Illinois Department of
Natural Resources
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Rod R. Blagojevich, Governor
Sam Flood, Acting Director

April 18, 2006

SUBJECT: Pedestrian Bridge Over Sinnissippi Dam
Sterling-Rock Falls, Illinois
Whiteside County
Steel Truss Bridge
Federal Project Number TE-00DC(45)
IDOT Job Number C-30-003-00
IDNR Contract Number FR-420
Addendum A

NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans and proposal. The addendum involves revised and/or added material. A complete new set of plans is included because over 75% of the plan sheets had revisions and 4 new plan sheets were added.

1. Revised plan sheets 1, 2, 5, 6, 7, 8, 9, 11, 12, 13, 16, 17, 18, 19, 20, and 21.
2. Added plan sheet 12A "Access Bridge Railing IA".
3. Added plan sheet 19A "Ladder Details".
4. Added plan sheet 19B "Access Bridge Light Pole Base Details".
5. Added plan sheet 20A "Lighting Details".
6. Plan sheets 3, 4, 10, 14, and 15 are the only unchanged plan sheets. They are included in the addendum so that the entire set of plans is available at one location.
7. Revised the quantity of items 14 and 26 and added items 28 and 29 to the Schedule of Prices in the proposal documents.
8. Revised "Dam Signage" special provision on page 77.
9. Added "Bridge Lighting" special provision pages 80 and 80A.
10. Added "General Conditions – Electrical" special provision pages 81, 81A and 81B.
11. Added "Basic Electrical Materials and Methods" special provision pages 82, 82A - 82K.
12. Added "Lighting" special provision pages 83, 83A - 83D.

Prime Contractors must utilize the enclosed material when preparing their bid and must include any Schedule of Prices changes in their bidding proposal.

Bidders using computer generated bids are cautioned to reflect any and all Schedule of Prices changes, if involved, into their computer programs.

Sincerely,

Ted Montrey

Ted Montrey, P.E., S.E.
Chief, Design Section

TMM:GMS:kmp

PEDESTRIAN BRIDGE OVER SINNISSIPPI DAM
STERLING-ROCK FALLS, ILLINOIS
WHITESIDE COUNTY
STEEL TRUSS BRIDGE
FEDERAL PROJECT NUMBER TE-00DC (45)
IDOT JOB NUMBER C-30-003-00
IDNR CONTRACT NUMBER FR-420

	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE		TOTAL PRICE	
					DOLLARS	CENTS	DOLLARS	CENTS
	1	Topsoil Excavation and Placement	cu yd	158				
	2	Perimeter Erosion Barrier	foot	184				
	3	Aggregate Base Course, Type B 6"	sq yd	146				
	4	Bituminous Materials (Prime Coat)	gal	52				
	5	Bituminous Concrete Binder Course, Mixture B, Class I Type 2	ton	11				
	6	Bituminous Concrete Surface Course, Mixture D, Class I Type 2	ton	11				
	7	Bridge Approach Pavement (Special)	sq yd	11				
	8	Aggregate Shoulders, Type B 6"	sq yd	51				
	9	Concrete Removal	cu yd	0.5				
	10	Cofferdams	each	8				
	11	Concrete Structures	cu yd	11.1				
	12	Elastomeric Bearing Assembly, Type I	each	8				
	13	Furnishing and Erecting Structural Steel	l sum	1				
*	14	Reinforcement Bars, Epoxy Coated	pound	1,240				
	15	Name Plates	each	1				
	16	Bridge Seat Sealer	sq ft	214				

***Revised April 18, 2006**

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	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE DOLLARS	UNIT PRICE CENTS	TOTAL PRICE DOLLARS	TOTAL PRICE CENTS
	17	Mobilization	l sum	1				
	18	Bicycle Railing	foot	181				
	19	Jacking Existing Superstructure	l sum	1				
	20	Pedestrian Truss Superstructure	sq ft	5,053				
	21	Modular Segmental Block Retaining Wall	sq ft	1,070				
	22	Collapsible Vehicle Stop	each	1				
	23	Construction Staking	l sum	1				
	24	Seeding, Mulching and Fertilizing	acre	0.10				
	25	Dam Signage	l sum	1				
*	26	Removable Access Bridge Railing	foot	1,140				
	27	Bridge Lighting	l sum	1				
*	28	Bridge Lighting Decorative Fixtures/Poles	l sum	1				
*	29	Fiber Optic Conduit	foot	2,340				
					TOTAL PROPOSAL			

NOTE ***Revised/Added April 18, 2006**

1. Each pay item should have a unit price and a total price.
2. The unit price shall govern if no total price is shown or if there is a discrepancy between the product of the unit price multiplied by the quantity.
3. If a unit price is omitted, the total price will be divided by the quantity in order to establish a unit price.
4. A bid will be declared unacceptable if neither a unit price nor a total is shown.

SPECIAL PROVISION

DAM SIGNAGE

DESCRIPTION: This work shall consist of furnishing all materials, equipment, and labor required for the removal and installation of new dam warning signs, and the removal of the existing sign solar lighting systems.

GENERAL: The contractor shall remove and dispose of existing dam warning signs and their attachments at the locations called for on the plans. New dam warning signs shall be attached to the exterior face of the bridge truss members at the locations shown on the plans. The existing solar lighting systems shall be removed and given to the Engineer for reuse by the Department.

MATERIALS: The warning signs shall be constructed of heavy duty aluminum with a minimum thickness of 0.125 inches. The signs shall have a highly durable and reflective finish. Warning signs shall be attached to the bridge components in accordance with the recommendations of the sign manufacturer and in accordance with the Highway Standards. The work shall be done in accordance with all applicable portions of Section 720 of the Standard Specifications. The minimum lettering height shall be 9" and shall be visible from a distance of 300 feet. The sign backgrounds shall be white. The sign shapes and sizes shall match the existing signs.

The Type 2 Warning Sign shall read:

Lettering	Color
WARNING	Red
DAM AHEAD	Black
STAY BACK 300 FEET	Black

The Type 3 Warning Sign shall read:

Lettering	Color
WARNING	Red
TURBULENT WATER	Black
BOATS STAY BACK	Black
300 FEET	Black

METHOD OF MEASUREMENT: The material, equipment, labor and supplies required for the, removal of the existing dam warning signs, the removal of the existing solar lighting systems, and the fabrication, painting, transporting, and erection of the new dam signs will be paid on a lump sum basis.

BASIS OF PAYMENT: The work under this item will be paid for at the contract lump sum price for "DAM SIGNAGE" which will be payment in full for completing the work as described.

SPECIAL PROVISION
BRIDGE LIGHTING

DESCRIPTION

This item consists of furnishing all materials, equipment, and labor required for furnishing and installing all components required for the bridge lighting on the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway, and removal and replacement of three (3) light poles/fixtures on existing access bridge over the gated spillway, sign lighting on Piers P9, P10, and P11, and fiber optic conduits as indicated on the Plans and as specified herein. The bridge lighting system shall include, but is not limited to, decorative light fixtures, poles, high pressure sodium lamps, sign lighting fixtures, fluorescent lamps, conduit, flexible conduit, wires, junction boxes, expansion joints, conduit removal / relocation, concrete foundations, trench and backfill, and all attachment hardware and fittings.

MATERIALS

The decorative light fixtures shall be Traditional Colonial Style clear seeded acrylic lense, pole mounting arm, straight fluted aluminum pole and base as manufactured by Sternberg Model 1843/480PM/77XXFP5/BCC/70HPS-120/RE3G/CSA/BLACK complete with all mounting hardware.

The pole shall be an aluminum pole with a 10 foot (16 foot where indicated) mounting height designed to accommodate one ornamental Traditional Colonial Style lensed fixture as shown on the plans. Provide decorative mounting arm as described in the light fixture schedule on the plans. The pole shall have the straight flat fluted pattern, and be 5” diameter minimum. The pole shall have a decorative base with handhole opening of 9” x 7” x 5” minimum. The pole and base shall be painted Black using the powder coat process. Each pole installed on a concrete foundation shall be furnished with four “L” shaped galvanized anchor bolts, nuts, and washers as shown on the plans. Each pole installed on a steel support attached to the bridge structure shall be furnished with a leveling plate and vibration pad, nuts, and washers as shown on the plans or as required by the manufacturer.

The fixture shall be a High Pressure Sodium luminaire with a 70 watt lamp and CWA HPF type ballast. The fixture shall produce an asymmetrical Type III light distribution. The lense material shall be clear seeded acrylic. The fixture shall have a built-in glass refractor and integral ballast and shall be fully sealed to exclude dirt and insects. The lamps shall be non-cycling bulbs. Fixture mounting shall be post arm mounted vertical slip fitter. The fixture and arm shall be painted Black using the powder coat process.

A minimum of 24 inches of liquid-tight flexible conduit shall be provided at each bridge mounted fixture.

The light fixture / pole shall be as supplied by Sternberg or of equal specifications with prior approval of the Engineer.

GENERAL REQUIREMENTS

The bridge lighting system shall be installed as indicated on the Plans and as specified by the Engineer. The Contractor is alerted that this item involves the lighting of the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway, and removal and replacement of three (3) light poles/fixtures on existing access bridge over the gated spillway, sign lighting on Piers P9, P10, and P11, and fiber optic conduits.

The electrical system for bridge lighting shall meet the requirements of the following Special Provisions included elsewhere in the project specifications:

a. General Conditions - Electrical
b. Basic Electrical Materials and Methods
c. Lighting

BASIS OF PAYMENT

The work under this item will be paid for at the Contract lump sum price for BRIDGE LIGHTING, which price shall be considered as payment in full for all labor, materials, tools, equipment, hardware, concrete foundations, formwork, trenching, backfilling, and surface restoration, junction boxes, conduit, wire, connections, raceway supports, expansion joints, grounding, and incidentals necessary to install an electrical lighting system for the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway and existing access bridge over the gated spillway, and sign lighting on Piers P9, P10, and P11, to the satisfaction of the Engineer.

Payment for the decorative light fixtures / poles will be paid for at the Contract lump sum price for BRIDGE LIGHTING DECORATIVE FIXTURES / POLES, which shall be considered as payment in full for all labor, materials, tools, equipment, hardware for furnishing and installing decorative light fixtures / poles for the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway, and removal and replacement of three (3) light poles/fixtures on existing access bridge over the gated spillway complete with lamps, ballasts, mounting arms, leveling plate and vibration pad, fixture connections, anchor bolts and all required accessories to the satisfaction of the Engineer.

Payment for the fiber optic conduits will be paid for at the Contract unit price per foot for FIBER OPTIC CONDUIT, which shall be considered as payment in full for all labor, materials, tools, equipment, hardware for furnishing and installing of rigid steel conduits, expansion joints, and stainless steel junction boxes for the prefabricated truss portion of the pedestrian bridge over the Ogee spillway and existing access bridge over the gated spillway for future fiber optic cables to the satisfaction of the Engineer.

SPECIAL PROVISION
GENERAL CONDITIONS - ELECTRICAL

GENERAL

1. Work Includes: Provide complete electrical installations as specified herein and shown on the drawings.

2. Requirements of this special provision apply to all Electrical Special Provisions as if repeated in full therein.

3. Contractor shall thoroughly familiarize himself with existing conditions via an on site inspection of the site for which work is to be accomplished prior to bidding.

MATERIALS

1. None for this Special Provision.

CONSTRUCTION REQUIREMENTS

1. Coordination:

   A. The Contractor shall coordinate the work of all sub-contractors.

   B. The layout shown on the Drawings is diagrammatic, but shall be followed as closely as other work will permit. Changes from these Drawings to make the work conform to the construction shall not be made without prior review by the Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the review in writing, of the Engineer.

   C. Coordinate work regarding location and size of pipes, raceways, openings, light poles so there is no interference between installation or of progress of any trade.

   D. The Engineer reserves the right to change the location of any equipment 5 feet and any piping, conduit, etc., 10 feet in any direction without extra charge, provided such changes are made before installation.

   E. Install all equipment with ample space allowed for removal, repair, or changes to equipment. Provide ready accessibility to removable parts of equipment and to all wiring without moving equipment installed or already in place.

2. Delivery, Storage and Handling:

   A. Materials shall be suitably packaged by manufacturer to prevent damage during shipment. Damaged materials will not be acceptable for installation.

   B. Store materials on site in clean, dry storage area. When outside, store elevated above grade and enclosed in durable, watertight wrapping.

   C. Store electronic components protected from weather extremes. Do not exceed the electronics' storage humidity and temperature ratings. Allow components to stabilize if moved between wide temperature ranges prior to installation.

   D. Handle all materials carefully to prevent damage. Minor scratches, marks or blemishes to finish shall be repaired to the satisfaction of the Engineer.

   E. At project completion, clean all equipment to the original finish. Remove all shipping labels.

   F. Provide touch-up painting of all equipment marred in any way during shipment or installation.

3. Existing Conditions: If the existing conditions prohibit proper installation or installation as shown on the drawings, Contractor shall contact the Engineer for a solution.

4. Protection:

   A. Contractor shall protect all electrical items and shall replace items which are damaged during construction.

   B. Fixtures installed prior to the finishing of a space shall be protected from damage or the accumulation of dirt, paint, moisture, etc. Any fixture damaged after installation during the finishing of the space shall be replaced.

5. Scheduling:

   A. All expenses incurred by the Engineer in trouble shooting systems and problems caused by inadequate workmanship or unauthorized deviations from the contract documents including materials or equipment substitutions on the part of a contractor shall be borne by the Contractor.

   B. Where inspections of the work are required by State of Local authorities, obtain certificates if inspection of the work by such authorities, and these certificates (in triplicate) shall be submitted to the Engineer.

6. Lines and levels: Determine all grades, maintain necessary lines and levels throughout the progress of the work, and assume full responsibility for their correctness. Where levels are indicated on the Drawings, work shall be installed at those levels unless prior written approval to change is obtained from the Engineer. It shall be the Contractor’s responsibility to mark the proposed locations of all light poles for examination with the Engineer at the preconstruction inspection. The exact locations of all items shall be confirmed with the Engineer prior to starting work.

7. Guarantee:

   A. In entering into a contract covering this work, the Contractor accepts the specifications and guarantees that the work will be carried out in accordance with the requirements of this specification or such modifications as may be made under the contract documents.

   B. Contractor further guarantees that the material will be of the best procurable and that none but experienced workman familiar with each particular class of work will be employed.

   C. Contractor further guarantees to replace and make good at his own expense any defects which may develop within one (1) year after final payment and acceptance by the Engineer, due to faulty workmanship or material, upon receipt of written notification from Using Agency.

8. Workmanship:

   A. Unless explicitly stated to the contrary, Contractor shall furnish and install each item of equipment or material hereinafter specified, complete with all necessary fittings, supports, trim, piping, insulation, etc., as required for a complete and operating installation.

   B. All materials and equipment shall be new and all work shall be executed with the maximum speed consistent with good workmanship. Provide materials and equipment promptly after authorization to proceed, and proceed with work in progress with the other contractors on the project. Perform all work in a manner that will not cause delays to or interfere with the progress of other contractors.

   C. All equipment and materials shall be installed according to the manufacturer's instructions unless otherwise specifically directed by the contract documents.

   D. Where electrical equipment is located on damp or wet walls or locations as directed, it shall be "stand-off" mounted 1/2 in. from the wall in a manner so that the rear of the equipment is freely exposed to the surrounding air.

E. Items of equipment may be specified in the singular. However, provide and install the number of items of equipment indicated on the Drawings or as required for a complete system.

9. Cutting, Patching, and Sealing:

   A. Where cutting is required to facilitate construction, patch and repair, cut items to original state. Do not cut structural work without prior written approval of Engineer.

   B. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills not allowed, except where permitted by Engineer because of limited work space.

   C. Layout holes in advance. Notify Engineer prior to drilling through structural sections, for determination of proper layout.

10. Identification:

    A. Furnish and install approved permanent nameplates on all items of electrical equipment showing nature of and function of each piece of equipment. Nameplates shall be fastened to devices (except for factory installed nameplates) with rivets, or stainless steel screws after finish painting of item is completed.

    B. Identify circuit numbers inside panels, and connection points.

    C. Lighting cable identification: Each wire installed shall be identified with its complete circuit number at each termination, splice, junction box, or other location where the wire is accessible.

METHOD OF MEASUREMENT

1. All items described in this Special Provision shall be included as a part of one or more of the following systems:

   A. BRIDGE LIGHTING: All Electrical Systems mounted on the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway, and existing access bridge over the gated spillway, and sign lighting on Piers P9, P10, and P11.

   B. BRIDGE LIGHTING DECORATIVE FIXTURES/POLES: All decorative light poles/fixtures mounted on the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway, and removal and replacement of three (3) light poles/fixtures on existing access bridge over the gated spillway.

   C. FIBER OPTIC CONDUIT: All fiber optic conduits mounted on the prefabricated truss portion of the pedestrian bridge over the Ogee spillway and existing access bridge over the gated spillway.

2. Each system described above shall be considered as its own separate pay item. All equipment required for a completely operational system shall be included as part of the pay item.

3. Items required for each system may be described in multiple Special Provisions. See each Special Provision for list of systems it applies to.

BASIS OF PAYMENT

1. Work described in this Special Provision shall not be paid separately but shall be considered included with the following pay items:

   A. BRIDGE LIGHTING.

   B. BRIDGE LIGHTING DECORATIVE FIXTURES/POLES.

   C. FIBER OPTIC CONDUIT.

SPECIAL PROVISION
BASIC ELECTRICAL MATERIALS AND METHODS

GENERAL

1. Work includes all basic materials required for a complete system as specified and shown on the drawings.

2. System Description. Basic materials and methods include:

   A. Raceways.
   B. Fittings.
   C. Sealing.
   D. Wire and cables.
   E. Boxes.
   F. Supporting Devices.
   G. Grounding.
   H. Testing.

3. Provide all new materials, without blemish or defect, in accord with standards specified and U.L. listed or labeled.

4. References: Specified references, or cited portions thereof, current at date of bidding documents unless otherwise specified, govern the work. In conflict between referenced standards and contract documents, notify Engineer immediately. Confirm notification in writing. Do not proceed with the work until Engineer issues written instructions.

   A. American National Standards Institute (ANSI):

      1. C80.1 - Specification for Rigid Steel Conduit, Zinc-Coated.
      2. C80.4 - Specification for Fittings for Rigid Metal Conduit.

   B. National Fire Protection Association (NFPA):

      1. NFPA 70 - National Electrical Code, most current edition in force.

   C. Underwriters Laboratories, Inc. (UL):

      1. All materials UL listed and labeled.
      2. UL6 - Rigid Metal Conduit.
      3. UL360 - Liquid Tight Flexible Metallic Conduit.

   D. National Electrical Manufacturers Association (NEMA):

      1. FB-1 - Conduit and Cable Assemblies.
      2. OS-1 - Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
      3. TC-2 - Electrical Plastic Tubing and Conduit.
      4. TC-3 - PVC Fittings for Use With Rigid PVC Conduit and Tubing.
      5. WC-5 - Thermoplastic Insulated Wire and Cable
      6. 250- Enclosures for Electrical Equipment

5. Submittals: Submit the following items to the Engineer prior to beginning work for approval:

   A. Submit list of equipment and material for all basic materials along with the manufacturer and catalog number to be used on project.

   B. Submit project record documents for electrical installations at completion of project.

MATERIALS

1. Raceways:

   A. Conduit:

      1. Steel Rigid Metal. ANSI C80.1 & UL-6.
      2. Intermediate Metal. ANSI C80.1 & UL-6.
      3. Steel Liquid-tight Flexible. UL-360, NEC Article 352.
      4. Rigid Non-Metallic Conduit: polyvinylchloride plastic Type EPC-40, heavy wall rated for 90 deg. C. cable meeting NEMA Standard TC-2.

   B. Fittings:

      1. Rigid and IMC:

         a. ANSI C80.4.
         b. Locknuts: steel or malleable iron.
         c. Bushings: insulating or insulated throat type.
         d. Couplings: threaded or gland compression steel or die cast type. **Set screw or indentor type not acceptable.**

      2. Non-Metallic:

         a. Couplings, fittings, conduit bodies, and Connectors: NEMA TC-3.

      3. Liquid-tight Flexible:

         a. Connectors; malleable iron, threadless, squeeze clamp type for non-jacketed conduit.

         b. Connectors; steel or malleable iron compression type with insulated throat and "O" ring assembly for liquid tight conduit.

2. Wire and cable:

   A. Conductors:

      1. Annealed coated copper per ASTM B 33 or B 189 with conductivity of not less than 98 percent, 600 volt insulation, complying with UL-83, ICEA S-61-402 or S-66-524. Wire through No.10 solid; No.8 and larger, stranded. Stranded wire shall be Class B per ASTM B 8.

      2. Minimum of No.12 AWG unless otherwise noted in these specifications or on the drawings.

      3. The direct-current resistance shall not exceed by more than 2% the values given in ICEA Standards.

      4. Cables in panels, wireways, and other large enclosures, shall be bundled and tied with cable ties.

   B. 600Volt general use cable THWN-2:

      1. UL listed for general use at a maximum of 600 volts and a maximum temperature of 90 degrees C in dry locations and 75 degrees C in wet locations and be constructed in accordance with UL Standards for thermoplastic insulated wires.

      2. Insulation shall be polyvinylchloride compound (PVC) in compliance with UL & ANSI Standards. Have an overall nylon jacket UL listed for use on THWN-2 wire.

C. 600Volt General Use Cable (No.4 AWG & Larger) XHHW-2:

1. UL listed for general use at a maximum of 600 volts and a maximum temperature of 90 degrees C in dry locations and 75 degrees C in wet locations, be constructed in accordance with UL Standards for rubber insulated wires and cables.

2. Have a white opaque mylar tape (strand shield) or an extruded mylar, or other, strand shield under the insulation. Insulation shall be a cross-linked polyethylene compound in compliance with UL and ANSI Standards.

D. Joints and Splices:

1. Wire No. 8 or smaller: Compression or crimp type with insulating wrap cover, or insulated twist-on spring connector.

2. Wire No. 6 or larger: Mechanical compression or bolted type connector covered with insulating tape or heat shrinkable insulation equal to conductor insulation.

E. Color Coding:

System	Phase A	Phase B	Phase C	Neutral
208Y/120V	Black	Red	Blue	White
Ground - Bare Copper or Green				

1. Colors shall be integrally pigmentation color coding for No.10 and smaller wires. For No.8 and larger, tape shall be applied to the wire. Tape shall be applied in a spiral half-lap manner over exposed conductor portions in boxes, panels, and other enclosures.

2. Underground Warning Tape:

a. Made of acid and alkali resistant 0.0035 inch thick polyethylene film, 6 inches wide, with a tensile strength of 1750 PSI length wise, 1500 PSI cross-wise and an elongation of 350, be bright yellow or red and read 'CAUTION BURIED ELECTRIC LINE' over entire length, black printing shall be overcoated to prevent fading.

F. Wire Pulling Lubricants:

1. Pulling lubricant shall be a UL listed, water-based, polymer solution. Lubricants containing waxes or soaps are not acceptable.

2. The lubricant shall be compatible with the cable insulation and shall not cause any premature deterioration of the insulating materials.

3. Dried residue from lubricant shall not become tacky or gum-up. Cables shall remain pullable after lubricant has dried.

4. The lubricant shall be approved by the cable manufacturer for use with their cables.

3. Boxes:

A. Outlet Boxes:

1. Exterior boxes or exposed interior in wet/damp locations: Cast aluminum, deep type, corrosion proof fasteners, watertight, gasketed, threaded hubs. U.L. 514A.

B. Pull Boxes and Junction Boxes:

1. NEC - 314 and U.L. 50.

2. Surface mounted boxes: Screw-on or hinged cover. Provide silicon bronze standard retaining screws. Spaced twelve-inch maximum

3. Boxes of 14 gauge steel minimum, stainless steel.

4. Boxes greater than 1400 sq. in., make of 1-1/2 inch x 1-1/2 inch x 1/4 inch galvanized angle covered with 10 gage galvanized sheet steel riveted or bolted; cover of 11 gage stainless steel.

5. Boxes shall be NEMA 4 outdoors.

C. Conduit Bodies:

1. Galvanized cast metal of type, shape and size to fit location.

2. Constructed with threaded conduit ends, removable cover, corrosion resistant screws.

3. Comply with NEMA FB-1.

4. Supporting devices:

A. Suspended conduits less than 1 inch:

1. For exposed construction, provide strap type hangers supported from beam clamps or threaded rods.

2. For conduits suspended above ceilings, anchor to building structural steel. When span exceeds NEC limits, provide galvanized channel steel between framing members.

3. Provide threaded rod with "U" type hangers for single conduit.

4. Anchor threaded rod to inserts in concrete or beam clamp on steel structure.

5. Provide trapeze hanger assemblies and threaded rod for two or more conduits.

B. Surface Mounted Conduit:

1. Provide one-hole galvanized steel straps for conduits 1 in. or less.

2. Provide clampbacks on exterior walls below grade or in wet areas.

3. For conduit larger than 1 in., use malleable iron pipe straps.

4. For multiple conduits, provide channel anchored to wall with conduit attached to channel with split pipe clamps.

C. Anchoring:

1. Hollow Masonry: Toggle bolts or spider type expansion anchors.
2. Solid Masonry: Lead expansion anchors or preset anchors.
3. Concrete: Self-drilling anchor or powder driver studs.
4. Metal: Machine screws, bolts or welded studs.

5. Grounding:

A. Materials used for grounding conductors shall be in accordance with 2005 NEC Article 250-62.

B. Ground Rods: Steel, copper-encased, 5/8-inch O.D. X 10'-0", UL Listed.

C. Equipment grounding conductors (wires) shall be installed. Insulation shall be 600 volt, same type as phase conductors, green in color.

D. All products associated with the grounding system shall be UL-listed and labeled.

E. All connections, located above grade, between the different types of grounding conductors shall be made using UL-listed double compression crimp type connectors or UL-listed bolted ground connectors. For ground connections to enclosures, cases and frames of electrical equipment not supplied with ground lugs the Contractor shall drill required holes for mounting a bolted ground connector. All bolted ground connectors shall be Burndy, Thomas and Betts, or approved equal. Tighten connections to comply with tightening torques in UL Standard 486A to assure permanent and effective grounding.

F. Connections below grade: Exothermic weld.

CONSTRUCTION REQUIREMENTS

1. Conduit:

   A. Conduit Schedule:

      1. Minimum Conduit Size: 3/4 in. unless otherwise specified. When surface metal raceway is used, the minimum free area available must match 3/4" conduit.

      2. RGS:

         a. Used for bridge crossing.

         b. Used in concrete pole foundations.

         c. May be used for all raceways except where other type is specified to be used or is required by codes.

      3. PVC: (Schedule 40)

         a. May be used for buried where permitted by codes and shown on the Drawings. Elbows and conduits to above grade shall be RGS. PVC conduit shall not be exposed.

         b. Where PVC conduit transitions from underground to above grade the conduits shall transition by means of pre-made couplings from plastic to rigid steel. Such transition shall be made a minimum of twelve (12) inches below finished grade.

         c. Ground wire must be run in conduit for all lighting runs.

      4. Flex:

         a. May be used where permitted by code when other conduit type is not practical.

         b. Used for final connection to portable or vibrating equipment.

         c. Used for spanning expansion joints.

   B. Installation:

1. Joints shall be cut square, reamed smooth, and drawn tight. Bends or offsets shall be made with standard conduit ells, field bends made with a bender or hickey, or hub-type conduit fittings. Number of bends per run shall conform to NEC limitations. Bends shall conform to NEC radius requirements and shall not have kinks or flat spots.

2. Size all conduit as indicated on Drawings; where not shown, in accordance with National Electrical Code. Make all conduit systems mechanically and electrically continuous from source of current to all outlets, and ground in accordance with the National Electrical Code.

3. Exposed conduits shall be run parallel to and at right angles to structure.

4. Ream conduit after threads are cut. Cut ends square and butt solidly into couplings.

5. Provide conduit expansion joints or liquid-tight flexible conduit connection at expansion joints for conduits less than 1-1/2 inches

6. Fasten conduits to all sheet metal boxes and cabinets with two locknuts, in accord with NEC. Where insulated bushings are used and where bushings cannot be brought into firm contact with the metal enclosures; use at least a single locknut and bushing.

7. Continuous from device to device and from device to cabinets, pull or junction boxes, and shall be secured to all boxes and locknuts and bushings in such a manner that each system shall be electrically continuous throughout. Conduit ends shall be capped to prevent entrance of foreign materials during construction.

8. Conduit terminals at cabinets and boxes shall be rigidly secured with locknuts and bushings as required by NEC. On all conduit 1 in. trade size and larger, insulated bushings shall be installed.

9. Raceways shall be installed complete before conductors are pulled in.

10. Provide empty or future conduits with a pull wire. Pull wire shall be No. 14 AWG zinc coated steel or of plastic having not less than 200 pound tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

11. Securely supported as required by NEC, and with-in 2 feet of box, couplings and each side of offsets or bends. Horizontal and vertical conduit runs shall be supported by one-hole heavy duty malleable iron straps, clamp backs, or other devices with suitable bolts, expansion shields (where needed) or beam-clamps for mounting to building structure or special brackets.

12. Make changes in direction or runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with conduit bending machine to avoid changing the internal diameter of the conduit and not damage its protective coating either inside or outside. Individual bends shall not exceed 90 degrees and not more than 270 degrees total bends will be allowed in any one conduit run. Where more bends are necessary install a suitable pull box or junction box.

13. Adjustable hangers may be used to suspend conduits when separately located. If adjustable trapeze hangers are used to support groups of parallel conduits, U-bolt or similar type clamps shall be installed at each elbow.

14. The use of perforated straps or tie wire for supporting or strapping conduits will not be permitted.

15. The required strength of the supporting equipment, and the size and type of anchors, shall be based on the combined weight of conduit, hangers and cables.

16. Sealing locknuts shall be used on boxes and cabinets which are other than NEMA 4 construction.

17. RGS:

    a. Threaded, unless rigid compression fittings are used.

    b. Running threads will not be permitted.

    c. Conduit ends shall have bushings installed.

18. PVC:

    a. Joints shall be properly sealed to make them watertight and installed as recommended by the manufacturer.

    b. Where used for other than buried it shall have expansion rings between boxes and on each run over 30 foot.

19. Hangers:

    a. Straps shall only be used on conduits run on walls or columns.

    b. Spacing shall be as required by NEC.

20. Underground Conduits:

    a. Ground shall be excavated in open trenches, the width, depth and direction necessary for the proper installation of the underground work.

    b. Conduit lines shall be laid with a minimum slope of 4 inches per 100 foot. Ells and offsets shall be made with factory ells or with field bends made in accordance with conduit manufacturer's recommendations. The minimum bend radius shall be 36 inches. Otherwise, long sweep bends having a minimum radius of 25 feet shall be used for a change of direction of more than 5 degrees, either horizontally or vertically. Both curved and straight sections may be used to form long sweep bends as required.

    c. Conduits shall be kept clean of concrete, dirt, or foreign substances during storage and construction. After conduit installation, a standard flexible mandrel shall be used for cleaning, followed by a brush with stiff bristles. Mandrel shall be at least 12 inches long and have a diameter 1/4 inch less than the inside diameter of the conduit being cleaned. All obstructions in conduits shall be removed prior to pulling wires or final acceptance. Conduits unable to pass mandrel shall be replaced. All unused conduits shall be capped.

    d. Conduits shall be marked with a 5-mil brightly colored tape not less than 3 inches wide and inscribed at not more than 10 feet on centers identifying conduits. Tape shall have a metallic backing and a corrosion resistant 1-mil metallic foil core. Place tape approximately 12 inches below finish grade directly above conduits.

    e. Conduits shall be installed a minimum of 24 in. below finished grade.

    f. Conduit shall be bedded firmly and continuously on sand or pea gravel and provide a minimum of 6 inches of covering of sand or pea gravel on all sides of conduit.

    g. Maintain all trenches and excavations free of standing water.

h. Backfill all trenches in 8 inch layers and compact by tamping and puddling. Backfill material shall be clean dirt, free of solid material (rocks, concrete, brick, or other debris). Installation shall be approved by Engineer prior to backfilling.

i. Provide adequate barricades, signs, lights, etc. while excavations are open.

j. Examine all available site utility information in regard to existing utility lines and locate and protect existing lines. Repair all existing utility lines that are damaged by this construction.

2. Wire and cable:

A. Drawings are diagrammatic in showing circuitry to and between devices, fixtures, and equipment. Provide all phase conductors, neutrals, grounds, as required for a complete and operable system.

B. Wire and cable shall be suitably protected from weather and damage during storage and handling and shall be in first-class condition when installed. Conductors shall be soft-drawn copper with insulation and outer covering as noted. Conductor sizes shall be Standard American Wire Gauge sizes (**NO ALUMINUM WIRE WILL BE ALLOWED**)

C. Make conductors continuous from device to device. Do not make splices except in junction boxes. Make all feeder cables continuous from origin to panel or equipment terminations without running splices in intermediate pull or boxes, unless specifically indicated on the Drawings or approved in writing by Engineer.

D. Do not exceed conduit fill established by the National Electrical Code for number of conductors installed in a raceway.

E. All wire shall be copper. Use minimum wire sizes in no case less than shown on the drawings or specified herein:

1. Control and Signal: No.14 AWG.

2. Branch Circuits: No.12 AWG.

F. Do not pull any cable or wire in a raceway until conduit system is complete and internal raceway has been cleaned. Strain on cables shall not exceed manufacturer's recommendations during pulling. Use pulling lubricant, compatible with insulation and covering that will not cause deterioration of insulation or jacket covers of cables or conductors. Use pulling lubricant recommended by wire manufacturer.

G. Provide each cable or conductor in panels, pullboxes or troughs with a permanent pressure-sensitive label with suitable numbers or letter for easy identification. Identify control wires at each end and in junction boxes with designated wire numbers corresponding to control schematic drawings.

H. Provide wires and cables entering equipment or panels with enough slack to eliminate stretched angular connection. Neatly arrange wiring, bundle and fan out to termination panels. Make minimum bending radius for conductors in accord with National Electrical Code.

I. Support all conductors in vertical raceways in accord with National Electrical Code.

J. Leave at least 6 in. loops or ends at each device for installation of fixtures. Roll up all wires in the boxes not for connection to fixture at that box, connect together and tape.

K. Upon completion of cable and wire installation, but before termination to equipment, test each wire for grounds and short circuits. Replace or correct defective wiring.

L. Ground wire of correct size shall be provided for each conduit run.

M. Provide properly sized conductors to prevent exceeding a 3% voltage drop and increase conduit sizes as required by NEC.

N. All circuits in all distribution equipment shall be neatly grouped and tied with seine twine, Ty-Rap or wrap tabs.

3. Boxes:

A. Boxes shall be accessible.

B. Location of boxes shown on the drawings is diagrammatic only. Coordinate exact location of boxes with details, equipment connection requirements and work of other trades. Engineer may alter the location of boxes shown within a six feet radius prior to installation.

C. Independently support all boxes. No parts of the weight or stress thereof shall be borne by conduits terminating therein.

D. Installed per NEC requirements for area in which it is being installed.

E. The covers for surface mounted boxes shall be of the same material as the box.

F. Surface mounted boxes 10 ft. above floor or less shall be cast type, unless otherwise noted.

G. Plug all unused openings. Use threaded plugs for cast boxes.

4. Raceway support and hangers:

A. Securely fasten raceways in place and support from structure at spacings not exceeding:

	Material	Maximum Spacing of Supports
1.	1/2" through 1" Trade Size Conduit	6 feet
2.	1-1/4" through 1-1/2" Trade Size Conduit	8 feet
3.	2" to 4" Trade Size Conduit	10 feet
4.	Flexible Metal Conduit	4-1/2 feet

B. Support rigid, or IMC conduits within 3 ft. of every outlet box, junction box, pull box, cabinet or termination. Support flexible conduit within 12 in. of every outlet box or fitting.

C. Support vertical runs or conduits at each floor level and at interval not to exceed 10 ft.

D. Support conduits by pipe straps, wall brackets, hangers, or ceiling trapeze. The use of perforated iron or wire for supporting conduits is prohibited. Fasten toggle bolts on hollow masonry units, by concrete inserts, or expansion steel conduits on steel. Do not weld conduits or pipe straps to steel structures unless specifically indicated.

E. The load applied to fasteners or hangers shall not exceed one-third the proof test load of the fasteners or hangers.

F. For fasteners attached to concrete, use vibration and shock resistant type.

G. Where two or more conduits one inch trade size or larger run parallel, trapeze hangers may be used consisting of threaded solid rods, washers, nuts and galvanized "L" angle or channel iron. Individually fasten conduits to the cross member of every other trapeze hanger with one hole straps or clamp backs with proper size bolts, washers and nuts. When adjustable trapeze hangers are used, use U-bolt type clamps at end of conduit runs, at each elbow and at each third intermediate hanger to fasten each conduit.

H. Make hangers of durable materials suitable for the application involved.

I. Fabricate all screws, bolts, washers and miscellaneous hardware used for conduit supports from rust-resisting metal. Trapeze hangers shall have hanger assemblies protected with galvanized finish.

J. Install UL approved expansion fittings complete with grounding jumpers were conduits cross expansion joints.

5. Grounding:

A. The Contractor shall furnish and install all grounding shown on the plans and/or as may be necessary or required to make a complete grounding system as required by the latest National Electrical Code (NFPA 70) in force. The reliability of the grounding system is dependent on careful, proper installation and choice of materials. Improper preparation of surfaces to be joined to make an electrical path, loose joints or corrosion can introduce impedance that will seriously impair the ability of the ground path to protect personnel and equipment and to absorb transients that can cause noise in communications circuits.

B. All electrical systems, equipment and appurtenances shall be properly grounded in strict conformance with the NEC, even though every detail of the requirements is not specified or shown. Good ground continuity throughout the electrical system shall be assured. All electrical circuit runs shall have a continuous equipment grounding conductor. IN NO CASE SHALL THE EARTH BE CONSIDERED AS AN ADEQUATE EQUIPMENT GROUNDING PATH. When connections are made to painted surfaces, the paint shall be scraped to fully expose metal at the connection point and serrated connectors or washers shall be used. Where metallic conduit is utilized as the equipment grounding conductor, extreme care shall be exercised to assure continuity at joints and termination points. No wiring run shall be installed without a suitable equipment ground conductor.

C. Ground raceways and electrical equipment; use double locknuts at all panels; use bonding jumpers where conduits are installed in concentric knockouts. Ground panels, switches, and fixtures, with separate ground conductor in conduit system.

D. All bolted or mechanical connections shall be coated with a corrosion preventative compound before joining, Sanchem Company “No-Oxide A Special” compound or approved equal.

E. Bond all grounding systems together.

6. Testing:

A. Conduct such tests and adjustments of equipment as necessary to verify performance requirements.

B. Test Reports: Typewritten, listing testing equipment used, person or persons performing the tests, date tested, circuits tested, motor or equipment nameplate data, and results of tests.

C. Insulation resistance tests general:

1. Perform insulation resistance tests on equipment and cables listed herein.

2. Test equipment: Furnished by Contractor.

3. Resistance measured; line-to-ground.

4. Disconnect, prior to testing, any device that could be damaged by application of voltage.

D. Insulation resistance tests shall be conducted per following schedule:

Item Tested	Voltage of Test	Min. Acceptance Resistance in Megohms
No. 2 and larger cables (600 V)	1000V	50

E. Continuity Test:

1. Test branch circuits and control circuits to determine continuity of wiring and connection. Submit written statement that this has been performed.

2. Test power, and control circuits to determine continuity of wiring.

F. Voltage test shall be made and recorded at the following listed points. Tests shall be conducted under normal load conditions

1. Each new lighting circuit.

G. Phase Relationship: Check connections to equipment for proper A-B-C phase relationships. Verify proper motor relation.

1. Disconnect, prior to check, any device which could be damaged by application of voltage of reversed phase sequence.

H. Corrections of Defects

1. If tests disclose any unsatisfactory workmanship or equipment furnished under this contract, Contractor shall repair or replace such defects.

2. If any wiring or equipment is damaged by tests, Contractor shall repair or replace such wiring or equipment.

METHOD OF MEASUREMENT

1. All items described in this Special Provision shall be included as a part of one or more of the following systems:

A. BRIDGE LIGHTING: All Electrical Systems mounted on the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway, and existing access bridge over the gated spillway, and sign lighting on Piers P9, P10, and P11.

B. BRIDGE LIGHTING DECORATIVE FIXTURES/POLES: All decorative light poles/fixtures mounted on the prefabricated truss portion of the pedestrian bridge over the Ogee spillway, pedestrian pathway, and removal and replacement of three (3) light poles/fixtures on existing access bridge over the gated spillway.

C. FIBER OPTIC CONDUIT: All fiber optic conduits mounted on the prefabricated truss portion of the pedestrian bridge over the Ogee spillway and existing access bridge over the gated spillway.

2. Each system described above shall be considered as its own separate pay item. All equipment required for a completely operational system shall be included as part of the pay item.

3. Items required for each system may be described in multiple Special Provisions. See each Special Provision for list of systems it applies to.

BASIS OF PAYMENT

1. Work described in this Special Provision shall not be paid separately but shall be paid for as incidental with the following pay items:

   A. BRIDGE LIGHTING.

   B. BRIDGE LIGHTING DECORATIVE FIXTURES/POLES.

   C. FIBER OPTIC CONDUIT.

SPECIAL PROVISION
LIGHTING

GENERAL

1. Work Includes: Light fixtures to illuminate the bridge and path walkway and warning signs, and the removal of existing light poles/fixtures as shown on the Drawings. The existing removed light poles/fixtures shall be given to the Engineer for reuse by the Department.

2. Lighting System Includes:

   A. High Intensity Discharge Walkway Luminaires.
   B. Fluorescent Sign Lighting Luminaires
   C. Ballasts.
   D. Lamps.

3. REFERENCES: Specified references, or cited portions thereof, shall govern all work. References shall be the latest editions at date of bidding documents, unless specifically dated otherwise. If conflict exists between referenced standard and contract documents, notify Engineer immediately; confirm notification in writing. Do not proceed with the conflicting work until instructed in writing by the Engineer.

   A. American National Standards Institute (ANSI):

      1. ANSI C62.41 - Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits.

   B. American Society of Testing Materials (ASTM).

   C. Certified Ballast Manufacturers Association (CBM).

   D. Electrical Testing Laboratories (ETL).

   E. Federal Communications Commission (FCC).

   F. Illuminating Engineers Society (IES):

      1. IES Lighting Handbook (Two Volume Set).

   G. National Electrical Manufacturers Association (NEMA).

   H. National Fire Protection Association (NFPA):

      1. NFPA-70, National Electric Code (NEC), most current edition in force.
      2. NFPA-101, Life Safety Code.

   I. Underwriters Laboratories (UL):

      1. All fixtures and components to be UL listed.
      2. Fixtures to be UL labeled for use in installed locations.

4. Allowable Tolerances:

   A. Alignment:

      1. Fixtures shall be arranged as shown on Drawings.

   B. Fixtures shall be located where shown on the electrical plans.

   C. Contact Engineer if conflict cannot be resolved. Do not proceed with any of the conflicting work until Engineer issues written instructions.

5. Submittals:

   A. Shop Drawings: Submit detailed drawings of all fixture mountings, showing attachment points, clearances, and special accessories.

   B. Product Data:

      1. Provide manufacturers' catalog cuts for all fixtures. Where multiple fixture models are shown on one data sheet, identify clearly the model or models to be used. Indicate all accessories and options to be provided with fixtures.

      2. Submit manufacturers' catalog cuts for all ballast/lamp combinations. Ballast data sheet must show compatible lamps, starting temperature and operating current. Lamp data sheet must show wattage, configuration, and color temperature.

   C. Operating and Maintenance Data: Submit manufacturers' standard maintenance literature for all fixtures and heat recovery fans. Data should include an exploded view of fixture with all parts identified.

   D. Warranties: Submit copies of manufacturers' standard warranty for all items.

6. Warranties and bonds:

   A. Manufacturers' Warranties:

      1. Two years on electromagnetic ballasts.
      2. One year for all other items.

MATERIALS

1. Exterior luminaires:

   A. UL listed for installed location.

   B. Provided with all necessary hardware and accessories for the mountings detailed on drawings.

   C. Internal fixture wiring to be in compliance with NEC.

   D. Acceptable Products: As listed in Fixture Schedule on drawings.

2. Ballasts:

   A. High intensity discharge ballasts.

      1. UL Listed, CBM Approved.

      2. Circuit Type as recommended by Lamp Manufacturer.

      3. High Power Factor, Energy Saving Type.

   B. Fluorescent Ballasts:

      1. UL listed, CBM approved, Class protected.

      2. High power factor type, with less than 50% THD.

      3. Sound rating C, weatherproof.

      4. Same size and wiring connections as electromagnetic ballasts.

      5. Certified as meeting FCC Part 18 for EMI.

6. Capable of withstanding an ANSI C62.41, category A waveshape without damage.

7. Have a minimum starting temperature of -20 deg. F.

8. Acceptable Manufacturers:

    a. Advance
    b. Magnetek

3. Lamps:

A. High Intensity Discharge Lamps:

1. Capable of burning in any position. If arc tube is arched for greater efficiency, base shall contain positioning pins for proper lamp alignment.

2. Provide clear lamps unless noted otherwise in fixture schedule.

B. Fluorescent Lamps:

1. Size, Shape, and Wattage as listed in Fixture Schedule.

2. Fluorescent lamps shall have color temperature and CRI as listed in fixture schedule on drawings.

3. 4-foot and 8-foot lamps to be T12 size unless noted otherwise.

4. All lamps by same manufacturer. All lamps in similar locations shall have same color temperature and CRI.

C. Acceptable Manufacturers:

1. General Electric.
2. Philips.
3. Osram/Sylvania.

<u>CONSTRUCTION REQUIREMENTS</u>

1. Install fixtures so as not to be hidden or obstructed by any pipes, or other equipment.

2. Where interference prohibits installation of fixtures as shown, contact Engineer immediately for resolution. Do not proceed with fixture installation in affected space until instructed by Engineer.

3. Install fixtures so that doors can be opened or removed without obstruction.

4. Lenses shall not be installed in fixtures until space has been finished and cleaned. Clean entire fixture, including lamps and reflectors, prior to installing lenses.

5. Surface Mount Fixtures:

A. Rigidly attached to surface with mounting hardware appropriate for construction.

B. Fixtures shall be supported from each end. Provide additional supporting points at four foot maximum intervals.

6. Hid Fixtures:

A. Fixtures containing light control optics shall be equipped with clear lamps unless otherwise recommended by fixture manufacturer.

B. Exterior fixtures shall be sealed to prevent the infiltration of moisture and insects.

7. Fluorescent Fixtures:

    A. Fixtures installed in exterior locations that utilize 4 foot or 8 foot lamps shall be equipped with T12, standard wattage lamps.

    B. Fixtures shall be provided with ballast capable of operating lamps down to the minimum expected temperature of the installed location.

8. Compatibility:

    A. Contractor shall be responsible for determining that ballasts provided with fixtures are appropriate for the location and lamps installed.

    B. Contractor shall be responsible for determining that the indicated lamps will fit the sockets provided with the fixture.

    C. Contractor shall provide, at his own expense, any modifications necessary to provide proper compatibility.

9. Field quality control:

    A. Fixtures installed prior to the finishing of a space shall be protected from damage.

    B. Fixtures which require aiming shall be aimed by Contractor. Exterior fixtures shall be aimed at night.

    C. Fixtures shall be checked for proper alignment. Lenses and louvers shall set squarely into fixture. Door frames shall be square and operate freely. Lamps shall be properly seated into sockets.

    D. Fixtures with ballasts shall be checked for excessive noise. Contractor shall replace any ballasts or fixtures that are noisy.

    E. Prior to Final Acceptance:

        1. All failed lamps and ballasts shall be replaced.

        2. All fixtures shall be cleaned of dirt, dust, paint, debris, etc., including lamps and reflectors.

        3. All lenses and other accessories shall be installed on fixtures.

10. Lighting pole foundation:

    A. Lighting pole foundation work shall consist of constructing a concrete foundation as indicated on the plans. Foundations shall include the raceways as indicated on the plans. Concrete shall be of the Class specified in the Contract.

    B. All conduits in the foundation shall be installed rigidly in place before concrete is deposited in the form. Bushings shall be provided at the ends of conduit. Anchor rods and reinforcing shall be set in place before concrete is deposited by means of a template constructed to space the anchor rods according to the pattern of the bolt holes in the base of the controller. The foundation shall utilize formwork to provide the proper dimensions of the foundation.

<u>METHOD OF MEASUREMENT</u>

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   B. BRIDGE LIGHTING DECORATIVE FIXTURES/POLES.

   C. FIBER OPTIC CONDUIT.