

| AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT | | | 1. CONTRACT ID CODE J | PAGE OF PAGES 1 21 |
|--|----------------------------------|--|---|-------------------------------|
| 2. AMENDMENT/MODIFICATION NO. 0004 | 3. EFFECTIVE DATE 28-May-2004 | 4. REQUISITION/PURCHASE REQ. NO. W16ROE-4077-6848 | | 5. PROJECT NO.(If applicable) |
| 6. ISSUED BY USA ENGINEER DISTRICT, NEW YORK ATTN:CENAN-CT ROOM 1843 26 FEDERAL PLAZA NEW YORK NY 10278 | CODE W912DS | 7. ADMINISTERED BY (If other than item 6) See Item 6 | | |
| 8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code) | | X | 9A. AMENDMENT OF SOLICITATION NO. W912DS-04-B-0007 | |
| | | X | 9B. DATED (SEE ITEM 11) 21-Apr-2004 | |
| | | | 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 checked="" 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) | | | | |
| 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 purpose of this amendment 0004 to solicitation W912DS-04-B-0007 are to revise specifications and drawings, provide answers to questions asked by potential bidders, and incorporate the latest Labor Wage Rate Decision..As a result of this amendment, the bid opening date remains unchanged at 8 June 2004 @ 1:00 P.M. NOTE: Bidders must acknowledge receipt of this amendment by the date specified in the solicitation (or as amended), by one of the following methods: in the space provided on the SF1442, by separate letter, by telegram, or by signing block 15 below. FAILURE TO ACKNOWLEDGE AMENDMENTS BY THE DATE AND TIME SPECIFIED MAY RESULT IN REJECTION OF YOUR BID IN ACCORDANCE WITH THE LATE BID, LATE MODIFICATIONS OF BIDS OR LATE WITHDRAWAL OF BIDS (FAR 14.304). All other terms and conditions remain unchanged and in full force and effect. | | | | |
| 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) | | 28-May-2004 |

EXCEPTION TO SF 30
APPROVED BY OIRM 11-84

30-105-04

STANDARD FORM 30 (Rev. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION 00800 - SPECIAL CONTRACT REQUIREMENTS

The following have been added by full text:

AMENDMENT 0004 CHANGES**AMENDMENT 0004 TO THE BID SCHEDULE, DRAWINGS AND SPECIFICATIONS FOR Maintenance Training Facility, McGUIRE AFB, NEW JERSEY; W912DS-04-B-0007****TO OFFERORS**

The following changes shall be made to the drawings and specifications.

DRAWINGS

1. The following drawings have been **REVISED** and **REISSUED**:

| <u>Sheet</u> | <u>Drawing Title</u> | <u>Revision Number</u> | <u>Date of Revision</u> |
|---------------------|--|-------------------------------|--------------------------------|
| G-002 | Optional Bid Items Plan | 1 | 05/27/2004 |
| C-102 | Demolition Plan | 2 | 05/27/2004 |
| C-201 | Site Plan | 2 | 05/27/2004 |
| C-202 | Grading and Drainage Plan | 2 | 05/27/2004 |
| C-203 | Utility Plan | 2 | 05/27/2004 |
| C-601 | Soil Erosion and Sediment Control Plan | 2 | 05/27/2004 |
| L-100 | Landscape Plan | 2 | 05/27/2004 |
| A-001 | Architectural Site Plan | 2 | 05/27/2004 |
| A-100 | Overall Floor Plans | 1 | 05/27/2004 |
| A-102 | East First Floor Plan | 2 | 05/27/2004 |
| A-200 | Overall Building Elevations | 1 | 05/27/2004 |
| A-201 | Enlarged Building Elevations | 1 | 05/27/2004 |
| A-305 | Toilet Room Plans & Elevations / Mounting Heights | 1 | 05/27/2004 |
| A-401 | East First Floor Reflected Ceiling Plan | 1 | 05/27/2004 |
| A-508 | Details | 1 | 05/27/2004 |
| A-600 | Finish Schedule and Legends | 2 | 05/27/2004 |
| A-602 | Door Schedule & Types & Legends | 1 | 05/27/2004 |
| S-104 | East Lower Roof Framing Plan | 1 | 05/27/2004 |
| M-102 | East First Floor Mechanical Plan | 1 | 05/27/2004 |
| E-302 | Electrical – East First & Second Floor Plans Lighting | 1 | 05/27/2004 |
| E-402 | Electrical – East First & Second Floor Plans Power & Auxiliary | 1 | 05/27/2004 |
| E-502 | Electrical – East First & Second Floor Plans Mech Equip & Fire Alarm | 1 | 05/27/2004 |
| T-301 | Telecommunications Room Layout/Riser | 1 | 05/27/2004 |

2. The following drawings are **REVISED** but not **REISSUED**:

"Sheet C-203, Note 9: Revise "existing transformer" to read "existing sectionalizer".

SPECIFICATIONS

1. The following specifications are **ADDED** to the specification and issued with this amendment:

Section 16710A – Premise Distribution System

2. The following specifications are **REVISED** and **REISSUED** with this amendment:

Section 00900 – Wage Determination

General Decision Number: NJ020002 is REPLACED by General Decision Number: NJ20030002 05/28/2004 which accompanies this amendment.

Section 02552A - Pre-Engineered Underground Heat Distribution System

3. The following specifications are **REVISED**, but not reissued.

1. Section 02220, Demolition, Paragraph 3.4, Cleanup, and Paragraph 3.4.1, Debris and Rubbish; last sentence in each paragraph, **DELETE** "Local regulations" and **REPLACE** with "Local, State, and Federal regulations".

2. Specification Section, 13851A Fire Detection and Alarm System, Addressable, Paragraph 2.1, Control Panel: **DELETE** "Control panel shall be Faraday MPC-2000 with one spare expansion board for future tie-ins."

BIDDER'S QUESTIONS AND GOVERNMENT REPLY

(Questions that may be of general interest of all bidders/Government and that are not readily answered by the proceeding changes will appear below. These questions may have been paraphrased or altered to represent several questions regarding the same subject and/or clarify and simplify the question(s). Questions and answers are issued to the Offerors/Bidders for information only.)

Q36: The plans and specs. call for a sprinkler system design density of .1/3000 sq. ft., with a 250 GPM hose stream and sprinkler head spacing that exceeds 130 sq. ft. This is a "hybrid " design that falls between "light hazard" and "ordinary group 1 hazard". Please confirm and advise us of your findings.

A36: The building is classified as light hazard. The hydraulic design requirements 0.10 gpm/sq. ft. over 3000 sq. ft. and the 250 gpm hose demand are in accordance with UFC 3-600-1 and specification section 13930A paragraphs 1.2.1 and 1.2.1.1, for this hazard classification. Paragraph 1.2.2 of section 13930A indicates sprinkler head coverage consistent with UFC 3-600-1 and NFPA 13.

Q37: Drawing C-201 references two (2) crosswalks across West Arnold Avenue with a note stating, "MAFB Base Standard Crosswalk (typ)". Where is the detail for this standard crosswalk?

A37: They are to painted white, perpendicular to the street, 24" deep, 72" wide, and 18" from each other.

Q38: According to drawing A-102, there are folding partitions located along column lines 8 and 12.5. According to drawing S-104, there is no beam along column line 12.5 at the location of the folding partition. How is this partition to be supported?

A38: The partition at 12.5 will be supported by a beam. S-104 will be revised to reflect this.

Q39: According to note 4 on drawing S-101, the finish floor slab elevation is 115'-9". According to section 1/A-500, the lower eave elevation at the south end of column line 8 is 124'-9", which is also the finish ceiling height in classrooms 145 and 146. The beam supporting the roof deck at this location is even higher. As the beam along column line 8 is slanted and thus gets increasingly further off of the floor from south to north, how is the folding partition along this column line to be supported? Please provide a detail.

A39: Please refer to revised sheet A-508 (current revision issued with this amendment) and new detail 9/A-508.

Q40: Question 10 as listed in Addendum #3 referenced not only projection screens, but visual display boards as well. The answer to that question in Addendum #3 dealt only with the size and location of a projection screen, without answering the part about size and location of any other display boards (i.e. marker boards referenced in paragraph 2.3). Please provide the sizes of any required marker boards and the locations where they are to be installed.

A40: There are no marker boards located on this project.

Q41: What will be the condition of the building at the time the lowest bidder takes possession for demolition and asbestos removal? Will all furniture (i.e. desks, chairs, filing cabinets, loose bookcases, etc.) be removed, or will some of these items have to be removed as part of the demolition work? If some of the items are to be removed under our demolition scope, please itemize how many items we should include.

A41: The condition of the building itself is relatively fair to good. All furnishings will be removed prior to its release to the contractor.

Q42: The Langan asbestos report indicates that there is 12,550 sf of non-friable ACM floor tile and mastic to be removed. Is all of this floor tile exposed? Is any of it covered by another material (i.e. carpet)? If so, does the covering material have to be removed as ACM as well? If so, please provide the quantity of covering material, which must be removed.

A42: Approximately 50% of the tile is covered by carpet. The carpet is able to be removed without disturbing the mastic and thus disposed of as Non-ACM. However, if contractor cannot remove w/o disturbing, then the carpet shall be disposed of as ACM along with the mastic & tile.

Q43: Details 13, 13A, and 13B on drawing S-202 all show the steel tube enclosing the ductwork through the lobby ceiling area, but none of the details show the thickness of the steel. What is the steel thickness for these tubes?

A43: The thickness for the steel tube is ¼".

Q44: The stairs to the 2nd floor are referenced on the finish schedule on drawing A-600 as having no floor finish. Detail 9/A-502 indicates the treads receive a rubber finish. Which is correct?

A44: The stairs treads do not have rubber treads and will be a concrete finish.

Q45: The canopies over the building entrances on the south and west elevations extend beyond the roofline of the rest of the building. These canopies have standing seam metal roofs, with gutters on the sides perpendicular to the building. Where does the water collected in these gutters go? How is it drained off of the canopy roofs?

A45: The gutters on these canopies do not have down spouts but drain onto the roof at the sloped side where the gutter and roof intersect.

Q46: Wall sections 2, 3, and 4 on drawing A-501 and the roof plan on drawing A-104 all show internal gutters within portions of the standing seam upper roof. The extent of the internal gutters as shown on A-104 would seem to indicate that they end along column line 4.1, at column line B. Section 2/A-500, taken along column line 4.1 south of column B, shows no gutters. How is the high roof between column lines B and J along column line 4.1 drained?

A46: The water will run off the high roof onto the lower roof and drain through the lower roof gutter system.

Q47: What kind of frame do the overhead doors receive? The door schedule on drawing A-602 shows no frame type, no head details, and no jamb details for these openings.

A47: The overhead door assembly shall reflect information provided in Specification Section 08332 Rolling Service Doors and also referenced details 8 & 12 on A-506 in the Bidding Documents.

Q48: On the site plan, drawing C-201, there is a service yard shown. It refers you to the Architectural drawings. Drawing A-508 has a note at the top left corner that shows edge of concrete apron. There are no details on A-508 or the site plan, which clearly shows what is intended. Will the service yard need to be a concrete slab? If so, what will the requirements be?

A48: The service yard will need a 4" concrete slab to the edges shown on A-508 and exterior equipment foundations as identified on detail 10 / S-202.

Q49: Drawing A-508, detail #3 does not show any dimensions for the 2 equipment pads. Can you clarify the sizes?

A49: Design size for the mechanical chiller pad is 20'-6" x 8'-6" and the transformer is 7'-6" x 8'-6". These are basis of design dimensions and final pad dimensions need to be coordinated with the selected equipment manufacturers.

Q50: Will the concrete filled pan stairs require Light Weight concrete?

A50: Lightweight concrete is NOT required for the concrete filled pan stairs.

Q51: On drawing S-102, if option #4 is used what will happen with the column footings at the junction of column lines N and 13?

A51: The footing and column design at column N15 will not be used when both options 3 and 4 are implemented. The foundation at column N13 will remain as shown on the bidding documents.

Q52: What type of glass is to be used for window types W1, W2, W3 and W4 and for aluminum storefront types SF1 through SF7? The specifications provide more than one type of glass.

A52: All exterior and interior glazing shall comply with Specification Section 08800-2.2. Interior / Exterior glazing in window types S1 – S10 and Exterior window types W1 – W4 have 1" thick insulating glazing units.

Q53: Under spec section 15400A, table two is missing for the aboveground hot water service lines. Is this required?

A53: There are NO aboveground hot water service lines required.

Q54: After much research, I find that the Faraday MPC 2000 is a discontinued product with NO direct replacement at this time. In order for companies to bid this project, we need more information and

additional time to put a quotation together. Also, the Monaco BT2-8 is unheard of at Faraday. What is it, what does it do?

A54: The Faraday MPC-2000 is a discontinued model. A comparable replacement is the Faraday MPC-1500. This panel would still require the Radio transceiver panel (Monaco BT2-8). Monaco M-2 addressable panel would also be acceptable. This is a relatively new product not to be confused with the Zonal M-2 panel. This panel is a combination fire alarm/transceiver panel. This panel does not require a separate radio transceiver panel.

AM 0004 LABOR WAGE RATES

GENERAL DECISION: **NY20030003** 05/28/2004 NY3

Date: May 28, 2004 sg 5/28/04
General Decision Number: **NY20030003** 05/28/2004

Superseded General Decision Number: NY020003

State: New York

Construction Types: Building, Heavy, Highway and Residential

Counties: Bronx, Kings, New York, Queens and Richmond
Counties in New York.

BUILDING & RESIDENTIAL CONSTRUCTION PROJECTS (includes single family homes and apartments up to and including 4 stories),
HEAVY AND HIGHWAY CONSTRUCTION PROJECTS

| Modification Number | Publication Date |
|---------------------|------------------|
| 0 | 06/13/2003 |
| 1 | 05/14/2004 |
| 2 | 05/28/2004 |

ASBE0012-001 01/01/2004

| | Rates | Fringes |
|---|----------|---------|
| Asbestos Workers/Insulator includes application of all insulating materials, protective coverings, coatings and finishing to all types of mechanical systems..... | \$ 39.16 | 22.11 |
| Hazardous Material Handler..... | \$ 24.00 | 6.20 |

BOIL0005-001 09/01/2003

| | Rates | Fringes |
|------------------|----------|---------|
| Boilermaker..... | \$ 39.50 | 24.40+a |

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Thanksgiving Day, Memorial Day, Independence Day, Labor Day and Good Friday, Friday after Thanksgiving, Christmas Eve Day and New Year's Eve

BRNY0001-001 07/01/2003

| | Rates | Fringes |
|-----------------|----------|---------|
| Bricklayer..... | \$ 36.42 | 20.31 |

Stonemason.....\$ 37.36 10.67

BRNY0001-002 07/01/2003

| | Rates | Fringes |
|-----------------------------------|-------|---------|
| Pointer, cleaner and caulker...\$ | 33.46 | 16.24 |

BRNY0003-001 01/01/2003

| | Rates | Fringes |
|--------------------------|-------|---------|
| Terrazzo Finisher.....\$ | 30.07 | 14.60 |
| Terrazzo Worker.....\$ | 39.03 | 14.60 |

BRNY0004-001 01/01/2000

| | Rates | Fringes |
|----------------------|-------|---------|
| Marble Setter.....\$ | 28.72 | 15.65 |

BRNY0020-001 01/01/2000

| | Rates | Fringes |
|------------------------|-------|---------|
| Marble Finisher.....\$ | 23.69 | 16.83 |

BRNY0024-001 01/01/2000

| | Rates | Fringes |
|-------------------------|-------|---------|
| N/A | | |
| MARBLE POLISHERS.....\$ | 29.90 | 12.38 |

BRNY0052-001 12/01/2003

| | Rates | Fringes |
|-------------------|-------|---------|
| Tile Layer.....\$ | 37.21 | 18.12 |

BRNY0088-001 12/02/2002

| | Rates | Fringes |
|----------------------|-------|---------|
| Tile Finisher.....\$ | 29.37 | 14.50 |

CARP0001-009 07/01/2003

| | Rates | Fringes |
|-------------------------|----------|---------|
| Carpenters: | | |
| Carpenters & Soft floor | | |
| layers..... | \$ 38.78 | 26.05 |

CARP0740-001 07/01/2003

| | Rates | Fringes |
|-----------------|----------|---------|
| Millwright..... | \$ 37.06 | 30.46 |

CARP1456-004 07/01/2003

| | Rates | Fringes |
|------------------------------|----------|---------|
| Dock Builder & Piledrivermen | | |
| DOCKBUILDERS..... | \$ 37.70 | 26.05 |

CARP1456-005 07/01/2003

| | Rates | Fringes |
|-------------------|----------|---------|
| Diver..... | \$ 46.30 | 26.05 |
| Diver Tender..... | \$ 34.25 | 26.05 |

CARP1536-001 07/01/2003

| | Rates | Fringes |
|----------------|----------|---------|
| Carpenters: | | |
| TIMBERMEN..... | \$ 34.47 | 26.05 |

ELEC0003-001 05/15/2003

| | Rates | Fringes |
|------------------------|----------|---------|
| Electrician | | |
| Electricians..... | \$ 41.00 | 29.45 |
| Jobbing, and | | |
| maintenance and repair | | |
| work..... | \$ 23.80 | 10.77+a |

PAID HOLIDAYS:

a. New Years Day, Martin Luther King, Jr.'s Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Election Day, Thanksgiving Day, the day

after Thanksgiving Day, and Christmas Day

ELEC1049-001 04/04/2004

QUEENS COUNTY

| | Rates | Fringes |
|---|----------|---------|
| Line Construction (Substation and Switching structures pipe type cable installation and maintenance jobs or projects; Railroad electrical distribution/transmission systems maintenance (when work is not performed by railroad employees) Overhead and Underground transmission/distribution line work. Fiber optic, telephone cable and equipment) | | |
| Groundman..... | \$ 21.12 | 12.60 |
| Heavy Equipment Operator.... | \$ 28.16 | 12.60 |
| Lineman and Cable Splicer..... | \$ 35.20 | 12.60 |
| Tree Trimmer..... | \$ 22.28 | 7.76 |

* ELEV0001-002 03/17/2004

| | Rates | Fringes |
|------------------------------|----------|----------|
| Elevator Mechanic | | |
| Elevator Constructor..... | \$ 41.10 | 19.697+a |
| Modernization and Repair.... | \$ 32.95 | 18.563+a |

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Lincoln's Birthday,
Washington's Birthday, Memorial Day, Independence Day, Labor
Day, Columbus Day, Veteran's Day, Thanksgiving Day, Friday
after Thanksgiving, and Christmas Day.

PAID VACATION: Employer contributes 8% of regular basic
hourly rate as vacation pay for employees with more than 5
years of service, and 6% for employees with less than 5 years
of service.

ENGI0014-001 07/01/2003

| | Rates | Fringes |
|-----------------------------|-------|---------|
| Pavement equipment operator | | |

| | | |
|---|----------|---------|
| Asphalt Plants..... | \$ 33.67 | 20.05+a |
| Asphalt roller..... | \$ 40.04 | 20.05+a |
| Asphalt spreader..... | \$ 41.16 | 20.05+a |
| Power Equipment Operator (HEAVY & HIGHWAY) | | |
| GROUP 1..... | \$ 53.60 | 20.05+a |
| GROUP 2..... | \$ 43.98 | 20.05+a |
| GROUP 3..... | \$ 45.40 | 20.05+a |
| GROUP 4..... | \$ 44.31 | 20.05+a |
| GROUP 5..... | \$ 43.41 | 20.05+a |
| GROUP 6..... | \$ 41.61 | 20.05+a |
| GROUP 7..... | \$ 42.42 | 20.05+a |
| GROUP 8..... | \$ 41.16 | 20.05+a |
| GROUP 9..... | \$ 40.24 | 20.05+a |
| GROUP10..... | \$ 38.45 | 20.05+a |
| GROUP11..... | \$ 35.82 | 20.05+a |
| GROUP12..... | \$ 36.62 | 20.05+a |
| GROUP13..... | \$ 36.93 | 20.05+a |
| GROUP14..... | \$ 27.53 | 20.05+a |
| GROUP15..... | \$ 25.46 | 20.05+a |
| Steel erector | | |
| Compressors, Welding Machines..... | \$ 29.90 | 20.05+a |
| Cranes, Hydraulic Cranes, 2 drum derricks, Forklifts, Boom Trucks..... | \$ 47.45 | 20.05+a |
| Three drum derricks..... | \$ 49.43 | 20.05+a |
| Utility Laborer | | |
| Horizontal boring rig..... | \$ 39.07 | 20.05+a |
| Off shift compressors..... | \$ 32.25 | 20.05+a |
| Utility Compressors..... | \$ 25.30 | 20.05+a |

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Tower crane

GROUP 2: Backhoes, power shovel, Hydraulic clam shells, moles and machines of a similar type

GROUP 3: Mine hoists and crane, etc. used as mine hoists

GROUP 4: Gradalls, keystones, cranes (with digging buckets), bridge cranes, trenching machines, vermeer cutter and machines of a similar nature

GROUP 5: Piledrivers, derrick boats, tunnel shovels

GROUP 6: Raise bore drill, and machines of a similar nature

GROUP 7: Back filling machines, cranes, mucking machines, dual drum pavers

GROUP 8: Mixers (concrete w/loading attachments), concrete pavers, cableways, land derricks, power house (low pressure units), concrete pumps

GROUP 9: Concrete plants, well drilling machines, stone crushers double drum hoist, power house (other than above)

GROUP 10: Concrete mixers

GROUP 11: Elevators

GROUP 12: Concrete breaking machine, Hoists (single drum), load masters, locomotive and dinkies over 10 tons

GROUP 13: Vibratory console

GROUP 14: Compressors (portable 3 or more in battery), tugger machine (caissons), well point pumps, chum drill

GROUP 15: Boilers, (high pressure, compressors (portable, single, or 2 in battery, not over 100' apart), pumps (river cofferdam and welding machines (except where arc is operated by members of local 15) push button machines, all engines irrespective of power (power pac) used to drive auxilliary equipment, air, hydraulic etc.

PREMIUMS ON CRANES (Crawler or Truck):

- 100' to 149' boom - add .50
- 150' to 249' boom - add .75
- 250' to 349' boom - add 1.00
- 350' to 450' boom - add 1.50

Premiums for Cranes on Steel Erection:

- 100' to 149' boom - add 1.75
- 150' to 249' boom - add 2.00
- 250' to 349' boom - add 2.25
- 350' to 450' boom - add 2.75
- Tower crane - add 2.00

FOOTNOTE:

a. Paid Holidays: New Year's Day; Lincoln's Birthday; Washington's Birthday; Memorial Day; Independence Day; Labor Day; Veterans Day; Columbus Day; Election Day; Thanksgiving Day; and Christmas Day; provided the employee works one day the payroll week in which the holiday occurs.

ENGI0014-002 07/01/2003

| | Rates | Fringes |
|--------------------------|----------|---------|
| Power Equipment Operator | | |
| BUILDING & RESIDENTIAL | | |
| GROUP 1..... | \$ 44.55 | 20.05+a |
| GROUP 2..... | \$ 46.97 | 20.05+a |
| GROUP 3..... | \$ 42.81 | 20.05+a |
| GROUP 4..... | \$ 39.86 | 20.05+a |

GROUP 5.....\$ 30.67 20.05+a

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Double drum

GROUP 2: Stone derrick, cranes, hydraulic cranes, boom trucks

GROUP 3: 4 pole Hoist, Single Drum Hoists

GROUP 4: Fork lift, house cars, plaster (platform machine), plaster bucket, concrete pump and all other equipment used for hoisting material

GROUP 5: Compressors, welding machines (cutting concrete work), paint spraying, sand blasting, pumps (with the exclusion of concrete pumps), house car (settlement basis only), all engines irrespective of power (power pac) used to drive auxiliary equipment, air, hydraulic, etc., boilers

Premiums for Cranes:

- 100'-149' boom - add 1.75
- 150'-249' boom - add 2.00
- 250'-349' boom - add 2.25
- 350'-450' boom - add 2.75
- Tower cranes add 2.00

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Lincoln's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Columbus Day, Election Day, Thanksgiving Day, and Christmas Day, provided the employee works one day in the payroll week in which the holiday occurs

IRON0040-002 07/01/2003

BRONX, NEW YORK, RICHMOND

| | Rates | Fringes |
|-----------------------------|----------|---------|
| Ironworker, Structural..... | \$ 36.20 | 36.93 |

IRON0046-003 07/01/2002

| | Rates | Fringes |
|-------------------------------------|----------|---------|
| Ironworker METALLIC LATHERS..... | \$ 31.05 | 23.03 |

IRON0197-001 07/01/2003

| | Rates | Fringes |
|--|-------|---------|
|--|-------|---------|

| | | |
|-----------------------|----------|-------|
| Ironworker | | |
| STONE DERRICKMAN..... | \$ 35.76 | 29.07 |

IRON0361-002 07/01/2003

KINGS, QUEENS

| | Rates | Fringes |
|-------------------|----------|---------|
| Ironworkers: | | |
| (STRUCTURAL)..... | \$ 36.20 | 36.93 |

IRON0580-001 07/01/2003

| | Rates | Fringes |
|-----------------------------|----------|---------|
| Ironworker, Ornamental..... | \$ 35.65 | 28.50 |

* LABO0006-001 07/01/2003

| | Rates | Fringes |
|-----------------------|----------|---------|
| Laborers: | | |
| BUILDING CONSTRUCTION | | |
| CEMENT AND CONCRETE | | |
| WORKERS..... | \$ 31.50 | 15.27 |

LABO0029-001 07/01/2001

| | Rates | Fringes |
|---------------------------|----------|---------|
| Laborers: | | |
| Heavy | | |
| Blasters (hydraulic | | |
| trac drill)..... | \$ 32.08 | 16.70 |
| Blasters..... | \$ 31.53 | 16.70 |
| Hydraulic Trac Drill..... | \$ 28.38 | 16.70 |
| Jackhammers, | | |
| Chippers, Spaders, | | |
| Concrete Breakers, | | |
| All Other Pneumatic | | |
| Tools, Walk Behind | | |
| Self-Propelled | | |
| Hydraulic Asphalt and | | |
| Concrete Breaker..... | \$ 27.14 | 16.70 |
| Powder Carriers..... | \$ 24.50 | 16.70 |
| Wagon; Airtrac; | | |
| Quarry Bar Drill | | |
| Runners..... | \$ 27.83 | 16.70 |

* LABO0078-001 12/01/2003

| | Rates | Fringes |
|--|----------|---------|
| Asbestos Worker ASBESTOS (Removal, Abatement, Encapsulation or Decontamination of asbestos); LEAD; & HAZARDOUS WASTE LABORERS (Hazardous Waste, Hazardous Materials, Biochemical and Mold Remediation, HVAC, Duct Cleaning, Re-spray Fireproofing, etc..... | \$ 25.50 | 6.81 |

* LABO0079-001 01/01/2004

| | Rates | Fringes |
|---|----------|---------|
| Laborers Building Construction Mason Tenders..... | \$ 27.80 | 15.09 |
| Demolition Laborers Tier A..... | \$ 27.80 | 14.09 |
| Tier B..... | \$ 17.50 | 8.05 |

CLASSIFICATIONS

TIER A: Responsible for the removal of all interior petitions and structural petitions that can consist of sheet rock, block or masonry. Also, all structural slab openings for ducts, mechanical, shafts, elevators, slab openings and exterior walls where the building is not being completely demolished.

TIER B: Responsible for shoveling of debris into containers, pushing containers from the inside to the outside of the building.

* LABO0147-001 07/01/2003

| | Rates | Fringes |
|----------------------------|----------|---------|
| Laborers: LABORERS..... | \$ 28.86 | 30.51 |

FREE AIR TUNNEL WORKERS Tunnel Workers (including Maintenance Men, Inside Muck Lock Tenders, Pump Men, Electricians, Cement Finishers, Caulkers, Hydraulic Men, Shield Men, Monorail Operators, Motor Men, Conveyor Men, Powder Carriers, Pan Men, Riggers, Chuck Tenders, Track Men, Painters, Nippers, Brakemen, Cable Men, Hose Men, Grout Men,

Gravel Men, Form Workers, Concrete Workers, Tunnel Laborers,
Mole Nipper (one (1) Mole Sipper per Working Shaft per Shift
for up to and including Two (2) Moles)

LABO0731-001 07/01/2001

| | Rates | Fringes |
|---------------------------------|----------|---------|
| Laborers: | | |
| Building, Heavy and Residential | | |
| UNSKILLED..... | \$ 28.74 | 14.64 |
| UTILITY LABORER..... | \$ 28.59 | 14.64 |

 Paid Holidays: Labor Day and Thanksgiving Day

LABO1010-001 07/01/2001

| | Rates | Fringes |
|--|----------|---------|
| Laborers: | | |
| HIGHWAY CONSTRUCTION | | |
| Fence Installer & Repairer..... | | |
| | \$ 28.84 | 15.55+a |
| FORMSETTERS..... | \$ 32.04 | 15.55+a |
| LABORERS..... | \$ 28.94 | 15.55+a |
| Landscape Planting & Maintenance..... | | |
| | \$ 28.84 | 15.55+a |
| Maintenance Safety Surface..... | | |
| | \$ 28.44 | 15.55+a |
| Slurry/Sealcoater/Play Equipment Installer..... | | |
| | \$ 28.69 | 15.55+a |
| Small Equipment Operator (Not Operating Engineer)..... | | |
| | \$ 28.94 | 15.55+a |
| Small Power Tools Operator..... | | |
| | \$ 28.44 | 15.55+a |

FOOTNOTES:

a. PAID HOLIDAYS: Memorial Day, Fourth of July, Labor Day, Columbus Day, Election Day and Thanksgiving Day, provided the employee has worked one (1) day in the calendar week in which the said holiday occurs.

LABO1018-001 07/01/2001

| | Rates | Fringes |
|---|----------|---------|
| Laborers: | | |
| Asphalt Rakers..... | \$ 32.36 | 15.55+a |
| Asphalt Tampers..... | \$ 29.92 | 15.55+a |
| Landscape Planting & Maintenance Fence Installer/Maintenance..... | | |
| | \$ 29.81 | 15.55+a |
| Line Striping | | |

| | | |
|----------------------------|----------|---------|
| Installers..... | \$ 29.56 | 15.55+a |
| Play Equipment/Safety | | |
| Surface Installer..... | \$ 29.31 | 15.55+a |
| Screedman/Micropaver..... | \$ 32.73 | 15.55+a |
| Shoveler, General | | |
| Laborers/ All | | |
| other incidental work..... | \$ 29.81 | 15.55+a |
| Slurry/Sealcoater..... | \$ 29.31 | 15.55+a |
| Small Equipment | | |
| Operator..... | \$ 29.56 | 15.55+a |

FOOTNOTE:

a. Paid Holidays: Memorial Day, Independence Day, Labor Day, Columbus Day, Election Day, Veterans Day, and Thanksgiving Day

PAIN0009-001 05/01/2002

| | Rates | Fringes |
|--|----------|---------|
| Glazier..... | \$ 32.20 | 20.17 |
| All repair and maintenance work on particular building, whenever performed, where the total cumulative contract is under \$100,000.00. | | |
| GLAZIERS..... | \$ 19.05 | 11.44 |
| Painters: | | |
| Painters, Drywall | | |
| Finishers, Lead | | |
| Abatement Worker | | |
| (Bridge Work)..... | \$ 30.25 | 15.42 |
| Spray, Scaffold and | | |
| Sandblasting..... | \$ 33.25 | 15.42 |

PAIN0806-001 10/01/2003

| | Rates | Fringes |
|----------------------|----------|---------|
| Painters: | | |
| Structural steel and | | |
| Bridge..... | \$ 40.25 | 24.01 |

PAIN1974-001 07/03/2002

| | Rates | Fringes |
|------------------------------|----------|---------|
| Painters: | | |
| Drywall Tapers/Pointers..... | \$ 33.82 | |

PLAS0260-001 07/01/1999

BRONX, NEW YORK AND RICHMOND COUNTIES:

| | Rates | Fringes |
|----------------|----------|---------|
| Plasterer..... | \$ 27.91 | 15.55 |

PLAS0260-002 07/01/1999

KINGS AND QUEENS COUNTIES

| | Rates | Fringes |
|----------------|----------|---------|
| Plasterer..... | \$ 27.91 | 15.16 |

PLAS0530-001 02/04/2004

| | Rates | Fringes |
|--------------------------------------|----------|---------|
| Plasterer DRYWALL PLASTERERS..... | \$ 31.00 | 15.55 |

PLAS0780-001 07/01/2003

| | Rates | Fringes |
|-------------------|----------|---------|
| Cement Mason..... | \$ 39.00 | 19.35 |

PLUM0001-001 07/01/2003

| | Rates | Fringes |
|---------------------------|----------|---------|
| Plumber PLUMBERS:..... | \$ 41.31 | 23.88 |

PLUM0638-001 12/01/2003

| | Rates | Fringes |
|--|----------|---------|
| Plumber SPRINKLER FITTERS, STEAMFITTEES..... | \$ 39.82 | 28.57 |

Service Fitter work shall consist of all repair, service and maintenance work on domestic, commercial and industrial refrigeration, air conditioning and air cooling, stoker and oil burner apparatus and heating apparatus etc., including but not exclusively the charging, evacuation, leak testing and assembling for all machines for domestic, commercial and industrial refrigeration, air conditioning and heating

apparatus. Also, work shall include adjusting, including capacity adjustments, checking and repairing or replacement of all controls and start up of all machines and repairing all defects that may develop on any system for domestic, commercial and industrial refrigeration and all air conditioning, air cooling, stoker and oil burner apparatus and heating apparatus regardless of size or type.

ROOF0008-003 07/01/2003

| | Rates | Fringes |
|-------------|----------|---------|
| Roofer..... | \$ 31.08 | 20.03 |

SHEE0028-002 01/29/2004

| | Rates | Fringes |
|-------------------------|----------|---------|
| Sheet metal worker..... | \$ 39.49 | 27.48 |

TEAM0282-001 07/01/2003

| | Rates | Fringes |
|---------------------------|-----------|-------------|
| Truck drivers: | | |
| TRUCK DRIVERS: | | |
| Asphalt..... | \$ 29.885 | 22.3525+a+b |
| Euclids & Turnapulls..... | \$ 30.45 | 22.3525+a+b |
| High Rise..... | \$ 32.16 | 21.6025+a+b |

FOOTNOTES:

PAID HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Election Day, Veterans' Day (Armistice Day), Thanksgiving Day and Christmas Day. Employees working two (2) days in the calendar week in which a holiday falls are to be paid for such holiday, provided that they shape each remaining workday during such calendar week.

b. VACATION: For each 15 days worked within the contract year an employee will receive one day's vacation with pay with a maximum vacation of 3 weeks per year.

TEAM0813-001 12/01/1998

| | Rates | Fringes |
|----------------|----------|---------|
| Truck drivers: | | |
| GROUP 1..... | \$ 19.49 | 3.61+a |
| GROUP 2..... | \$ 19.76 | 3.61+a |
| GROUP 3..... | \$ 19.90 | 3.61+a |
| GROUP 4..... | \$ 20.23 | 3.61+a |
| GROUP 5..... | \$ 20.40 | 3.61+a |

| | | |
|--------------|----------|--------|
| GROUP 6..... | \$ 21.29 | 3.61+a |
| GROUP 7..... | \$ 22.40 | 3.61+a |
| GROUP 8..... | \$ 19.90 | 3.61+a |

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Martin Luther King, Jr.'s Birthday, Presidents' Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Thanksgiving Day, Christmas Day, Employee's Birthday, Two (2) Personal Days, and any holiday or day of mourning proclaimed as such by the State or Federal Government.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Closed body trucks with self contained loading unit up to and including 22 yard capacity

GROUP 2: Open trucks, rack body or trucks with no self contained mechanical loading device, up to 22 yard capacity. One-container tractor hoist

GROUP 3: 10 wheel, open trucks, container loaders, dino-master, over-cab loaders, rack body trucks, or any trucks 22 yards to and including 25 yards capacity

GROUP 4: Rubbish and garbage trucks, 26 yards to and including 31 yards

GROUP 5: Single axle working non-compactor containers up to 15 yards capacity on rubbish and garbage removal

GROUP 6: Roll-off trucks up to and including 42 yard capacity

GROUP 7: Roll-off truck with more than 42 yard capacity or any tractor trailer trucks

GROUP 8: One-container tractor hoist on construction and alteration debris removal

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

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

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

prevailing.

WAGE DETERMINATION APPEALS PROCESS

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

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

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

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

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

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

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END OF GENERAL DECISION

(End of Summary of Changes)

SECTION 02552A

PRE-ENGINEERED UNDERGROUND HEAT DISTRIBUTION SYSTEM

09/03

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 within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 300 (2002) Inorganic Zinc Rich Primer

ASTM INTERNATIONAL (ASTM)

ASTM A 106 (2002a) Seamless Carbon Steel Pipe for High-Temperature Service

ASTM A 134 (1996; R 2001) Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)

ASTM A 135 (2001) Electric-Resistance-Welded Steel Pipe

ASTM A 139 (2000) Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)

ASTM A 167 (1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

ASTM A 234/A 234M (2002) Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

ASTM A 36/A 36M (2001) Carbon Structural Steel

ASTM A 53/A 53M (2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASME INTERNATIONAL (ASME)

ASME B16.3 Malleable-Iron Screwed Fittings, 150 and 300 lb.

ASME B16.11 (2002) Forged Fittings, Socket-Welding and Threaded

ASME B16.9 (2001) Factory-Made Wrought Steel Buttwelding Fittings

ASME B31.1 (2001) Power Piping

ASME B40.100 (2000) Pressure Gauges and Gauge Attachments

ISA - THE INSTRUMENTATION, SYSTEMS AND AUTOMATION SOCIETY (ISA)

ISA MC96.1 (1982) Temperature Measurement Thermocouples

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. 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

Heat Distribution System; G.

A complete description of the design and assembly of the system, materials of construction and field installation instructions, not later than 21 days prior to the start of field measurements. Submittal shall also include sufficient system details to show that the specified minimum insulation thickness has been met. A detailed design layout of the system (plan and elevation views) showing size, type, elevations and location of each component to be used in the system, the design and location of anchors, pipe guides, pipe supports, expansion loops, Z-bends, L-bends, end seals, leak plates, joint locations, pipe and insulation thickness and sizes, types, and movements, connection to manhole and building wall penetrations, and including, if applicable, details of transition point to aboveground or other type systems. Also, if applicable, type and details of the cathodic protection system to be used. Detailed design layout drawings shall be stamped by a registered Professional Engineer.

SD-03 Product Data

Expansion Loops and Bends; G.

Pipe-stress and system-expansion calculations for each expansion compensation elbow using a finite element computer generated 3 dimensional analysis, not later than 7 days after notice to proceed. Calculations shall demonstrate that pipe stresses from temperature changes are within the allowable requirements in ASME B31.1 and that the anchors and the guides will withstand the resultant forces. Detailed design layout drawings shall include all analysis node points. As a minimum, computer analysis results shall include node stresses, forces, moments and displacements. Calculations shall be stamped by a registered Professional Engineer in the employ of the UHDS manufacturer.

Cathodic Protection Installation; G.

Design life calculations for the cathodic protection system, not later than 7 days after notice to proceed. Calculations shall be stamped by an NACE qualified corrosion engineer.

Interruption of Existing Service; G.

Schedule of proposed outages and interruptions of existing services, 14 days in advance.

Work Plan; G.

A proposed schedule of activities, not later than 14 days after notice to proceed.

Quality Assurance Plan

Manufacturer's quality assurance plan not later than 14 days after notice to proceed.

UHDS Manufacturer's Representative Reports

A daily written report from the representative of the UHDS manufacturer, whenever the representative is required to be on the jobsite.

Connecting to Existing Work; G.

Changes required to the UHDS design due to interferences or conflicts, upon realization of interferences or conflicts.

SD-06 Test Reports

Thermal Performance Testing; G.

Manufacturer's data sheets on all UHDS components and the instrumentation required for thermal performance testing, 14 days after notice to proceed. Because of its geometry, the PIFI system is exempt from the thermal performance test requirement.

Operational Test; G.

Schedule of testing, 14 days in advance.

Tests; G.

A proposed test procedure and proposed samples of test data sheets for each required test, 30 days prior to the proposed test date. The procedure shall contain a complete description of the proposed test with calibration curves or test results furnished by an independent testing laboratory of each instrument, meter, gauge, and thermometer to be used in the tests. The test shall not commence until the procedure has been approved.

Test of WSL Systems for Steam Service; G

Test of WSL Systems for Condensate Return Service; G

Test reports in booklet form showing all factory and field tests

performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system.

SD-07 Certificates

Manufacturer; G.

Certification stating that the UHDS manufacturer regularly and currently manufactures direct-buried systems, and that the designs of the system and equipment to be provided for this project conform to specification requirements. This certification shall be an original signed by a principal officer of the UHDS manufacturer and shall be submitted at least 2 weeks prior to the start of work.

Manufacturer's Representative; G.

A letter from the system manufacturer, at least 2 weeks prior to the start of work, listing the experience and training of the manufacturer's representative.

UHDS Design; G

A Certificate of Satisfactory Operation certifying that at least 3 systems installed by the UHDS manufacturer within the previous 5 years are operating satisfactorily, not later than 14 days after notice to proceed.

Certificate of Compliance; G.

Upon completion of the work, and before final acceptance, a notarized statement signed by a principal officer of both the UHDS manufacturer and the Contractor, certifying that the system has been installed satisfactorily and in accordance with the contract drawings, specifications, UHDS manufacturer's detailed design layout drawings and with the UHDS manufacturer's recommendations.

Testing Firm

A Certificate of Qualification from the independent testing firm or firms, not later than days after notice to proceed.

Welding

Certification of Acceptability of all welds made in the field, upon completion of the project. This certification shall consist of a letter, signed by an official of the independent testing firm or firms examining welds, stating that all provisions of this specification have been complied with, and that all welds inspected radiographically have met the specified acceptability standards.

SD-10 Operation and Maintenance Data

Heat Distribution System; G.

Operation and maintenance manual listing routine maintenance

procedures, possible breakdowns and repairs, procedures for recording conduit temperatures biannually, and troubleshooting guides, before completion of work. Manual shall include as-built piping layout of the system including final elevations.

1.3 DEFINITIONS

The following definitions shall apply to the work.

1.3.1 Heat Distribution System

A complete pre-engineered, underground heat distribution system including all required components such as high temperature hot water supply pipe, high temperature hot water return pipe, and fittings, anchors, pipe supports, insulation, protective casing, and cathodic protection, for the system supplied. The pre-engineered system does not include valve manholes and the piping and equipment inside the valve manholes; Section 15184 shall be used for pertinent requirements. The pre-engineered system shall include all piping and components to a point at least 6 inches inside the building and valve manhole walls. The UHDS shall not use any part of the building or valve manhole structure as an anchor point.

1.3.2 Direct-Buried

A system which is buried, without the need for a field-fabricated protective enclosure such as a concrete trench or tunnel.

1.3.3 UHDS Types

1.3.3.1 Drainable-Dryable-Testable (DDT) Direct-Buried System

A factory-fabricated system including an air and water-tight outer protective casing, air space and an insulated carrier pipe. Drains and vents are provided at the end plates of the system (in manholes or buildings). The drains are normally capped but the caps can be removed to drain water which may leak into the air space if there is a failure in the casing or the carrier pipe. The vents allow water vapor to escape and provide a tell-tale sign of leakage.

1.4 WORK DESCRIPTION

1.4.1 Scope

The work shall include the design and fabrication; furnishing; installing, and testing of a direct buried underground insulated heat-distribution system and insulated high temperature hot water supply pipe, insulated high temperature hot water return pipe consisting of piping as indicated, cathodic protection system (where required by this specification), together with fittings and appurtenances necessary for a complete and operable system. Gland type end seals will not be permitted. DDT systems with fiberglass casings shall not be provided.

1.4.2 UHDS Design

The UHDS manufacturer shall be responsible for the complete design of the UHDS, the product to be supplied, fabrication, witnessing installation and testing of the system within the design parameters established by the

contract drawings and specifications, and in compliance with the detailed design. The complete design of the UHDS shall be sealed by a Professional Engineer in the employ of the UHDS manufacturer.

1.4.3 Contract drawings

The contract drawings accompanying this specification provide information on:

- a. The size of carrier pipes, approximate length, and site location of the system.
- b. The routing and elevation of the piping along the route.
- c. Location and design of manholes.
- d. The obstacles that must be avoided along the path.
- e. Location of piping anchors (anchors will be no closer than 3 feet or further than 5 feet from entrance to manholes or buildings) at manholes and/or buildings. The UHDS manufacturer shall incorporate anchors as needed for the system.
- f. Operating pressure and temperature of system.

1.5 QUALIFICATIONS

1.5.1 Manufacturer

The UHDS manufacturer is the company responsible for the design and manufacture of the pre-engineered system. The manufacturer shall submit certification of past experience as specified in the submittals paragraph; the certificate shall indicate the location, type of system, size of system, point of contact (POC) including phone number, for information verification. This certificate of satisfactory operation shall be an original signed by a principal officer of the UHDS manufacturer. The UHDS manufacturer directs the installation of the system and has a representative on the jobsite. The manufacturer shall submit a Work Plan indicating when various items of work and tests are to be carried out and when its representative will be present at job site. The manufacturer shall submit a list of characteristics indicating what defects or damage will necessitate replacement. The manufacturer shall submit a Quality Assurance Plan for fabrication, delivery, storage, installation and testing of the system. The manufacturer shall submit data sheets for all coatings and indicating thicknesses of insulation for carrier pipes.

1.5.2 Manufacturer's Representative

The UHDS manufacturer's representative shall be a person who regularly performs the duties specified, is certified in writing by the UHDS manufacturer to be technically qualified and experienced in the installation of the system, and shall be authorized by the manufacturer to make and sign the daily reports specified. The UHDS manufacturer's representative shall be under the direct employ and supervision of the UHDS manufacturer.

1.5.3 Corrosion Engineer

Corrosion engineer refers to a person who by knowledge of the physical sciences and the principles of engineering and mathematics, acquired by professional education and related practical experience, is qualified to engage in the practice of corrosion control. Such person may be a licensed professional corrosion engineer or certified as being qualified by the National Association of Corrosion Engineers (NACE), if such licensing or certification includes 3 years experience in corrosion control on underground metallic surfaces of the type under this contract. NACE certification shall be technologist, corrosion specialist, or cathodic protection specialist. The corrosion engineer shall make at least 3 visits to the project site. The first of these visits shall include obtaining soil resistivity data, acknowledging the type of pipeline coatings to be used and reporting to the Contractor the type of cathodic protection required. Once the submittals are approved and the materials delivered, the corrosion engineer shall revisit the site to ensure the Contractor understands installation practices and laying out the components. The third visit shall involve testing the installed cathodic protection systems and training applicable personnel on proper maintenance techniques. The corrosion engineer shall supervise, inspect, and test the installation and performance of the cathodic protection system.

1.5.4 Testing Firm

The Testing Firm must be able to certify that: weld examination methods and procedures, and the interpretation of radiographic films will be performed in accordance with ASME B31.1; the firm intends to utilize the proper film exposure, techniques, and penetrometer to produce density and geometric sharpness in sufficient clarity to determine presence of defects; and that all radiographic films will be reviewed and interpreted, and reading reports signed, by not less than a Certified American Society for Nondestructive Testing Level III Radiographer.

1.6 SYSTEM REQUIREMENTS

1.6.1 Cathodic Protection

Cathodic protection shall be provided for systems with coated steel casings in accordance with Section 13110A Cathodic Protection System (Sacrificial Anode).

1.6.2 System Requirements

1.6.2.1 Operating Characteristics: The high temperature hot water supply and return system shall have an operating temperature of 400 degrees F and an operating pressure of 300 psig. The maximum distance between expansion loops shall be 225 feet. Anchors will be no closer than 3 feet or further than 5 feet from entrance to manhole. Expansion loops shall not be cold sprung.

1.6.2.2 Rated Characteristics: Thermal expansion calculations shall be computed for the supply and return piping using the following design characteristics and installation temperature. The system design conditions for high temperature water supply and/or return shall be a temperature of 400 degrees F and a pressure of 300 psig. For calculation purposes, the installation temperature shall not be higher than the ambient temperature at the site: 11 degrees F.

1.6.3 Manhole Standards: All manholes will be 10' x 10' wide, and 6' deep, but depth can be more depending on the depth of the HTHW conduit. All

conduits shall be drainable back to manhole.

1.6.3.1 Use high temp Linkseal for all sealing and all conduit penetrations through manhole. Waterproof all manholes completely. No Gland seals shall be used on HTHW conduits.

1.6.3.2 Provide calcium silicate for all manhole insulation. The pipe insulation shall be finished with a stainless steel jacket no less than 0.010 inches thick. Joints in jacket shall be overlapped minimum 1 1/2 inches. Seams shall be located at 4 O'clock to shed water. Jacket shall be secured with stainless steel bands.

1.6.3.3 All valves in manhole need to be physically accessible without requiring mechanic to jump, climb, or crawl over pipes.

1.6.3.4 High and low ventilation shall be mushroom capped and painted base dark brown standard color. No "J" vents.

1.6.3.5 Conduit case shall have telltales piped up to vent and the conduit drain plug shall be installed.

1.6.3.6 Compressed air sump pumps (Sarco) shall be provided for each manhole in a sump pit. The sump pump should discharge away from manhole in a French drain.

1.6.3.7 Entry doors to manholes shall be equivalent to Bilco doors with 25 year warranties. Run rim drain line away from manhole. All manholes shall have built in ladder with a square safety pole.

1.6.3.8 All new manholes shall be completely waterproofed on the exterior of the manhole prior to backfilling. Provide a bituminous material.

1.6.3.9 Provide drains on carrier pipe as appropriate inside manholes.

1.6.4 All HTHW shall have cathodic protection. Refer to Section 1311 0A Cathodic Protection System (Sacrificial Anode).

1.6.5 Conduit systems will have a 0.25" thick conduit.

1.6.6 HTHW lines require a minimum separation from PVC lines of 5 feet.

1.6.7 No threaded schedule 40 pipe. All threaded pipe shall be schedule 80.

1.6.8 Work on HTHW should be limited to non-winter (1 May - 15 Oct).

1.6.9 Where HTHW crosses the road, a concrete slab shall be placed directly underneath the asphalt surface and shall be supported by undisturbed earth on both sides (extend over the trench by 1 foot on both sides).

1.7 STANDARD PRODUCTS

The designed system and equipment provided for this project shall be of current production and shall essentially duplicate systems that have been in satisfactory use for at least 5 years prior to bid opening at 3 locations. The systems shall have been operated under pressure, temperature and site characteristics that are equal to or more severe than the operating conditions in this specification and shall have distributed

the same medium. The system shall be supported by a service organization that can reach the site after a service call within 48 hours.

1.8 SITE CLASSIFICATION

Classification of the site conditions for the UHDS shall be based on ASTM D 2487.

The Pre-engineered underground heat distribution system shall be a Class "A" system for Class "A" soil conditions.

PART 2 PRODUCTS

2.1 FACTORY FABRICATED, DIRECT-BURIED DDT SYSTEMS

2.1.1 DDT High Temperature Hot Water Carrier Pipes

Requirements shall be in accordance with paragraph HEAT DISTRIBUTION PIPING.

2.1.3 DDT Carrier Pipe Insulation

Carrier pipe insulation shall conform to minimum thicknesses and type listed in Tables 1 and 2 as required for temperature specified under paragraph Rated Characteristics.

2.1.4 Insulation Banding and Scrim

Stainless steel bands and clips, at least 1/2 inch wide, conforming to ASTM A 167 (304 stainless steel), at a maximum spacing of 18 inches shall be used over the scrim to secure the insulation onto the carrier pipe; a minimum of 2 bands shall be used for each 4 foot section of insulation. Scrim shall be vinyl-coated fiberglass with 18 x 16 mesh (number of filaments per 1 inch) and made of 0.013 inch diameter vinyl-coated fibrous glass yarn.

2.1.5 Casing

Casing shall be smooth-wall steel, electric resistance spiral welded, conforming to ASTM A 134, ASTM A 135, or ASTM A 139 and the values tabulated below. Eccentric connectors shall be provided between casing sections as needed to provide drainage of casing section between manholes and between manholes and buildings.

| Casing Diameter (in) | Minimum Thickness (in) |
|----------------------|------------------------|
| 6 - 26 | 0.250 |
| 27 - 36 | 0.250 |
| 37 - 42 | 0.250 |
| 46 | 0.250 |

2.1.6 Casing End Plates, Vents, and Drains

End plates shall be made of ASTM A 36/A 36M steel, minimum thickness 1/2 inch for conduit pipe sizes above 12 inches and 0.375 inches for conduit pipe sizes 12 inches and less. A 1 inch ASTM A 53/A 53M, Sch 40, galvanized vent riser pipe shall be provided on end plate vent opening. Vent pipe shall extend to top of manhole and terminate 12 inches above grade with a 180 degree bend. A 1 inch drain shall be provided at the

bottom and vent at the top. Malleable iron plugs (ANSI/ASME B13.3) and half coupling, constructed with welded steel and welded to the end plate, shall be furnished; drains shall be plugged; vents shall not be plugged. Gland seals will not be acceptable.

2.1.7 Air Space

Continuous 1 inch minimum air space shall be provided between carrier pipe insulation and casing.

2.1.8 Casing Coating

Coating shall be rated by manufacturer for continuous service for at least 25 years at temperatures of 230 degrees F. Coating shall be applied in accordance with the coating manufacturer's instructions, shall be factory inspected for holidays and repaired as necessary.

2.1.8.1 Fusion-Bonded Epoxy

Casing coating shall be fusion-bonded epoxy, minimum thickness 0.04 inches.

2.1.8.2 Urethane Elastomer

Coating shall be urethane elastomer, minimum thickness 0.04 inches.

2.1.9 Coating of End Plates and Conduit Extending into Manholes

End plates and conduit extending into manholes shall be coated with a zinc-rich coating conforming to AASHTO M 300 Type IA, except that volatile organic compounds shall not exceed 2.8 pounds/gallon. The zinc-rich coating shall be applied in accordance with the coating manufacturer's requirements including surface preparation. No additional top coat shall be applied.

2.1.10 Carrier Pipe Guides

Carrier pipe guides shall be spaced 10 feet on centers maximum, no more than 5 feet from pipe ends, with a minimum of 3 guides per elbow section. Guides shall be designed to allow thermal expansion without damage, to provide proper pipe guiding, and to allow horizontal movement in 2 directions as required at expansion loops and bends. Design of supports shall permit flow of water through the support. Pipe insulation shall extend through the pipe guides and be protected by steel sleeves. Design of guides shall negate metal-to-metal contact between the casing and the carrier pipe. Insulation or non-metallic material used to ensure no metal-to-metal contact shall not be compressed by the weight of the carrier pipe when full of water.

2.1.11 Anchor Plates

Anchor plate shall be ASTM A 36/A 36M steel, welded to carrier pipe and casing, 1/2 inch minimum thickness, with passages for air flow and water drainage thru the annular air space in the system. Exterior surface of the anchor plate shall be coated with the same coating material as the casing.

2.1.12 Field Connection of Casing Sections

Field connection of casing shall be made using a compatible steel section, welded to casing sections, coated on all surfaces with UHDS manufacturer's coating field repair compound, and covered with a 0.05 inch minimum thickness polyethylene shrink sleeve designed for a service temperature exceeding 176 degrees F.

2.1.13 Pipe and Pipe Support-Guides

All piping in conduit shall be as hereinafter specified for the service required. All ferrous pipe field joints shall be welded by competent mechanics and hammer tested under hydrostatic pressure of 250 psig or one and one-half times the design pressure, whichever is greater. Concealed pipe weld in prefabricated conduit fittings shall be factory tested the same as specified welds prior to assembly.

Piping shall be suitably spaced and supported in conduit designed full round insulating support-guides which permit the pipe to expand and/or contract freely without stress or wear on the pipe and insulation as well as provide for drainage and free air circulation.

2.1.14 Expansion Loops, Ells and Tees

Prefabricated ells, loops and tees shall be furnished and installed where shown on plans and shall consist of pipe, insulation, and conduit conforming to the same specification as hereinbefore specified for straight runs.

Expansion loops shall be of proper design and accordance with stress limits indicated by ANSI B 31.1. Code for pressure piping. Loop piping shall be installed in conduit suitability sized to handle pipe movement.

2.1.15 Expansion Loops and Bends

Stresses shall be less than the maximum allowable stress from the Power Piping Code (ASME B31.1). Detailed design layout drawings and stress and anchor force calculations shall be provided for all loops and bends. Locations of all anchors, guides and supports shall be shown. The calculations shall be based on design characteristics (pressures and temperatures) specified for both the supply and return lines. The maximum space between expansion loops shall be 225 feet.

2.1.16 Manufacturer's Identification

Embossed brass or stainless steel tag, hung by brass or stainless steel chain at each end of each conduit or insulated piping in the manholes and buildings, shall be provided. The tag shall identify UHDS manufacturer's name, date of installation, Government contract, and manufacturer's project number.

2.3 PIPE INSULATION TYPE AND MINIMUM THICKNESS

The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS. Materials containing asbestos will not be permitted. The minimum thickness of insulation for the heat distribution system shall be in accordance with Table 1 in which the insulations listed have passed the 96 hour boiling water test. Pipe insulation work shall include piping, fittings, and valves.

TABLE 1
MINIMUM PIPE INSULATION THICKNESS (inches)

High Temperature
Hot Water Supply and Return (250 to 450 degrees F)

INSULATIONS
For Drainable/Dryable
Systems

| Nominal Pipe Diameter (inches) | Delta | Thermo-12 Super Caltemp | MPT-PF MPT-PC |
|---|-------|-------------------------------|------------------|
|---|-------|-------------------------------|------------------|

TABLE 1
MINIMUM PIPE INSULATION THICKNESS (inches)

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INSULATIONS
For Drainable/Dryable
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| Nominal Pipe Diameter (inches) | Delta | Thermo-12 Super Caltemp | MPT-PF MPT-PC |
|---|-------|-------------------------------|------------------|
|---|-------|-------------------------------|------------------|

| | | | |
|-----|-----|-----|-----|
| 1.0 | 2.5 | 4.0 | 2.0 |
| 1.5 | 2.5 | 4.0 | 2.0 |
| 2.0 | 3.5 | 4.5 | 2.5 |
| 2.5 | 3.5 | 4.5 | 2.5 |
| 3.0 | 4.0 | 5.0 | 3.0 |
| 4.0 | 4.0 | 5.0 | 3.0 |
| 5.0 | 4.0 | 5.0 | 3.0 |
| 6.0 | 4.5 | 5.5 | 3.5 |
| 8.0 | 4.5 | 5.5 | 3.5 |

- NOTE: 1) Delta is available from Rockwool in Leeds, Alabama.
 2) MPT is available from Mineral Products of Texas in Houston, TX
 3) Thermo-12 and Super Caltemp are available from Johns Manville in Denver, Colorado.

2.4 HEAT DISTRIBUTION PIPING

2.4.1 High Temperature Hot Water Pipe

Pipe material shall be steel; seamless ASTM A 53/A 53M, Grade B or ASTM A 106, Grade B; or electric resistance welded ASTM A 53/A 53M, Grade B; Schedule 40. Standard weight will be permitted for pipe sizes 12 inches and above. ASTM A 53/A 53M, Type F furnace butt welded pipe will not be allowed. Joints will not be allowed in the factory fabricated straight

section of the carrier pipe. Factory fabricated piping sections, as part of an expansion loop or bend, shall have all welded joints 100% radiographically inspected in accordance with ASME B31.1. Radiographs shall be reviewed and interpreted by a Certified American Society for Nondestructive Testing (ASNT) Level III radiographer, employed by the testing firm, who shall sign the reading report.

2.4.1.1 Joints

Joints shall be butt-weld except socket-weld joints will be permitted for pipe sizes 2 inches and smaller. Dye penetrant may be used in place of 100% radiographic inspection for pipe sizes 2 inches and below. Location and elevation of all field joints shall be indicated on detailed design layout drawings. Split-ring welding rings may be used.

2.4.2 Fittings

Welds in factory fittings shall be radiographically inspected. Radiographs shall be reviewed and interpreted by a Certified ASNT Level III radiographer, employed by the testing firm, who shall sign the reading report. The Contracting Officer may review all inspection records, and if any welds inspected are found unacceptable in accordance with ASME B31.1, the fitting shall be removed, replaced, and radiographically reexamined at no cost to the Government.

2.4.2.1 Butt-Welded

Fittings shall be steel; ASTM A 234/A 234M, Grade B, ASME B16.9, same schedule as adjoining pipe. Elbows shall be long radius unless otherwise indicated. Tees shall be full size or reducing as required, having interior surfaces smoothly contoured. Split-ring welding rings may be used.

2.4.2.2 Socket-Welded

Fittings shall be forged steel ASME B16.11; 2000 pound class shall be used for pipe sizes 2 inch and below. Dye penetrant inspection may be used in lieu of radiographic inspection of welded fittings for pipe sizes 2 inches and below.

2.4.3 Pipe Supports

2.4.3.1 Piping in Manholes:

Piping shall be supported in accordance with Section 15184N High Temperature Water System within Buildings.

2.5 COMPRESSED AIR PIPING

Compressed air piping in the heat distribution conduit and in manholes shall be the same material as specified for high temperature hot water piping. All joints, fittings, and valves shall be welded. Valves shall be as specified for the high temperature hot water piping.

2.6 MANHOLE SUMP PUMP DISCHARGE PIPING

Sump Pump discharge piping located within the manholes shall be standard weight, zinc coated, steel pipe, ASTM A53, with malleable iron fittings,

ASME B 16.3. Sump pump discharge piping located underground shall be cast iron soil pipe, as described in Section 15400A Plumbing General Purpose. Valves shall be Class 125, bronze, with threaded ends. Valves shall be gate valves and swing check valves.

2.7 HIGH TEMPERATURE HOT WATER PIPING VALVES

Valves in high temperature water piping shall be as specified Section 15184N High Temperature Water System Within Buildings. Valves shall be gate valves or globe valves. Valves shall be factory equipped with bypass valves to warm the carrier pipe with main valve closed. Bypass valves and bypass piping shall meet the provisions specified for high temperature hot water piping and high temperature hot water piping valves.

2.8 MANHOLE SUMP PUMPS

Manhole sump pumps shall be powered by compressed air and shall not require any electrical energy. Pump bodies shall be cast iron, shall contain a float operated snap-acting mechanism with no external seals or packing, stainless steel trim, stainless steel bearing components and bronze check valves. Pump shall discharge 4 gallons of sump water per cycle. Compressed air consumption shall be 100SCF per 10000 pounds of liquid pumped. Pump shall be constructed for 125 psig. Pump capacity (instantaneous discharge rate) shall be up to 30 gallons per minute. Compressed air pressure will vary at the site from 125 psig to 40 psig.

2.9 INSULATING FLANGE KITS

Provide insulating flange kits rate for the high temperature hot water piping service, HECK KIT (diameter to suit pipe sizes) as manufactured by Miami Valley Gasket Company, 1800-316-5358 or approved equal.

The section of piping to be protected with cathodic protection shall be isolated from the remaining piping (piping in manholes and piping in buildings) through the use of insulating flange kits. The insulating flanges shall be provided inside manhole walls and inside each building immediately after the first interior valve. The piping shall be isolated from building and manhole rebar.

All underground distribution system (except in manholes) shall be provided with cathodic protection.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

3.1.1 Job Conditions

Phasing of demolition and construction shall be as shown on contract drawings.

3.1.2 Interruption of Existing Service

The Contractor shall arrange, phase and perform work and provide temporary facilities, materials, equipment, and connections to utilities, to ensure adequate heat distribution service for existing installations at all times. Only necessary interruptions required for making connections will

be permitted, and only at times when approval is obtained from the Contracting Officer. All interruptions shall be during hours as approved by the Contracting Officer.

3.1.3 Grading

Unless otherwise shown on the contract drawings or the detailed design layout drawings and high temperature hot water supply/return lines shall be graded uniformly downward not less than 5.0 inches in 100 feet to the lower point of entry between manholes and/or building entries.

3.1.4 Connecting to Existing Work

New work shall be connected to existing work in a neat and workmanlike manner. Connections shall be made only in manholes. Where an existing structure must be cut or existing utilities interfere, such obstructions shall be bypassed, removed, replaced or relocated, restored and repaired. Any changes required to the UHDS design as a result of interferences or conflicts shall be approved by the UHDS designer and the Contracting Officer. Work disturbed or damaged shall be replaced to its prior condition.

3.1.5 Coordination

The location of all items of equipment and work of all trades shall be coordinated. Operability and maintainability of the equipment and systems shall be maintained.

3.1.6 Variations

Any variations from the approved, detailed design layout drawings shall be submitted to the Contracting Officer for approval. Variations shall be signed and sealed by the UHDS manufacturers' professional engineer responsible for the complete design of the UHDS.

3.1.7 Storage and Handling During Installation

Equipment and material placed on the job shall remain in the custody of the Contractor until final acceptance whether or not the Contractor has been reimbursed for the equipment and material by the Government. The Contractor shall be solely responsible for the protection of the equipment and material against damage from any source while stored or during installation. Materials shall be protected against damage from UV light, and entry of water and mud, by installing watertight protection on open ends at all times. Sections of the casing or carrier piping found to have been subjected to full or partial submergence in water (which would allow the insulation to become wet) shall be immediately replaced. Materials awaiting installation shall be covered to protect from UV degradation.

3.2 DEMOLITION

3.2.1 Demolition Procedures

Work shall be performed in accordance with requirements for phasing. Pipe, valves, fittings, insulation, and hangers, including the connection to the structure and any fastenings, shall be removed. Openings in manhole or building walls shall be sealed after removal of piping. Material and

equipment removed shall become the property of the Contractor and shall be removed from Government property within 1 week and shall not be stored in operating areas. Flame cutting shall be performed with adequate fire protection facilities available as required by safety codes and Contracting Officer.

3.2.2 Asbestos Removal

Asbestos removal shall conform to Section 13280A ASBESTOS ABATEMENT.

3.3 PIPE, PIPING JOINTS AND FITTINGS

3.3.1 Joint Preparation

Pipe and fittings shall be cleaned inside and outside before and after assembly. Dirt, scale, and other foreign matter shall be removed from inside the piping by use of a pipe swab or pipe pig before connecting pipe sections, valves, equipment or fittings. Eccentric connectors shall be used as needed between casing sections to provide drainage of casing section between manholes and between manholes and buildings.

3.3.2 Direction Changes

Changes in direction shall be made with factory-built reinforced fittings. Field-fabricated fittings and miters will not be permitted.

3.4 WELDING

The Contractor shall be responsible for welding quality and shall:

- a. Conduct tests of the welding procedures used in the work, determine the suitability of the procedures used, determine that the welds made will meet the required tests, and determine that the welding operators have the ability to make sound welds under standard conditions.
- b. Comply with ASME B31.1.
- c. Perform all welding operations required for construction and installation of the heat distribution system.

3.4.1 Qualification of Welders

Rules of procedure for qualification of all welders and general requirements for fusion welding shall conform with the applicable portions of ASME B31.1, and as outlined below.

3.4.2 Examining Welders

The Contractor shall examine each welder to determine the ability of the welder to meet the required qualifications. Welders shall be tested for welds in all positions, including welds with the axis horizontal (not rolled) and with the axis vertical. Each welder shall:

- a. Weld only in positions in which they have qualified.
- b. Identify welds with the specific code marking signifying name and

number assigned.

3.4.3 Examination Results

The Contractor shall furnish a list of welder's names and corresponding code markings. Welders which fail to meet the prescribed welding qualifications shall be retested. Welders who fail the second test shall be disqualified for work on this project.

3.4.4 Beveling

Field and shop bevels shall be done by mechanical means or by flame cutting. Where beveling is done by flame cutting, surfaces shall be thoroughly cleaned of scale and oxidation just prior to welding.

3.4.5 Alignment

Split welding rings shall be used for field joints on carrier pipes above 2 inches to assure proper alignment, complete weld penetration, and prevention of weld spatter reaching the interior of the pipe. Field joints 2 inches and smaller shall be made with welding sockets.

3.4.6 Erection

Piping shall not be split, bent, flattened, or otherwise damaged before, during, or after installation. Where the pipe temperature falls to 32 degrees F or lower, the pipe shall be heated to approximately 100 degrees F for a distance of 1 foot on each side of the weld before welding, and the weld shall be finished before the pipe cools to 32 degrees F.

3.4.7 Defective Welds

Defective welds shall be replaced and reinspected in accordance with ASME B31.1. Repairing defective welds by adding weld material over the defect or by peening will not be permitted. Welders responsible for defective welds shall be tested for qualification.

3.4.8 Electrodes

Electrodes shall be stored in a dry, heated area, and shall be kept free of moisture and dampness during fabrication operations. Electrodes that have lost part of their coating shall not be used.

3.4.9 Radiographic Testing

An approved independent testing firm regularly engaged in radiographic testing shall perform radiographic examination of 100% of the field welds in the carrier piping of direct-buried systems in accordance with ASME B31.1. The following shall be furnished: a set of films showing each weld inspected, a reading report evaluating the quality of each weld, and a location plan showing the physical location where each weld is to be found in the completed project, prior to installing casing field joints, backfilling and hydrostatic testing. All radiographs shall be reviewed and interpreted by a Certified American Society for Nondestructive Testing Level III radiographer, employed by the testing firm, who shall sign the reading report. The Contracting Officer may review all inspection records, and if any welds inspected are found unacceptable they shall be removed,

rewelded, and radiographically reexamined at no cost to the Government.

3.5 HEAT DISTRIBUTION SYSTEM INSTALLATION

The UHDS manufacturer's representative shall oversee the delivery, storage, installation and testing of the system. Work shall be in accordance with the requirements specified and with the printed instructions of the manufacturer. These specifications shall take precedence over the printed instructions if conflicts arise. Printed instructions shall be submitted to the Contracting Officer prior to system installation.

3.5.1 Verification of Final Elevations

Prior to covering the top of the casing with backfill material, but after all temporary supports have been removed and initial backfilling of the conduit system has been accomplished, the Contractor shall measure and record the elevation of the top of the casing in the trench. For the PIP system, elevations of the top of each pipe shall be measured and recorded. Elevations shall be taken at every completed field joint, 1/3 points along each pipe section and top of elbows. These measurements shall be checked against the contract drawings and shall confirm that the conduit system has been installed to the elevations shown on the contract drawings. Slope shall be uniform to within 0.1%. These measurements shall be recorded by the Contractor, included in the UHDS manufacturer's representative daily report, and given to the Contracting Officer prior to covering the casing with backfill material.

3.5.2 Excavation, Trenching, and Backfilling

Excavation, trenching, and backfilling shall be performed as required by the UHDS manufacturer's design and as specified in Section 02300 EARTHWORK. Pipe shall lay on a 12 inch minimum sand bed and shall be backfilled with sand on all sides to a minimum of 6 inches as measured from outside of casing. This sand bedding requirement does not apply to the PIP system. Foundation for system shall be firm and stable. Foundation and backfill shall be free from rocks or substances which could damage the system coating. Concrete anchor and thrust blocks shall be installed in undisturbed earth. Backfilling shall not commence until system has been satisfactorily pressure tested (both hydrostatic test of carrier and air test of casing). Minimum depth of burial to the top of the casing shall be 39 inches. Maximum depth of burial to the top of the casing shall be 10 feet.

3.5.3 UHDS Manufacturer's Representative Responsibilities

The UHDS Manufacturer's representative shall be present at the job site and witness when the following types of work are being performed:

- a. Inspection and unloading.
- b. Inspection of trench prior to commencing installation of system.
- c. Inspection of concrete anchors and thrust blocks.
- d. Pneumatic and Hydrostatic testing.
- e. Field joint closure work.

- f. Air test of casing.
- g. Holiday test of conduit coating.
- h. Repair of any coating.
- i. Installation of cathodic protection system.
- j. Initial backfill up to 10 inches above the top of the casing.
- k. Verification of final elevations. Elevation readings shall be witnessed and recorded.
- l. Testing of cathodic protection system.
- m. Operational tests.

The UHDS manufacturer's representative shall notify the Contractor immediately of any problems. The UHDS manufacturer's representative shall notify the Contracting Officer of problems requiring immediate action; otherwise, the daily reports shall note any problems encountered and indicate the corrective actions taken.

3.5.4 UHDS Manufacturer's Representative Reports

The UHDS manufacturer's representative shall: prepare and sign a written daily report; present the original daily report to the Contracting Officer no later than one working day after it is prepared; and forward 1 copy to the manufacturer's main office. The report shall state whether or not the condition and quality of the materials used and the delivery, storage, installation and testing of the system are in accordance with the drawings, specifications, and manufacturer's printed instructions and are satisfactory in all respects. When any work connected with the installation is unsatisfactory, the report shall state what corrective action has been taken or shall contain the UHDS manufacturer's recommendations for corrective action. The report shall identify any condition that could result in an unsatisfactory installation, including such items as open conduit ends left in the trench overnight and improper manhole entries. The daily reports shall be reviewed, signed and sealed, on a weekly basis, by the registered engineer responsible for the system design. Signed and sealed copies of the daily reports shall be submitted with the payment request. Requests for payment will be denied if the weekly review is not accomplished. Upon completion of the work and before final acceptance, a notarized Certificate of Compliance, signed by a principal officer of both the manufacturing and the contracting firms, stating that the installation is satisfactory and in accordance with drawings, specifications, and manufacturer's instructions shall be delivered to the Contracting Officer. The UHDS manufacturer shall retain a copy of all daily reports and the Certificate of Compliance for 5 years after final acceptance of the system by the Government.

3.5.5 Protection

Casing coating shall be protected from damage during unloading, storage, rigging and installation. Casing and carrier pipe ends shall be protected from water intrusion during unloading, storage, rigging and installation. Piping and accessories shall be protected from damage due to exposure to UV

light.

3.5.6 Defective Material

The UHDS manufacturer's representative shall take prompt action to remove from the site all damaged or defective material, subject to rejection in accordance with the quality assurance provisions included in the manufacturer's submittals and printed instructions, and shall order prompt replacement of such material.

3.5.7 Cathodic Protection Installation

Provide cathodic protection for all steel casing systems and all buried exposed metal. Assume that 25 percent of the exterior of the UHDS is exposed metal. Cathodic protection systems shall have a minimum design life of 30 years. Dielectric pipe flanges and waterways, and isolation devices shall be provided at all points necessary. Test stations at grade shall be provided on each section of the piping system. 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 the 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.

3.6 TESTS

Leak-tightness of all piping systems shall be demonstrated by performing pressure tests (hydrostatic, pneumatic) and operational tests. Heat distribution system shall be pressure tested in conformance with specified requirements and printed instructions for the system supplied; tests shall include carrier piping and casing. The carrier pipe shall be hydrostatically tested. Casings of DDT systems shall be pneumatically tested. Casing and end seals of WSL system shall be tested for intrusion of water into the casing and insulation. Mercury shall not be used in thermometers required for the tests.

3.6.1 Holiday Testing of Direct-buried System Steel Casings

Entire exterior surface of the casing, including the bottom exterior surface, shall be tested for faults in coating after installation in trench, prior to backfilling, using test method and voltage recommended by coating manufacturer. If any holidays are found, they shall be repaired and the coating retested. System shall not be backfilled until all holidays are eliminated.

3.6.2 Pneumatic, Hydrostatic and Operational Tests

Before conducting heat distribution system tests, lines shall be flushed with high pressure water until [discharge shows no foreign matter] [the Contracting Officer, after examining the discharge, stops the flush].

3.6.2.1 Pneumatic Test

The casing of DDT systems shall be pneumatically tested after welding and before field coating using air as the test medium. The test pressure shall

be 15 psig. Persons not working on the test operations shall be kept out of the testing area while testing is proceeding. The test shall be made on the system as a whole or on sections that can be isolated. Joints in sections shall be tested prior to backfilling when trenches must be backfilled before the completion of other pipeline sections. The test shall continue for 24 hours from the time of the initial readings to the final readings of pressure and temperature. The initial test readings of the instrument shall not be made for at least 1 hour after the casing has been subjected to the full test pressure, and neither the initial nor final readings shall be made at times of rapid changes in atmospheric conditions. There shall be no indication of reduction of pressure during the test after corrections have been made for changes in atmospheric conditions in conformity with the relationship $T(1)P(2) = T(2)P(1)$, in which T and P denote absolute temperature and pressure, respectively, and the numbers denote initial (1) and final (2) readings. Pressure shall be measured with a pressure gauge conforming to ASME B40.100. A throttling type needle valve or a pulsation dampener and shutoff valve may be included. The diameter of the face shall be at least 4.5 inches with a measurable range of 0 to 15 psig and graduations of at least 0.5 psig. During the test, the entire system shall be completely isolated from all compressors and other sources of air pressure. Each joint shall be tested while under test pressure by means of soap and water or an equivalent nonflammable solution prior to backfilling or concealing any work. All labor, materials and equipment for conducting the tests shall be furnished by the Contractor and shall be subject to inspection at all times during the tests. The Contractor shall maintain proper safety precautions for air pressure testing at all times during the tests.

3.6.2.2 Hydrostatic Test

Carrier piping shall be tested hydrostatically before insulation is applied at field joints and shall be proved tight at a pressure 1.5 times the heat distribution supply pressure of 300 psig for 2 hours. There shall be no indication of reduction of pressure during the test. Pressure shall be measured with a device calibrated to be read in increments not greater than 0.1 psi.

3.6.2.3 Operational Test

Prior to acceptance of the installation, Contractor shall subject system to operating tests simulating actual operating conditions to demonstrate satisfactory functional and operating efficiency. These operating tests shall cover a period of not less than 6 hours for each portion of system tested. Contractor shall submit for approval a schedule of the tests to be performed. The contractor shall provide calibrated instruments, equipment, facilities and labor, at no additional cost to the Government. When failures occur, problems shall be repaired and test repeated.

3.6.3 Deficiencies

Deficiencies discovered shall be corrected at the Contractor's expense. Major deficiencies, or failure to correct deficiencies, may be considered cause for rejecting the entire installation.

3.7 VALVE MANHOLES

Valve manholes, piping, and equipment in valve manholes shall be in accordance with the contract drawings.

3.8 BURIED UTILITY WARNING AND IDENTIFICATION

3.8.1 Plastic Marking Tape

Polyethylene plastic tape manufactured specifically for warning and identifying buried utility lines shall be supplied and installed. Tape shall be buried above the pipe during the trench backfilling operation and shall be buried approximately 12 inches below grade. Tape shall be 0.004 inch thick polyethylene with a metallic core. Tape shall be acid- and alkali-resistant and shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise with an elongation factor of 350 percent. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. The tape shall be of a type specifically manufactured for marking and locating metallic underground utilities. Tape shall be 6 inches wide and printed with a caution and identification of the piping system over the entire tape length. Tape shall be yellow with bold black letters. Tape color and lettering shall be unaffected by moisture and other substances contained in the backfill material.

3.8.2 Markers for Underground Piping

Markers for underground piping shall be located along the distribution and service lines. Markers shall be placed as indicated approximately 2 feet to the right of the distribution system when facing in direction of flow in the supply line. The marker shall be concrete 6 inch square or round section 3 feet long. The top edge of the marker shall have a minimum 1/2 inch chamfer all around. The letters HTHW shall be impressed or cast on the top, and on one side of the markers to indicate the type of system that is being identified. Each letter shall be formed with a V-shaped groove and shall have a width of stroke at least 1/4 inch at the top and depth of 1/4 inch. The top of the marker shall protrude not more than 4 inches above finished grade.

3.9 THERMAL PERFORMANCE TESTING

The equipment and procedures specified shall be used to ensure acceptable thermal performance of the installed system. The test results shall be submitted for approval. All materials and procedures described for this test shall be included as deliverables of the construction contract for the system, unless otherwise noted. Due to its geometry, the PIPI system is exempt from this requirement.

3.9.1 Equipment

3.9.1.1 Casing Temperature Measurement

Before backfilling, and after field joint closures have been welded to the casing and the coating has been applied and cured, temperature sensors shall be attached to the exterior of every other field joint closure. The sensors shall be attached with epoxy suitable for use at 500 degrees F. A sensor shall be adhered with epoxy to the coated casing near the midpoint of every other pipe section between field joints. The sensor shall not be located closer than 5 feet from any guide in the interior of the casing. After the sensors have been adhered to the casing, 2 complete wraps of duct tape shall be used to secure and protect the sensor. The radial position

of the sensors shall be located 45 degrees from the top center of the casing, at either the 1:30 or 10:30 position, away from the adjacent heat distribution system pipe if present. All sensors shall be type T thermocouples in accordance with ISA MC96.1 copper constantan 20 gauge thermocouples, made from special limits grade thermocouple wire, 0.5 degrees C or 0.4 percent maximum error, with each conductor insulated and an overall jacket on both conductors. Insulation on the thermocouple wires shall be suitable for service at 500 degrees F. The thermocouple wire between sensor location and termination point shall be continuous with no splicing or other connections. Each sensor shall be shown with a special symbol on the detailed design layout drawings and shall be identified by a number and/or letter code, starting from the upstream manhole.

3.9.1.2 Carrier Pipe Temperature Measurement

Carrier pipe temperature shall be measured within the manhole where the panel box is located. Carrier pipe temperature shall be measured by a sensor adhered with epoxy directly to the exterior of the carrier pipe. All sensors shall be type T thermocouples in accordance with ISA MC96.1 copper constantan 20 gauge thermocouples, made from special limits grade thermocouple wire, 0.5 degrees C or 0.4 percent maximum error, with each conductor insulated and an overall jacket on both conductors. Insulation on the thermocouple wires shall be suitable for service at 500 degrees F. The thermocouple wire between sensor location and termination point shall be continuous with no splicing or other connections. The location of this sensor shall be at either the 1:30 or 10:30 position. At the location of the sensor, the carrier pipe shall be insulated with calcium silicate insulation at least 5 inches thick. This insulation shall extend at least 6 inches on each side of the actual sensor location and shall be clad with an aluminum jacket.

3.9.1.3 Terminals

The wires from each casing or carrier pipe temperature sensor shall be extended into the nearest manhole and terminated in a panel box. The panel box shall be a NEMA Type 4 waterproof enclosure, of suitable size, mounted near the top of the manhole at a location near the manhole entrance, accessible without entrance into the manhole, where possible. The termination of the sensor wires shall be with an approved connector of type OMEGA Miniature Jack Panel (MJP-*-*-T). The thermocouple jack panel shall be mounted to the back plate of the panel box. The temperature sensors shall be labeled at their termination within the panel box; a drawing showing the location of each temperature sensor shall be laminated and attached to the inside of the panel box. All temperature sensors shall be verified as operational by an independent laboratory, hired by the Contractor, after backfilling is complete but before the system is accepted.

3.9.2 Thermal Performance Test

After the system construction is complete, including backfilling, and the system has reached operating condition for at least 30 days, all of the temperature sensors shall be read by an independent laboratory with experience and equipment appropriate for the sensors used. The temperature shall be recorded for each sensor. The temperatures shall be tabulated and submitted in accordance with specified requirements. If temperatures exceed values in Table 3, that portion shall be repaired and temperatures again measured and recorded.

TABLE 3

| Carrier Pipe Temperat. TP (degrees C) | Carrier Pipe Temperat. TP (degrees F) | Acceptable Casing Temperature TC (degrees C) | Acceptable Casing Temperature TC (degrees F) |
|---|---|--|--|
|---|---|--|--|

TABLE 3

| Carrier Pipe Temperat. TP (degrees C) | Carrier Pipe Temperat. TP (degrees F) | Acceptable Casing Temperature TC (degrees C) | Acceptable Casing Temperature TC (degrees F) |
|---|---|--|--|
|---|---|--|--|

| | | | |
|-----|-----|----|-----|
| 121 | 250 | 43 | 110 |
| 135 | 275 | 47 | 116 |
| 149 | 300 | 50 | 123 |
| 163 | 325 | 54 | 129 |
| 177 | 350 | 58 | 136 |
| 204 | 400 | 65 | 149 |
| 218 | 425 | 68 | 155 |
| 232 | 450 | 72 | 162 |

The following equations were used to calculate the above values:

$$T_C < (0.261) \times (TP) + 44.3 \text{ (for English units)}$$

$$T_C < (0.261) \times (TP) + 11.5 \text{ (for Metric units)}$$

For carrier pipe temperatures between those given in Table 3, the maximum acceptable casing temperature may be either interpolated from the values in Table 3 or calculated using the equations above.

-- End of Section --

SECTION 16710A

PREMISES DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 REFERENCES

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

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

| | |
|----------------------------|---|
| EIA ANSI/TIA/EIA-568-B | (2001) Commercial Building Telecommunications Cabling Standard |
| EIA ANSI/TIA/EIA-568-B.2-1 | (2002) Transmission Performance Specifications for 4-pair 100 ohm Category 6 Cabling |
| EIA ANSI/TIA/EIA-569-A | (2001) Commercial Building Standard for Telecommunications Pathways and Spaces |
| EIA ANSI/TIA/EIA-606 | (1993) Administration Standard for the Telecommunications Infrastructure of Commercial Buildings |
| EIA ANSI/TIA/EIA-607 | (1994) Commercial Building Grounding/Bonding Requirement Standard |
| EIA TIA/EIA-TSB-67 | (1995) Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---------|---------------------------------|
| NFPA 70 | (2002) National Electrical Code |
|---------|---------------------------------|

1.2 SYSTEM DESCRIPTION

The premises distribution system shall consist of inside-plant horizontal, riser, and backbone cables and connecting hardware to transport telephone and data (including LAN) signals between equipment items in a building.

1.3 ENVIRONMENTAL REQUIREMENTS

Connecting hardware shall be rated for operation under ambient conditions of 32 to 140 degrees F and in the range of 0 to 95 percent relative humidity, noncondensing.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. 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

Premises Distribution System; G, AE

Detail drawings including a complete list of equipment and material. Detail drawings shall contain complete wiring and schematic diagrams and other details required to demonstrate that the system has been coordinated and will function properly as a system. Drawings shall include vertical riser diagrams, equipment rack details, elevation drawings of telecommunications closet walls, outlet face plate details for all outlet configurations, sizes and types of all cables, conduits, and cable trays. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearance for maintenance and operation.

Installation; G, AE

Record drawings for the installed wiring system infrastructure per EIA ANSI/TIA/EIA-606. The drawings shall show the location of all cable terminations and location and routing of all backbone and horizontal cables. The identifier for each termination and cable shall appear on the drawings.

SD-03 Product Data

Spare Parts

Lists of spare parts, tools, and test equipment for each different item of material and equipment specified, after approval of detail drawings, not later than 2 months prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of spare parts recommended for stocking.

Manufacturer's Recommendations; G

Where installation procedures, or any part thereof, are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations, prior to installation shall be provided. Installation of the item will not be allowed to proceed until the recommendations are received and approved.

Test Plan; G, AE

Test plan defining the tests required to ensure that the system meets technical, operational and performance specifications, 60 days prior to the proposed test date. The test plan must be approved before the start of any testing. The test plan shall identify the capabilities and functions to be tested, and include detailed instructions for the setup and execution of each test and procedures for evaluation and documentation of the results.

Qualifications; G, AE

The qualifications of the Manufacturer, Contractor, and the Installer to perform the work specified herein. This shall include proof of the minimum qualifications specified herein.

SD-06 Test Reports

Test Reports

Test reports in booklet form with witness signatures verifying execution of tests. Test results will also be provided on 3-1/2 inch diskettes in ASCII format. Reports shall show the field tests performed to verify compliance with the specified performance criteria. Test reports shall include record of the physical parameters verified during testing. Test reports shall be submitted within 14 days after completion of testing.

SD-07 Certificates

Premises Distribution System

Written certification that the premises distribution system complies with the EIA ANSI/TIA/EIA-568-B.2-1, EIA ANSI/TIA/EIA-569-A, and EIA ANSI/TIA/EIA-606 standards.

Materials and Equipment

Where materials or equipment are specified to conform, be constructed or tested to meet specific requirements, certification that the items provided conform to such requirements. Certification by a nationally recognized testing laboratory that a representative sample has been tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specifications.

Installers; G

The Contractor shall submit certification that all the installers are factory certified to install and test the provided products.

1.5 QUALIFICATIONS

1.5.1 Minimum Contractor Qualifications

All work under this section shall be performed by and all equipment shall be furnished and installed by a certified Telecommunications Contractor, hereafter referred to as the Contractor. The Contractor shall have the following qualifications in Telecommunications Systems installation:

- a. Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment.
- b. All supervisors and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products.
- c. All installers assigned to the installation of this system or any of its components shall have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and components.

1.5.2 Minimum Manufacturer Qualifications

The equipment and hardware provided under this contract will be from manufacturers that have a minimum of 3 years experience in producing the types of systems and equipment specified.

1.6 DELIVERY AND STORAGE

Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust or other contaminants.

1.7 OPERATION AND MAINTENANCE MANUALS

Commercial off the shelf manuals shall be furnished for operation, installation, configuration, and maintenance for all products provided as a part of the premises distribution system. Specification sheets for all cable, connectors, and other equipment shall be provided.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer's latest standard design that has been in satisfactory use for at least 1 year prior to installation. Materials and equipment shall conform to the respective publications and other requirements specified below and to the applicable requirements of NFPA 70.

2.2 UNSHIELDED TWISTED PAIR CABLE SYSTEM

2.2.1 Backbone Cable

Backbone cable shall meet the requirements of EIA ANSI/TIA/EIA-568-B for Category 3 100-ohm unshielded twisted pair cable. Cable shall be label-verified. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Conductors shall be solid untinned copper 24 AWG. Cable shall be rated CMP per NFPA 70, where appropriate.

2.2.2 Horizontal Cable

Horizontal cable shall meet the requirements of EIA ANSI/TIA/EIA-568-B.2-1 for Category 5E. Cable shall be label-verified. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Cable shall be rated CMP per NFPA 70.

2.2.3 Connecting Hardware

Connecting and cross-connecting hardware shall be the same category as the cable it serves. Hardware shall be in accordance with EIA ANSI/TIA/EIA-568-B.

2.2.3.1 Telecommunications Outlets

Outlet assemblies used in the premises distribution system shall consist of modular jacks assembled into both simplex and duplex outlet assemblies in single or double gang covers as specified in this section and as indicated on the drawings. Wall and desk outlet plates shall come equipped with two modular jacks, with the top or left jack labeled "voice" and the bottom or right jack labeled "data". Modular jacks shall be the same category as the cable they terminate and shall meet the requirements of EIA ANSI/TIA/EIA-568-B and shall meet the Link Test parameters as listed in EIA TIA/EIA-TSB-67 and supplemented by EIA ANSI/TIA/EIA-568-B.2-1.. Modular jack pin/pair configuration shall be T568A for voice, and T568B for data per EIA ANSI/TIA/EIA-568-B. Modular jacks shall be keyed or unkeyed as shown. Faceplates shall be provided and shall be ivory in color. Mounting plates shall be provided for system furniture and shall match the system furniture in color.

2.2.3.2 Patch Panels

Patch panels shall consist of eight-position modular jacks, with rear mounted type 110 insulation displacement connectors, arranged in rows or columns on 19 inch rack mounted panels. Jack pin/pair configuration shall be T568B per EIA ANSI/TIA/EIA-568-B. Jacks shall be keyed or unkeyed as shown. Panels shall be provided with labeling space. The modular jacks shall conform to the requirements of EIA ANSI/TIA/EIA-568-B, and shall be rated for use with Category 5E cable in accordance with EIA ANSI/TIA/EIA-568-B.2-1 and shall meet the Link Test parameters as listed in EIA TIA/EIA-TSB-67 and supplemented by EIA ANSI/TIA/EIA-568-B.2-1.

2.2.3.3 Patch Cords

Patch cords shall be cable assemblies consisting of flexible, twisted pair stranded wire with eight-position plugs at each end. Cable shall be label-verified. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Patch cords shall be wired straight through; pin numbers shall be identical at each end and shall be paired to match T568B patch panel jack wiring per EIA ANSI/TIA/EIA-568-B. Patch cords shall be keyed or unkeyed as shown. Patch cords shall be factory assembled. Patch cords shall conform to the requirements of EIA ANSI/TIA/EIA-568-B.2-1 for Category 5E.

2.2.3.4 Terminal Blocks

Terminal blocks shall be rack mounted wire termination units consisting of insulation displacement connectors mounted in plastic blocks, frames or housings. Blocks shall be type 110 which meet the requirements of EIA ANSI/TIA/EIA-568-B, and shall be rated for use with Category 5E cable in accordance with EIA ANSI/TIA/EIA-568-B.2-1 and shall meet the Link Test parameters as listed in EIA TIA/EIA-TSB-67 and supplemented by EIA ANSI/TIA/EIA-568-B.2-1. Blocks shall be mounted on standoffs and shall include cable management hardware. Insulation displacement connectors shall terminate 22 or 24 gauge solid copper wire as a minimum, and shall be connected in pairs so that horizontal cable and connected jumper wires are on separate connected terminals.

2.3 FIBER OPTIC CABLE SYSTEM

2.3.1 Backbone Cable

2.3.1.1 Multimode

Multimode fiber optic backbone cable shall meet the requirements of EIA ANSI/TIA/EIA-568-B and ICEA S-83-596 for 62.5/125 micrometer multimode graded index optical fiber cable. Numerical aperture for each fiber shall be a minimum of 0.275. Cable construction shall be tight buffered type. Individual fibers shall be color coded for identification. Cable shall be imprinted with fiber count and aggregate length at regular intervals. Cable shall be rated OFNP per NFPA 70, where appropriate.

2.3.2 Connecting Hardware

2.3.2.1 Connectors

Connectors shall be SC type with ceramic ferrule material with a maximum insertion loss of .5 dB. Connectors shall meet performance requirements of EIA ANSI/TIA/EIA-568-B. Connectors shall be field installable. Connectors shall utilize adhesive for fiber attachment to ferrule. Connectors shall terminate fiber sizes as required for the service.

2.3.2.2 Patch Panels

Patch panels shall be a complete system of components by a single manufacturer, and shall provide termination, splice storage, routing,

radius limiting, cable fastening, storage, and cross-connection. Patch panels shall be 19 inch rack mounted panels. Patch panels shall provide strain relief for cables. Panels shall be labeled with alphanumeric x-y coordinates per client's labeling scheme. Patch panel connectors and couplers shall be the same type and configuration as used elsewhere in the system.

2.3.2.3 Patch Cords

Patch cords shall be cable assemblies consisting of flexible optical fiber cable with connectors of the same type as used elsewhere in the system. Optical fiber shall be the same type as used elsewhere in the system. Patch cords shall be complete assemblies from manufacturer's standard product lines.

2.4 EQUIPMENT RACKS

2.4.1 Floor Mounted Open Frame

Floor mounted equipment racks shall be aluminum relay racks with uprights to mount equipment 19 inches wide. Uprights shall be 3 inch deep channel, 1-1/4 inches wide, drilled and tapped 12-24 in a 1/2 inch pattern. Racks shall be provided with a standard top crossmember, and predrilled base plate to allow floor fastening. Open frame equipment racks shall be 7 feet in height. AC outlets shall be provided as shown.

2.4.2 Cable Guides

Cable guides shall be specifically manufactured for the purpose of routing cables, wires and patch cords horizontally and vertically on 19 inch equipment racks. Cable guides shall consist of ring or bracket-like devices mounted on rack panels for horizontal use or individually mounted for vertical use. Cable guides shall mount to racks by screws and/or nuts and lockwashers.

2.5 EQUIPMENT MOUNTING BACKBOARD

Plywood backboards shall be provided, sized as shown, painted with white or light colored paint.

2.6 TELECOMMUNICATIONS OUTLET BOXES

Electrical boxes for telecommunication outlets shall be 4-11/16 inch square by 2-1/8 inches deep with minimum 3/8 inch deep single or two gang plaster ring as shown. Provide a minimum 1 inch conduit.

PART 3 EXECUTION

3.1 INSTALLATION

System components and appurtenances shall be installed in accordance with NFPA 70, manufacturer's instructions and as shown. Necessary interconnections, services, and adjustments required for a complete and operable signal distribution system shall be provided. Components shall be

labeled in accordance with EIA ANSI/TIA/EIA-606. Penetrations in fire-rated construction shall be firestopped in accordance with Section 07840A FIRESTOPPING. Conduits, outlets and raceways shall be installed in accordance with Section 16415A ELECTRICAL WORK, INTERIOR. Wiring shall be installed in accordance with EIA ANSI/TIA/EIA-568-B and as specified in Section 16415A ELECTRICAL WORK, INTERIOR. Wiring, and terminal blocks and outlets shall be marked in accordance with EIA ANSI/TIA/EIA-606. Cables shall not be installed in the same cable tray, utility pole compartment, or floor trench compartment with ac power cables. Cables not installed in conduit or wireways shall be properly secured and neat in appearance and, if installed in plenums or other spaces used for environmental air, shall comply with NFPA 70 requirements for this type of installation.

3.1.1 Horizontal Distribution Cable

The rated cable pulling tension shall not be exceeded. Cable shall not be stressed such that twisting, stretching or kinking occurs. Cable shall not be spliced. Fiber optic cables shall be installed either in conduit or through type cable trays to prevent microbending losses. Copper cable not in a wireway shall be suspended a minimum of 8 inches above ceilings by cable supports no greater than 60 inches apart. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items. Placement of cable parallel to power conductors shall be avoided, if possible; a minimum separation of 12 inches shall be maintained when such placement cannot be avoided. Cables shall be terminated; no cable shall contain unterminated elements. Minimum bending radius shall not be exceeded during installation or once installed. Cable ties shall not be excessively tightened such that the transmission characteristics of the cable are altered.

3.1.2 Riser and Backbone Cable

Vertical cable support intervals shall be in accordance with manufacturer's recommendations. Cable bend radius shall not be less than ten times the outside diameter of the cable during installation and once installed. Maximum tensile strength rating of the cable shall not be exceeded. Cable shall not be spliced.

3.1.3 Telecommunications Outlets

3.1.3.1 Faceplates

As a minimum each jack shall be labeled as to its function and a unique number to identify cable link.

3.1.3.2 Cables

Unshielded twisted pair and fiber optic cables shall have a minimum of 6 inches of slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturers bend radius for each type of cable shall not be exceeded.

3.1.3.3 Pull Cords

Pull cords shall be installed in all conduit serving telecommunications outlets which do not initially have fiber optic cable installed.

3.1.4 Terminal Blocks

Terminal blocks shall be mounted in orderly rows and columns. Adequate vertical and horizontal wire routing areas shall be provided between groups of blocks. Industry standard wire routing guides shall be utilized.

3.1.5 Unshielded Twisted Pair Patch Panels

Patch panels shall be mounted in equipment racks with sufficient modular jacks to accommodate the installed cable plant plus 10 percent spares. Cable guides shall be provided above, below and between each panel.

3.1.6 Fiber Optic Patch Panels

Patch panels shall be mounted in equipment racks with sufficient ports to accommodate the installed cable plant plus 10 percent spares. A slack loop of fiber shall be provided within each panel. Loop shall be provided as recommended by the manufacturer. The outer jacket of each cable entering a patch panel shall be secured to the panel to prevent movement of the fibers within the panel, using clamps or brackets specifically manufactured for that purpose.

3.1.7 Equipment Racks

Open frame equipment racks shall be bolted to the floor. Cable guides shall be bolted or screwed to racks. Racks shall be installed level. Ganged racks shall be bolted together. Ganged rack cabinets shall have adjacent side panels removed. Wall mounted racks shall be secured to the mounting surface to prevent fully loaded racks from separating from the mounting surface.

3.1.8 Rack Mounted Equipment

Equipment to be rack mounted shall be securely fastened to racks by means of the manufacturer's recommended fasteners.

3.1.9 Spare Parts

The Contractor shall provide spare parts data for each different item of material and equipment specified, after approval of the related submittals and not later than the start of the field tests.

3.2 TERMINATION

Cables and conductors shall sweep into termination areas; cables and conductors shall not bend at right angles. Manufacturer's minimum bending radius shall not be exceeded. When there are multiple system type drops to individual workstations, relative position for each system shall be maintained on each system termination block or patch panel.

3.2.1 Unshielded Twisted Pair Cable

Each pair shall be terminated on appropriate outlets, terminal blocks or patch panels. No cable shall be unterminated or contain unterminated elements. Pairs shall remain twisted together to within the proper distance from the termination as specified in EIA ANSI/TIA/EIA-568-B. Conductors shall not be damaged when removing insulation. Wire insulation shall not be damaged when removing outer jacket.

3.2.2 Coaxial Cable

Backbone cables shall be terminated with appropriate connectors or end-of-line terminators as required. Backbone cable shield conductor shall be grounded to communications ground at only one point and shall not make electrical contact with ground anywhere else.

3.2.3 Fiber Optic Cable

Each fiber shall have connectors installed. The pull strength between the connector and the attached fiber shall be not less than 25 pounds. The mated pair loss, without rotational optimization, shall not exceed 1.5 dB. Fiber optic connectors shall be installed per EIA ANSI/TIA/EIA-568-B.

3.3 GROUNDING

Signal distribution system ground shall be installed in the telecommunications entrance facility and in each telecommunications closet in accordance with EIA ANSI/TIA/EIA-607 and Section 16415A ELECTRICAL WORK, INTERIOR. Equipment racks shall be connected to the electrical safety ground.

3.4 ADDITIONAL MATERIALS

The Contractor shall provide the following additional materials required for facility startup.

- a. 10 of each type outlet.
- b. 10 of each type cover plate.
- c. 1 of each type terminal block for each telecommunications closet.
- d. 4 Patch cords of 10 feet for each telecommunications closet.
- e. 1 Set of any and all special tools required to establish a cross connect and to change and/or maintain a terminal block.

3.5 ADMINISTRATION AND LABELING

3.5.1 Labeling

3.5.1.1 Labels

All labels shall be in accordance with EIA ANSI/TIA/EIA-606.

3.5.1.2 Cable

All cables will be labeled using color labels on both ends with unencoded identifiers per EIA ANSI/TIA/EIA-606.

3.5.1.3 Termination Hardware

All workstation outlets and patch panel connections will be labeled using color coded labels with unencoded identifiers per EIA ANSI/TIA/EIA-606.

3.6 TESTING

Materials and documentation to be furnished under this specification are subject to inspections and tests. All components shall be terminated prior to testing. Equipment and systems will not be accepted until the required inspections and tests have been made in accordance with the approved Test Plan submitted by the Contractor, demonstrating that the signal distribution system conforms to the specified requirements, and that the required equipment, systems, and documentation have been provided. The Contractor shall submit Test Reports as they are completed.

3.6.1 Unshielded Twisted Pair Tests

All metallic cable pairs shall be tested for proper identification and continuity. All opens, shorts, crosses, grounds, and reversals shall be corrected. Correct color coding and termination of each pair shall be verified in the communications closet and at the outlet. Horizontal wiring shall be tested from and including the termination device in the communications closet to and including the modular jack in each room. Backbone wiring shall be tested end-to-end, including termination devices, from terminal block to terminal block, in the respective communications closets. These test shall be completed and all errors corrected before any other tests are started.

3.6.2 Category 5E Circuits

All category 5E circuits shall be tested using a test set that meets the Class II accuracy requirements of EIA TIA/EIA-TSB-67 standard, including the additional tests and test set accuracy requirements of EIA ANSI/TIA/EIA-568-B.2-1. Testing shall use the Basic Link Test procedure of EIA TIA/EIA-TSB-67, as supplemented by EIA ANSI/TIA/EIA-568-B.2-1. Cables and connecting hardware which contain failed circuits shall be replaced and retested to verify the standard is met.

3.6.3 Coaxial Cable

Cable shall be tested for continuity, shorts and opens. Characteristic impedance shall be verified over the range of intended operation. Cable length shall be verified. Cable shall be sweep tested for attenuation over the range of intended operation.

3.6.4 Fiber Optic Cable

Unless stated otherwise, tests shall be performed from both ends of each circuit. Connectors shall be visually inspected for scratches, pits or chips and shall be reterminated if any of these conditions exist. Each circuit leg and complete circuit shall be tested for insertion loss at 850 and 1300 nm using a light source similar to that used for the intended communications equipment.

-- End of Section --