)
Corrugated Steel and Aluminum Alloy	5

Not less than 30 days after the completion of backfilling, the Government may perform a deflection test on the entire length of installed flexible pipe using a mandrel or other suitable device. Installed flexible pipe showing deflections greater than those indicated above shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.5.1 Corrugated Metal Pipe

Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream, and with longitudinal laps on the sides. Fully paved steel pipe shall have a painted or otherwise applied label inside the pipe indicating sheet thickness of pipe. Any unprotected metal in the joints shall be coated with bituminous material as specified in AASHTO M 190 or AASHTO M 243. Interior coating shall be protected against damage from insertion or removal of struts or tie wires. Lifting lugs shall be used to facilitate moving pipe without damage to interior coating. During transportation and installation, pipe and coupling bands shall be handled with care to preclude damage to the lining. Damaged linings shall be repaired in accordance with the manufacturer's recommendations prior to placing backfill. Pipe on which lining has been damaged to such an extent that satisfactory field repairs cannot be made shall be removed and replaced.

3.6 JOINTING

3.6.1 Corrugated Metal Pipe

3.6.1.1 Field Joints

Transverse field joints shall be designed so that the successive connection of pipe sections will form a continuous line free of appreciable irregularities in the flow line. In addition, the joints shall meet the general performance requirements described in ASTM A 798/A 798M. Suitable transverse field joints which satisfy the requirements for one or more of the joint performance categories can be obtained with the following types of connecting bands furnished with suitable band-end fastening devices: corrugated bands, bands with projections, flat bands, and bands of special design that engage factory reformed ends of corrugated pipe. The space between the pipe and connecting bands shall be kept free from dirt and grit so that corrugations fit snugly. The connecting band, while being tightened, shall be tapped with a soft-head mallet of wood, rubber or plastic, to take up slack and ensure a tight joint. Field joints for each type of corrugated metal pipe shall maintain pipe alignment during construction and prevent infiltration of fill material during the life of the installations. The type, size, and sheet thickness of the band and the size of angles or lugs and bolts shall be as indicated or where not indicated, shall be as specified in the applicable standards or specifications for the pipe.

3.7 ENDWALLS

The PennDOT Standard Detail, from the PennDOT Standard Drawings, for a Type D Endwall, as referenced on the contract drawings, are attached to this section. Bedding shall be compacted as specified in paragraph entitled COMPACTION in Section 02721 RAPID DRAINING MATERIAL (RDM) DRAINAGE LAYER except the bedding shall be compacted to a minimum of 95 percent of laboratory maximum density. Mortar layer shall be laid as necessary to level the endwall.

3.8 STONE-LINED STORM DRAINAGE DITCH

The foundation area for the stone-lined storm drainage ditch shall be drained, dewatered, and excavated or filled in accordance with Section 02300 EARTHWORK. Geotextile shall be installed on the prepared surfaces in accordance with Section 02373 GEOTEXTILE. Stone shall be placed to the thickness indicated on the contract drawings and in a manner as specified for riprap in paragraph 3.2 entitled "RIPRAP" of Section 02271 RIPRAP.

3.9 MEASUREMENT AND PAYMENT

3.9.1 Stone-Lined Storm Drainage Ditch

The work specified in this section for constructing a stone-lined storm drainage ditch shall be measured for payment by the ton of stone placed and accepted. Payment will be made at the contract unit bid for Bid Item No. 19, "Stone-Lined Storm Drainage Ditch."

3.9.2 Other Work

All other work specified in this section will not be measured for payment and all costs in connection therewith, including removals of existing storm drains, shall be included in the contract lump sum price for Price Item No. 11, "Storm Drainage."

-- End of Section --

SECTION 16375

ELECTRICAL DISTRIBUTION SYSTEM MODIFICATION

PART 1 GENERAL

1.1 SCOPE OF SECTION

The work covered by this section consists of furnishing all labor, material, and equipment, and performing all operations required for modifications to existing electrical distribution system.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C119.1 (1986; R 1997) Sealed Insulated
Underground Connector Systems Rated 600
Volts

ANSI C80.1 (1995) Rigid Steel Conduit - Zinc Coated

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 153/A 153M (2001) Zinc Coating (Hot-Dip) on Iron and
Steel Hardware

ASTM B 3 (1995) Soft or Annealed Copper Wire

ASTM B 8 (1999) Concentric-Lay-Stranded Copper
Conductors, Hard, Medium-Hard, or Soft

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (1997) National Electrical Safety Code

IEEE Std 100 (1997) IEEE Standard Dictionary of
Electrical and Electronics Terms

IEEE Std 81 (1983) Guide for Measuring Earth
Resistivity, Ground Impedance, and Earth
Surface Potentials of a Ground System
(Part 1) \F31.00\F

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA FB 1 (1993) Fittings, Cast Metal Boxes, and
Conduit Bodies for Conduit and Cable
Assemblies

NEMA TC 5 (1990) Corrugated Polyolefin Coilable

Plastic Utilities Duct

NEMA TC 7 (1990) Smooth-Wall Coilable Polyethylene
Electrical Plastic Duct

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1242 (1996; Rev Mar 1998) Intermediate Metal
Conduit

UL 467 (1993; Rev thru Apr 1999) Grounding and
Bonding Equipment

UL 486A (1997; Rev thru Dec 1998) Wire Connectors
and Soldering Lugs for Use with Copper
Conductors

UL 486B (1997; Rev Jun 1997) Wire Connectors for
Use with Aluminum Conductors

UL 514A (1996; Rev Dec 1999) Metallic Outlet Boxes

UL 6 (1997) Rigid Metal Conduit

1.3 GENERAL REQUIREMENTS

1.3.1 Terminology

Terminology used in this specification is as defined in IEEE Std 100.

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

Electrical Distribution System Modifications; G, DO.

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams manufacturers standard installation drawings and other information necessary to define the installation and enable the Government to check conformity with the requirements of the contract drawings.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures shall be included with the detail drawings. Approved departures shall be made at no additional cost to the Government.

SD-03 Product Data

Material and Equipment; G, DO.

A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each such item.

General Installation Requirements; G,DO

Procedures shall include cable pulling plans, diagrams, instructions, and precautions required to install, adjust, calibrate, and test the electrical system.

SD-07 Certificates

Material and Equipment; FIO.

Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), the Contractor shall submit proof that the items provided conform to such requirements.

The label of, or listing by, UL will be acceptable as evidence that the items conform. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable as evidence that the item conforms. A similar certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable as evidence that the item conforms. In lieu of such certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have been tested and that they conform to the requirements listed, including methods of testing of the specified agencies. Compliance with above-named requirements does not relieve the Contractor from compliance with any other requirements of the specifications.

Cable Installer Qualifications; G,DO

The Contractor shall provide at least one onsite person in a supervisory position with a documentable level of competency and experience to supervise all cable pulling operations. A resume shall be provided showing the cable installers' experience in the last three years, including a list of references complete with points of contact, addresses and telephone numbers.

1.5 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced.

1.6 Coordination with Pennsylvania Power and Light (PP&L)

The electrical poles are the property of PP&L. The Contractor shall be responsible for coordinating with and having PP&L complete any required work on the poles. The point of contact at PP&L is Mr. Derek Williams, telephone number: 570-821-5836, address: PP&L Wilkes-Barre Service Center, 503 New Market Street, Wilkes-Barre, PA 18702.

PART 2 PRODUCTS

2.1 STANDARD PRODUCT

Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.2 CORROSION PROTECTION

2.2.1 Aluminum Materials

Aluminum shall not be used.

2.2.2 Ferrous Metal Materials

2.2.2.1 Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M.

2.3 CABLES

Cables shall be single conductor type unless otherwise indicated.

2.3.1 Low-Voltage Cables

Cables shall be rated 600 volts and shall conform to the requirements of NFPA 70, and must be UL listed for the application or meet the applicable section of either ICEA or NEMA standards.

2.3.1.1 Conductor Material

Underground cables shall be annealed copper complying with ASTM B 3 and ASTM B 8.

2.3.1.2 Insulation

Insulation must be in accordance with NFPA 70, and must be UL listed for the application or meet the applicable sections of either ICEA, or NEMA standards.

2.3.1.3 In Duct

Cables shall be single-conductor cable, in accordance with NFPA 70. Cables in factory-installed, coilable-plastic-duct assemblies shall conform to NEMA TC 5 or NEMA TC 7.

2.4 CABLE JOINTS, TERMINATIONS, AND CONNECTORS

2.4.1 Low-Voltage Cable Splices

Low-voltage cable splices and terminations shall be rated at not less than 600 Volts. Splices in conductors No. 10 AWG and smaller shall be made with an insulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A. Splices in conductors No. 8 AWG and larger shall be made with noninsulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A and UL 486B.

Splices shall then be covered with an insulation and jacket material equivalent to the conductor insulation and jacket. Splices below grade or in wet locations shall be sealed type conforming to ANSI C119.1 or shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductors.

2.5 CONDUIT AND DUCTS

Duct lines shall be nonencased direct-burial, thick-wall type. Where concrete encasement is not required, circuits may utilize factory-installed cable in coilable plastic duct.

2.5.1 Metallic Conduit

Intermediate metal conduit shall comply with UL 1242. Rigid galvanized steel conduit shall comply with UL 6 and ANSI C80.1. Metallic conduit fittings and outlets shall comply with UL 514A and NEMA FB 1.

2.5.2 Conduit Sealing Compound

Compounds for sealing ducts and conduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F, shall neither slump at a temperature of 300 degrees F, nor harden materially when exposed to the air. Compounds shall adhere to clean surfaces of fiber or plastic ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials.

2.6 HANDHOLES, SPLICE AND PULLBOXES

Handholes, splice and pull boxes shall be as indicated. Strength of the boxes, frames and covers shall conform to the requirements of IEEE C2. Handholes, splice and pull boxes shall consist of polymer concrete boxes, extensions, bases and covers which shall sustain a vertical load test of 12,000# over a 10 inch square. Boxes shall be stackable for extra depth. Covers shall have a minimum coefficient of friction of .50.

PART 3 EXECUTION

3.1 REMOVALS

The Contractor shall remove the existing utility pole in the location indicated on the contract drawings.

3.2 GENERAL INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions.

3.2.1 Conformance to Codes

The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable.

3.2.2 Verification of Dimensions

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

3.3 CABLE INSTALLATION

The Contractor shall obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature, lubricants, coefficient of friction, conduit cleaning, storage procedures, moisture seals, testing for and purging moisture, etc. The Contractor shall then perform pulling calculations and prepare a pulling plan which shall be submitted along with the manufacturers instructions in accordance with SUBMITTALS.

3.3.1 Cable Installation Plan and Procedure

Cable shall be installed strictly in accordance with the cable manufacturer's recommendations. Each circuit shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each manhole, handhole, junction box, and each terminal. Each tag shall contain the following information; cable type, conductor size, circuit number, circuit voltage, cable destination and phase identification.

3.3.1.1 Cable Inspection

The cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable in accordance with the cable manufacturer's recommendations.

3.3.1.2 Duct Cleaning

Duct shall be cleaned with an assembly that consists of a flexible mandrel (manufacturers standard product in lengths recommended for the specific size and type of duct) that is 1/4 inch less than inside diameter of duct, 2 wire brushes, and a rag. The cleaning assembly shall be pulled through conduit a minimum of 2 times or until less than a volume of 8 cubic inches of debris is expelled from the duct.

3.3.1.3 Duct Lubrication

The cable lubricant shall be compatible with the cable jacket for cable that is being installed. Application of lubricant shall be in accordance with lubricant manufacturer's recommendations.

3.3.1.4 Cable Installation

The Contractor shall provide a cable feeding truck and a cable pulling winch as required. The Contractor shall provide a pulling grip or pulling eye in accordance with cable manufacturer's recommendations. The pulling grip or pulling eye apparatus shall be attached to polypropylene or manilla rope followed by lubricant front end packs and then by power cables. A dynamometer shall be used to monitor pulling tension. Pulling tension shall not exceed cable manufacturer's recommendations. The Contractor shall not allow cables to cross over while cables are being fed into duct. For cable installation in cold weather, cables shall be kept at 50 degrees F temperature for at least 24 hours before installation.

3.3.1.5 Cable Installation Plan

The Contractor shall submit a cable installation plan for all cable pulls in accordance with the detail drawings portion of paragraph SUBMITTALS. Cable installation plan shall include:

- a. Site layout drawing with cable pulls identified in numeric order of expected pulling sequence and direction of cable pull.
- b. List of cable installation equipment.
- c. Lubricant manufacturer's application instructions.
- d. Procedure for resealing cable ends to prevent moisture from entering cable.
- e. Cable pulling tension calculations of all cable pulls.
- f. Cable percentage conduit fill.
- g. Cable sidewall thrust pressure.
- h. Cable minimum bend radius and minimum diameter of pulling wheels used.
- i. Cable jam ratio.
- j. Maximum allowable pulling tension on each different type and size of conductor.
- k. Maximum allowable pulling tension on pulling device.

3.3.2 Direct-Burial

3.3.2.1 Trenching

Trenches for factory assembled coilable duct cables shall be excavated to depths required to provide the minimum necessary cable cover. Bottoms of trenches shall be smooth and free of stones and sharp objects. Where bottoms of trenches comprise materials other than sand, a 3 inch layer of select fill shall be laid first and compacted to approximate densities of surrounding firm soil.

3.3.2.2 Cable Burial

Coilable ductcable shall be unreeled along the sides of or in trenches and carefully placed on the trench bottoms. Pulling cables into trenches from a fixed reel position will not be permitted, except as required to pull

cables through conduits under paving, or railroad tracks. Where cables cross, a separation of at least 3 inches shall be provided, unless each cable circuit is protected by a nonmetallic conduit sleeve at the crossing.

Where single-conductor cable is installed, all phases legs and the neutral shall be installed in the same sleeve. Bend radius of any cable shall be not less than 8 times the diameter of the cable. In no case shall cables be left under longitudinal tension. The first 6 inch layer of backfill shall be of select fill. Machine compaction shall not be used within 6 inches of the cable.

3.3.2.3 Other Requirements

Where cables cross under roads or other paving exceeding 5 feet in width, such cables shall be installed in concrete-encased ducts. Ducts shall extend at least 1 foot beyond each edge of any paving. Cables may be pulled into duct from a fixed reel where suitable rollers are provided in the trench. Where coilable duct cable transitions to duct-enclosed cable, the cables shall be centered in duct entrances, and a waterproof nonhardening mastic compound shall be used to facilitate such centering. If paving is in place where cables are to be installed, coated rigid steel conduits driven under the paving may be used in lieu of concrete-encased ducts. Damage to conduit coatings shall be prevented by providing ferrous pipe jackets or by predrilling. Where cuts are made in any paving, the paving and subbase shall be restored to their original condition.

3.3.2.4 Cable Markers

Markers shall be located near the ends of cable runs, at each cable joint or splice, at approximately every 500 feet along cable runs, and at changes in direction of cable runs. In addition to markers, a 5 mil, brightly colored plastic tape not less than 3 inches in width and suitably inscribed at not more than 10 feet on centers, or other approved dig-in warning indication, shall be placed approximately 12 inches below finished grade levels of trenches.

3.4 DUCT LINES

3.4.1 Requirements

Numbers and sizes of ducts shall be as indicated. Duct lines shall be laid with a minimum slope of 4 inches per 100 feet. Short-radius manufactured 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable. The minimum manufactured bend radius shall be 18 inches for ducts of less than 3 inch diameter, and 36 inches for ducts 3 inches or greater in diameter. Otherwise, long sweep bends having a minimum radius of 25 feet shall be used for a change of direction of more than 5 degrees, either horizontally or vertically. Both curved and straight sections may be used to form long sweep bends, but the maximum curve used shall be 30 degrees and manufactured bends shall be used.

3.4.2 Treatment

Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid.

Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.

**** "Concrete Encasement" Paragraph Deleted ****

3.4.3 Nonencased Coilable Duct

Top of duct lines shall be below the frost line depth. Between adjacent electric power and communication ducts, 12 inches of earth is required. Bottoms of trenches shall be smooth and free of stones, soft spots, and sharp objects. Where bottoms of trenches comprise materials other than sand, a 3 inch layer of select fill shall be laid first and compacted to approximate densities of surrounding firm soil before installing ducts.

3.4.4 Installation of Couplings

Joints in each type of duct shall be made up in accordance with the manufacturer's recommendations for the particular type of duct and coupling selected and as approved.

3.4.4.1 Plastic Duct

Duct joints shall be made by brushing a plastic solvent cement on insides of plastic coupling fittings and on outsides of duct ends. Each duct and fitting shall then be slipped together with a quick 1/4-turn twist to set the joint tightly.

3.4.5 Duct Line Markers

Duct line markers shall be provided at the ends of long duct line stubouts or for other ducts whose locations are indeterminate because of duct curvature or terminations at completely below-grade structures. In addition to markers, a 5 mil brightly colored plastic tape, not less than 3 inches in width and suitably inscribed at not more than 10 feet on centers with a continuous metallic backing and a corrosion-resistant 1 mil metallic foil core to permit easy location of the duct line, shall be placed approximately 12 inches below finished grade levels of such lines.

3.5 CONNECTIONS BETWEEN AERIAL AND UNDERGROUND SYSTEMS

Connections between aerial and underground systems shall be made as required.

Underground cables shall be extended up poles in conduit to cable terminations. Conduits shall be secured to the poles by 2-hole galvanized steel pipe straps spaced not more than 10 feet apart and with 1 strap not more than 12 inches from any bend or termination. Cable guards shall be secured to poles in accordance with the manufacturer's published procedures. Conduits shall be equipped with bushings to protect cables and minimize water entry. Cables shall be supported by devices separate from the conduit or guard, near their point of exit from the conduit or guard.

3.6 GROUNDING

3.6.1 Grounding Electrodes

Grounding electrodes shall be installed as follows:

- a. Driven rod electrodes - Unless otherwise indicated, ground rods

shall be driven into the earth until the tops of the rods are approximately 1 foot below finished grade.

- b. Additional electrodes - When the required ground resistance is not met, additional electrodes shall be provided interconnected with grounding conductors to achieve the specified ground resistance. The additional electrodes will be up to three, 8 feet rods spaced a minimum of 10 feet apart 5/8 inch. In high ground resistance, UL listed chemically charged ground rods may be used. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Contracting Officer shall be notified immediately.

3.6.2 Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process or with bolted solderless connectors, in compliance with UL 467, and those below grade shall be made by a fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3.6.3 Grounding and Bonding Conductors

Grounding and bonding conductors include conductors used to bond transformer enclosures and equipment frames to the grounding electrode system. Grounding and bonding conductors shall be sized as shown, and located to provide maximum physical protection. Bends greater than 45 degrees in ground conductors are not permitted. Routing of ground conductors through concrete shall be avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor, and the opening shall be sealed with a suitable compound after installation.

3.6.4 Surge Arrester Grounding

Surge arresters and neutrals shall be bonded directly to the transformer enclosure and then to the grounding electrode system with a bare copper conductor, sized as shown. Lead lengths shall be kept as short as practicable with no kinks or sharp bends.

3.6.5 Riser Pole Grounding

A single continuous vertical grounding electrode conductor shall be installed on each riser pole and connected directly to the grounding electrodes indicated on the drawings or required by these specifications. All equipment, neutrals, surge arresters, and items required to be grounded shall be connected directly to this vertical conductor. The grounding electrode conductor shall be sized as shown. Grounding electrode conductors shall be stapled to wood poles at intervals not exceeding 2 feet.

3.7 FIELD TESTING

3.7.1 General

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 30 days prior to conducting tests. The Contractor shall furnish all materials, labor,

and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. Field test reports shall be signed and dated by the Contractor.

3.7.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.7.3 Ground-Resistance Tests

The resistance of each grounding electrode or each grounding electrode system shall be measured using the fall-of-potential method defined in IEEE Std 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

- a. Single rod electrode - 25 ohms.
- b. Multiple rod electrodes -25 ohms.

3.7.4 Low-Voltage Cable Test

Low-voltage cable, complete with splices, shall be tested for insulation resistance after the cables are installed, in their final configuration, ready for connection to the equipment, and prior to energization. The test voltage shall be 500 volts dc, applied for one minute between each conductor and ground and between all possible combinations conductors in the same trench, duct, or cable, with all other conductors in the same trench, duct, or conduit. The minimum value of insulation shall be:

R in megohms = (rated voltage in kV + 1) x 1000/(length of cable in feet)
Each cable failing this test shall be repaired or replaced. The repaired cable shall be retested until failures have been eliminated.

3.7.5 Operating Tests

After the installation is completed, and at such times as the Contracting Officer may direct, the Contractor shall conduct operating tests for approval. The equipment shall be demonstrated to operate in accordance with the requirements herein. An operating test report shall be submitted in accordance with paragraph SUBMITTALS.

3.8 MEASUREMENT AND PAYMENT

3.8.1 Electrical Work

The work specified in this section, except the work to be completed by PP&L, will not be measured for payment and all costs in connection

therewith shall be included in the contract lump sum price for Bid Item No. 18, "Modifications to Electrical And Telephone Systems."

3.8.2 Work to Be Completed by PP&L

The contract work required to be completed by PP&L on PP&L-owned poles and transformers will not be measured for payment. All costs in connection with coordinating with PP&L and having PP&L complete the work on their poles and transformers, shall be included in the contract lump sum price for Bid Item No. 22. "Work Completed by Pennsylvania Power and Light."

-- End of Section --