

# A d d e n d u m

Iowa Department of Transportation  
Office of Contracts

Date of Letting: April 25, 2017  
Date of Addendum: April 21, 2017

<b>B.O.</b>	<b>Proposal ID</b>	<b>Proposal Work Type</b>	<b>County</b>	<b>Project Number</b>	<b>Addendum</b>
003	82-0741-199	BRIDGE – STEEL GIRDER	SCOTT	IM-NHS-074-1(199)5--03-82 IM-NHS-074-1(260)1--03-82	25APR003A05

Make the following changes to the PROPOSAL SPECIAL PROVISIONS LIST & TEXT:

Replace SP-150171 for ITS INFRASTRUCTURE INSTALLATION with attached SP-150171a.

Make the following changes to the PLAN for IM-NHS-074-1(197)5--03-82:

Replace SHEETS C.2, N.2, P.04, P.07, P.10, P.19, and P.30 with attached SHEETS C.2, N.2, P.4, P.7, P.10, P.19, and P.30.

Note: Sheet C.2

Modified the materials under “Handholes and Junction Boxes” to include galvanized steel junction boxes as noted in plans.

Sheet N.2

Notes 23 & 24 were modified for the new concrete insert detail and to reference the P sheets for details.

Sheet P.4

Added detail for universal concrete insert. Modified note 12 to match new concrete insert detail.

Sheet P.7

Denoted locations for galvanized steel junction boxes.

Sheet P. 10

Denoted locations for galvanized steel junction boxes.

Sheet P.19

Modified concrete insert note 7 to reference plan note 12 and detail on sheet P.4.

Sheet P.30

Modified details to call for galvanized steel mounting equipment and junction box.



**SPECIAL PROVISIONS  
FOR  
ITS INFRASTRUCTURE INSTALLATION**

**Scott County  
IM-NHS-074-1(199)5--03-82**

**Effective Date  
April 25, 2017**

**THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

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## **PART I GENERAL REQUIREMENTS**

This part consists of the general provisions necessary when furnishing and installing the ITS Infrastructure as described in the project plans and these special provisions.

This project involves supplying and installing conduit, bridge attachments, handholes, junction boxes, device poles, device cabinets and footings, tracer wire and pull tape, power supplies and cabling, and power terminations deemed necessary for a complete ITS Infrastructure installation designed for use with future proposed ITS fiber and device deployments and other uses planned by the Iowa DOT. The Iowa DOT plans to initiate separate contracts to install and terminate the fiber optic cable and place it in service (light the fiber network). Separate contracts will also be initiated to supply and install the cameras, sensors, and other ancillary equipment in or on the cabinets and poles, as well as other items required to provide a complete and functioning network of ITS devices.

The Contractor shall not take advantage of any apparent error, discrepancy or omission in the plans or specifications. Upon discovery of such an error, discrepancy or omission, the Contractor shall notify the Engineer immediately. The Engineer will then make such corrections or interpretations as necessary to fulfill the intent of the plans and specifications.

Materials or work described in words which, so applied, have known technical or trade meaning shall be held to refer to such recognized standards.

Figured dimensions on the plans shall be taken as correct but shall be checked by the Contractor before starting construction. Any errors, omissions, or discrepancies shall be brought to the attention of the Engineer and the Engineer's decision thereon shall be final. Correction of errors or omissions on the drawings or specifications may be made by the Engineer when such correction is necessary for the proper execution of the work.

The Contractor for this project shall coordinate work with the Contractor(s) working on the fiber optic cable and device deployment projects. The Iowa DOT will assist in the coordination and scheduling of work. The Contractor for this project shall assign a responsible staff member that will work with the Iowa DOT on decisions regarding order of work and scheduling as needed throughout the duration of this project.

### **1.01 Related Specifications and Standards**

The work as detailed on the plans for the ITS Infrastructure Installation shall be completed in accordance with the plans, special provisions and all other contract documents including the documents listed below. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete project.

- A. Specifications of the Underwriter's Laboratories, Inc.
- B. National Electric Code
- C. Manual on Uniform Traffic Control Devices

### **1.02 Local Requirements**

#### **A. General**

Comply with any special requirements and limitations identified in the plans.

#### **B. Coordination of Work**

Contractor for this project shall coordinate work with the Contractor(s) working on other Iowa DOT projects in the vicinity as noted in the plans. The Contractor shall provide the Engineer any requests to perform work during the dates of special events noted in the plans a minimum of 5 days prior to the event. The decision of the Engineer regarding a request shall be final.

#### **C. Building Facilities**

All work in or around any building facility shall be coordinated with the Engineer and the Iowa DOT District staff. Provide a minimum of 48 hour notice to the Engineer before performing any work in the immediate vicinity of a building or surrounding parking area.

### **1.03 Contractor's Responsibility**

#### **A. Coordination with Utilities**

1. The Contractor is responsible for determining the exact location and elevation of all public utilities in proximity to any construction work and shall conduct all activities to ensure that public utilities are not disturbed or damaged.
2. The Contractor is fully liable for all expenses incurred as a result of failing to obtain required clearances, location of utilities, and any damage to utilities caused by construction.
3. Utility companies whose facilities are shown on the plans or known to be within the construction limits shall be notified by the Contractor of the starting construction date.

#### **B. One Call Locating**

Until final acceptance, the Contractor shall provide all utility locates of the work performed under this contract when requested through One-Call services or by the Engineer. The Contractor shall perform any such locations within 48 hours of receiving notice that such locations are needed.

#### **C. Material and Equipment Storage and Construction Site Access**

1. Contractor shall secure a designated material storage area for this project. Any request to store material in the right-of-way in order to complete the current work activity shall be approved by the Engineer.
2. Construction equipment may be stored within the right-of-way during non-working hours if it is outside of the roadway clear zone, as far from the traveled way as practical and as approved by the Engineer. No equipment shall be stored at the toe of any roadway slope.
3. No worker vehicles will be allowed to park in, or access a job site directly from an Interstate or Freeway facility. Access to the job site for both workers and materials shall only be via interchanges or intersecting roadways unless otherwise approved by the Engineer. Worker vehicles shall be parked off-site or at a location acceptable to the Engineer.

#### **D. Finishing Activities**

Upon completion of the work at each project area, thoroughly clean the site and restore it to a condition at least equal to that existing prior to construction. Project area is defined as the approximate area disturbed during a normal week of work. During and after completion, employ appropriate measures for erosion control, where applicable. Seed and fertilize work areas upon completion of work in accordance with the contract documents.

### **1.04 Contractor Submissions**

#### **A. Materials List**

The Engineer shall furnish a list of materials required for the project to each bidder with the proposal. Complete and submit one electronic pdf file of the materials list within 14 calendar days after award of the project contract. Include the name of the materials supplier and catalog number of each item listed.

#### **B. Construction Schedule**

1. Within 30 days after award of contract, the Contractor shall submit to the Engineer one electronic pdf file of the detailed construction schedule including dates of commencement for each major work

item, duration of each major work item and completion of each major work item on each segment of the proposed construction.

2. Major items of work to be included on the schedule are installation of conduit, handholes, device poles and footings, device cabinets and footings, and electrical installations.
3. Upon acceptance of the schedule, the Contractor will be expected to adhere to these dates as proposed unless modified with the approval of the Engineer.
4. Submittal and approval of the proposed construction schedule by the Engineer is required before the Contractor can commence construction activities.

#### **C. Shop Drawings/Catalog Cuts**

1. Prior to construction and after approval of the Materials List, submit one electronic pdf file of the shop drawings or catalog cuts for the materials to the Iowa DOT for approval.
2. The Engineer shall review the shop drawings/catalog cuts for the purpose of assuring general conformance with the project design concept and contract documents.
3. Provide written notice of any deviations from the requirements of the plans or contract documents.
4. Engineer's approval of shop drawings/catalog cuts does not relieve the Contractor of responsibility for providing satisfactory materials complying with the contract documents. Errors not detected during review do not authorize the Contractor to proceed in error.
5. The Engineer shall provide approval before any materials are ordered.

#### **D. Materials Procurement**

1. Shop drawings, specification data, and samples for acceptance testing (when requested) shall be submitted to the Iowa DOT for approval and/or selection prior to the placing of orders for any equipment and materials.
2. The Contractor shall order all materials requiring production lead time greater than 4 weeks within 5 business days of receiving the approved shop drawing(s).
3. The Contractor shall submit to the Engineer proof of material purchase order in electronic pdf format.

#### **E. Warranty**

1. Transfer all required standard materials warranties on the date of final acceptance to the Iowa DOT.
2. Warranty periods shall not commence prior to final acceptance of the work.

### **1.05 As-Built Documentation**

#### **A. General**

1. As-built record drawings will be the responsibility of, and completed by, an on-site representative of the Engineer. As such, it will be the responsibility of the Engineer's representative to coordinate directly with the Contractor to ensure that a master record set of the plans is maintained throughout construction to document all installations and any deviations from the design shown in the contract documents.

2. It is the responsibility of the Contractor to maintain written records of daily construction progress, areas worked and quantities installed to aid in the completeness of as-constructed documentation by the Engineer's on-site representative.

**B. GPS Data Recording Staking Assistance**

1. The Engineer's on-site representative will be responsible for collecting GPS data of all installations including, but not limited to: conduit routing, handholes, device poles, device cabinets, and power supplies. All efforts will be made by the Engineer's on-site representative to coordinate with the Contractor and collect construction progress daily.
2. The Contractor shall be responsible to coordinate and assist the Engineer's on-site representative in this effort by staking, flagging or otherwise locating all installed features until such time that the GPS data can be collected.

## PART II TECHNICAL PROVISIONS

This part consists of the material requirements, construction details, and methods of measurement and basis of payment necessary to complete construction of the ITS Infrastructure project, in place, as described in the contract documents.

### 2.01 General

- A. Supply only new materials from reputable suppliers and manufacturers approved by the Engineer. Provide any items, equipment, or materials not specifically addressed in the contract documents but required to provide a complete and functional installation. The level of quality shall be consistent with other specified items. All miscellaneous electrical equipment and materials shall be UL-approved. Securely store and protect all materials delivered to the project site. Provide appropriate material quantities for testing or verification at no additional cost when requested by the Engineer.
- B. The Contractor shall expect some reasonable variation in location of the facilities shown due to unforeseen conflicts, changes in proposed work, installation difficulties, or other circumstances. The Engineer shall authorize any changes in location in writing before performing the installation. No additional compensation shall be provided for additional work associated with or resulting from unauthorized changes to the contract documents.

### 2.02 Device Cabinets

Furnish all work, apparatus, and materials to construct and install the device cabinets designed to house the control equipment required for the planned ITS system.

#### A. Materials

Furnish materials of new stock only.

##### 1. General

- a. Supply device cabinets, clean-cut in design and appearance.
- b. Cabinets shall be dimensioned as identified in the contract documents and have a typical internal layout as identified in the detailed drawings.
- c. Cabinets shall be corrosion resistant, UL-50 approved, NEMA Type 3R compliant, constructed of welded sheet aluminum with a minimum nominal thickness of 0.125 inch.
- d. Cabinets shall be complete with all required internal components, fully wired back panel, side mount DIN rails, terminal strips, and stainless steel hardware.
- e. Cabinets shall include one mounting shelf.
- f. Cabinets shall meet the requirements of ASTM B-209 for 5052 H-32 aluminum sheet. The aluminum shall be smooth and the exterior shall be left in its unpainted natural color.
- g. The cabinet structure shall be effectively sealed to prevent the entry of rain, dust, and dirt.
- h. All exterior seams for cabinet and doors shall be continuously welded. All edges shall be filed to a radius of 1/32 inch minimum.
- i. All pole mount cabinets shall be equipped with top and bottom mounting flanges and include pole mounting reinforcement/stiffener plates as part of the cabinet design. Mounting brackets shall be fabricated from 0.250 inch thick aluminum, 5052-H32, mill finish.

##### 2. Cabinet Doors

- a. The cabinet door shall be sturdy, torsionally rigid, and attached by a continuous heavy duty gauge aluminum butt hinge utilizing a stainless steel hinge. The door shall substantially cover the full area of the front of the cabinet and have a stainless steel, pad-lockable handle.
- b. The cabinet shall be hinged on the right side (as viewed from the front).
- c. The cabinet door shall be provided with a door stop catch mechanism to hold the door open at three positions – 90 degrees, 120 degrees and 180 degrees, with plus or minus 10 degrees accuracy. Both the door and door stop mechanism shall be of sufficient strength to withstand

a simulated wind load of five pounds per square foot of door area applied to both inside and outside surfaces.

- d. A closed-cell neoprene gasket shall be provided to act as a permanent and weather resistant seal at the cabinet door facing. The gasket material shall be of a non-absorbent material and shall maintain its resiliency after long term exposure to the outdoor environment. The gasket shall have a minimum thickness of 1/3 inch. The gasket shall be located in a channel provided for this purpose either on the cabinet or on the door. An "L" bracket is acceptable in lieu of this channel if the gasket is fitted snugly against the bracket to insure a uniformly dust and weather resistant seal around the entire door facing.
  - e. Cabinet light (LED) with light bulb provided shall be operated by door switch.
  - f. Each cabinet door shall be provided with a high quality, heavy duty tumbler-type lock. Two No. 2 keys for each tumbler lock shall be provided for each cabinet. All locks for the project shall be keyed identically to key pattern 9R46142 or as otherwise identified by the Engineer. Keys shall be given to the Engineer. Do not attach keys to the exterior of the cabinet at any time during storage or installation.
  - g. A heavy-duty clear plastic envelope shall be provided, securely attached to the inside wall of the cabinet or cabinet door, for stowing cabinet wiring diagrams and equipment manuals. Minimum dimensions shall be 9 inches wide by 12 inches deep.
- 3. Power Panel, Connecting Cables and Wiring**
- a. Provide cabinets equipped and configured with internal power components as shown in the contract documents.
  - b. One four position service entrance terminal block with tin plated aluminum connectors, nickel plated steel screws, and a current rating up to 70 Amps.
  - c. One 20 Amp single pole breaker (Main).
  - d. One 15 Amp single pole breaker (Equipment).
  - e. One 15 Amp single pole breaker (Auxiliary).
  - f. A 120/240 VAC surge protector with surge current at minimum of 100KA, nanosecond response time, and an operating temperature of -40°C to +85°C.
  - g. An auxiliary four terminal electrical block rated for a maximum 250 VAC RMS maximum voltage and 20 Amps current.
  - h. A 15 Amp GFCI receptacle in Ivory color.
  - i. An eight outlet Power Distribution Unit with built in surge suppressor (1800 Joules of surge/lightning protection) that includes a resettable circuit breaker and minimum cord length of 6 feet.
  - j. One 7 TAP Ground Bar.
  - k. One 7 TAP Neutral Bar.
  - l. All miscellaneous wiring, harnesses connectors and attachment hardware.
  - m. All conductors used on the cabinet wiring shall be No. 14 AWG or larger with a minimum of 19 strands. Conductors shall conform to MIL SPEC MIL-W-168780, Type B or D. The insulation shall have a minimum thickness of 10 MILS. All wiring containing line voltage shall be a minimum size of No. 12 AWG.
- 4. Ventilation**
- a. **Vents**
    - 1) Furnish cabinets containing a suitably designed rain tight vent or vents that:
      - Are equipped with suitable screens or dust filters, and
      - Allow the release of excessive heat and/or any explosive gases which may enter the cabinet.
    - 2) Ensure when filters are utilized, positive retainment is provided on all sides to prevent warpage and entry of foreign matter around the edges.
    - 3) The filters shall be dry type, easily removed and replaced, and standard dimensions commercially available.
  - b. **Vent Fan**

Meet the following requirements:

- A thermostatically controlled vent fan is furnished to provide air circulation within the cabinet.
- The thermostat controlling the fan is manually adjustable to turn on between 90°F and 150°F with a differential of not more than 10°F between automatic turn on and turn off.
- The fan is located with respect to the vent holes to direct the bulk of the air flow over the internal components within the cabinet.
- Ventilation fan shall be fused separately and wired after the main AC+ circuit breaker.

## 5. Grounding

- a. The cabinet internal ground shall consist of one or more ground bus-bars permanently affixed to the cabinet and connected to the grounding electrode.
- b. Use bare stranded No. 6 AWG copper wire between bus-bars and between the bus-bar and grounding electrode.
- c. Each copper ground bus-bar shall have a minimum of 20 connector points. Each connector point shall be capable of securing at least one No. 6 AWG conductor.
- d. AC neutral and equipment ground wiring shall return to bus-bars.

## B. Construction

### 1. General

- a. Install cabinets in accordance with the contract documents and the manufacturer's recommendations.
- b. Do not penetrate the top of any cabinets without prior authorization by the Engineer.
- c. Do not allow screws used for mounting shelves or other mounting purposes to protrude beyond the outside wall of the cabinet.
- d. All connections shall be watertight.
- e. Contact the Engineer a minimum of 1 week in advance to arrange a field review prior to placing the cabinets.

### 2. Mounting

- a. Orient cabinets as shown in the contract documents unless otherwise directed by the Engineer.
- b. Ensure sufficient clamps, nuts, hardware, etc., as required for the specified mounting type, are furnished with each cabinet.
- c. Seal all conduit openings in the controller cabinet with a sealing compound that meets the following requirements:
  - Readily workable, soft plastic,
  - Workable at temperatures as low as 30°F, and
  - Does not melt or run at temperatures as high as 300°F.

## C. Method of Measurement & Basis of Payment

1. Measurement and payment for device cabinets shall be paid for at the contract unit price per each for the pay item Cabinet, Furnish and Install, 36 Inch X 24 Inch X 17 Inch.
2. Payment is full compensation for:
  - The furnishing and installation of all pole mounted and pedestal mounted cabinets,
  - Including all internal components and accessories required to provide a complete cabinet installation per the contract documents,
  - Providing and installing all mounting materials, cable pulling, routing and management, cable termination, and all necessary electric grounding materials, and
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

## 2.03 Handholes

## **A. Materials**

### **1. General**

- a. Supply handholes constructed of epoxy or polyester resin mortar with woven glass fiber reinforcement and an appropriate aggregate dimensioned as indicated in the contract documents.
- b. Handhole materials shall not support combustion when tested in accordance with "Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position" ASTM D-635.
- c. Water absorption shall not exceed 2% of the original weight of material under test conditions per "Standard Test Method for Water Absorption of Plastics" ASTM D-570.
- d. The handhole shall be functional without failure throughout a temperature range of -50°F to +170°F.
- e. The handhole walls shall not deflect more than 0.24 inches per foot of length of box when installed and subject to an ASTM C-857 TIER 22 load.
- f. Handholes shall meet ANSI/SCTE 77 standards and be verified by a registered third party and stamped by a registered Professional Engineer.
- g. Handhole lid strength shall be tested to 33,750 pounds (Tier 22).
- h. Handhole lids shall be labeled as indicated in the plans or as directed by the Engineer.
- i. The Engineer shall provide approval prior to use of any handholes satisfying the contract documents requirements for structural, physical, and chemical properties.

### **2. Test Stations**

- a. Supply Rhino part TVTI780B-EM9125-0R or approved equivalent test stations at all Type III handholes.
- b. Test Stations shall be 78 inch triangular flexible orange plastic marker with five separate access terminals, isolation lever, and set screw to hold terminal concealment cap on.
- c. Place custom warning decals on all sides, the Engineer shall provide prior approval of decals.

## **B. Construction**

### **1. General**

- a. Install the type and size of handholes at the locations indicated in the contract documents.
- b. Construct all Type III handholes as located by in the plans.
- c. Set handholes flush with the surface when constructing in a sidewalk or driveway. Set handholes approximately 6 to 12 inches below the finished surface of the surrounding ground when constructing in an earth embankment or non-paved surface.
- d. Install course aggregate bedding to a depth of 1 foot below the handhole.
- e. Conduit shall enter the handhole from the bottom and extend conduit ends between 4 and 6 inches above the aggregate bedding.
- f. Side penetrations of the handholes are not permitted.
- g. Terminate each tracer wire run in test stations at Handhole, Type III locations.
- h. Label all ground wires and tracer wires in test stations.
- i. Install ground rods at all Type III handholes as indicated in the contract documents.
- j. Plug all open conduit ends within the handhole in a manner acceptable to the Engineer.
- k. Rodent proof all handholes to the satisfaction of the Engineer.

## **C. Method of Measurement & Basis of Payment**

1. Measurement and payment for all handholes shall be paid for at the contract unit price per each for the pay items Handhole, Furnish and Install, Type I; Handhole, Furnish and Install, Type FOR27; and Handhole, Furnish and Install, Type III.
2. Payment is full compensation for:
  - The furnishing and installation of all handholes,

- Including all surface excavations, repair or restoration of any nearby areas, concrete, proper water/moisture drainage materials, all necessary electric grounding materials and installation,
- Furnishing and installing all test stations at Handhole, Type III locations, and
- Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

## 2.04 Junction Boxes

### A. Materials

#### 1. General

- a. Supply only new junction boxes, free from damage, meeting the requirements in the standard specifications, NEC, and NEMA 3R.
- b. Junction boxes shall be constructed of ~~Stainless Steel 316 material~~ of galvanized steel per ASTM A 653 and shall be furnished with a lockable lid.
- c. Junction boxes shall be gasketed and vented.
- d. The Engineer shall provide approval prior to use of any junction boxes satisfying the contract documents requirements for structural, physical, and chemical properties.

### B. Construction

#### 1. General

- a. Install the type and size of junction boxes at the locations indicated in the contract documents.
- b. Mount junction box through the flanges or,
- c. Mount junction box through the wall of the junction box. Use silicone sealant between mounting hardware and wall of the junction box.
- d. Penetrate conduits 1.5 inches into the junction box. Terminate with bushings and/or bell ends that protect cables from chafing.

### C. Method of Measurement & Basis of Payment

1. Measurement and payment for all junction boxes shall be paid for at the contract unit price per each for the pay items Junction Box, Furnish and Install, 30 Inch X 30 Inch X 16 Inch; Junction Box, Furnish and Install, 12 Inch X 10 Inch X 6 Inch; and Junction Box, Furnish and Install, 10 Inch X 8 Inch X 4 Inch.
2. Payment is full compensation for:
  - The furnishing and installation of all junction boxes,
  - Including all mounting equipment, repair or restoration of any nearby areas, proper water/moisture drainage materials, all necessary electric grounding materials and installation,
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

## 2.05 Conduit

### A. Materials

#### 1. High Density Polyethylene (HDPE) conduit

- a. High Density Polyethylene (HDPE) conduit shall be smooth wall ORANGE.
- b. Comply with ASTM F 2160 (conduit) and ASTM D 3350 (HDPE material), minimum SDR 13.5, and NEMA TC-7 EPEC-B standards.
- c. Sequential foot markings printed on HDPE.
- d. Continuous reel or straight pieces to minimize splicing.
- e. For dissimilar conduit connections provide an adhesive compatible with both materials.

### B. Construction

**1. General**

- a. Follow all general guidelines covering the construction of buried conduit.
- b. Install conduit by plowing, jacking, pushing, boring, or other approved methods within the public right of way and in a manner that minimizes atypical damage from construction operations.
- c. The minimum bending radius of HDPE conduit shall be the larger of 20 times the outside diameter or the HDPE manufacturer's recommendations for minimum bending radius.
- d. Open trench installation is only permitted within 25 feet of any handhole, pole, structure, or other similar improvements, and any other requested locations approved by the Engineer.
- e. At the discretion of the Engineer, verify the integrity of the conduit structure in a manner acceptable to the Engineer.
- f. Tunneling under the pavement or water jetting shall not be permitted.
- g. No excavations are permitted to cross any roadways or any other paved or other similarly improved areas. At these locations, install conduits by boring method unless otherwise directed or approved in writing by the Engineer. Where indicated in the contract document and at all roadway and stream crossings, install conduit sections with external protection as specified herein.
- h. No direct-buried cable is allowed.
- i. Seal all conduit openings using an approved sealing compound (duct seal) at all conduit openings at the junction boxes, handholes, poles, cabinets, and building entrances.

**2. Installation Clearances**

- a. Depth of all bores shall be a minimum of 48 inches unless otherwise specified in the plans.
- b. Unless otherwise indicated, install all conduit at rail crossings at a minimum of 15 feet below base of rail or 15 feet below natural ground line, whichever is greater.
- c. Maintain the minimum depth throughout the length of all conduit installations.
- d. Maintain a minimum of 2 feet of separation when underground conduits parallel an existing facility.

**3. Conduit Splicing**

- a. All mechanically joined conduit splices shall use compression couplings designed for underground placement and blown-in fiber installation.
- b. Electrofusion joining of HDPE conduit will be allowed provided that the method used does not create a ridge on the inside of the conduit that may impact future fiber installation.
- c. Butt fusion welding and solvent welding of conduits will not be allowed.
- d. All conduit splices shall be watertight to 200 psi.
- e. Conduit splicing is incidental to the connected items of work.

**4. Facilities Protection**

- a. The contractor is responsible for protecting and maintaining the conduit throughout construction and until final acceptance.
- b. To avoid possible damage to buried conduit from exposure to traffic, livestock and other hazards, complete trenching of laterals, trenching around culverts, construction of aerial inserts and similar operations as soon as practicable behind all segment installations.
- c. If more than 48 hours lag is expected behind a segment installation, install additional protective measures acceptable to the Engineer.

**5. Backfilling**

- a. Backfill trenches and other excavations in lifts of 6 inches or less in compacted depth. Compact each layer thoroughly before placing subsequent layers.
- b. Remove all cinders, broken concrete, or other hard or abrasive materials in the backfill material before commencing backfilling operations.
- c. Remove and dispose of surplus and unsuitable materials upon completion of the backfilling operations in the area.
- d. Place and carefully hand tamp backfill under and around the structures in lifts not to exceed 4 inches in loose thickness. Use a suitably sized mechanical tamper for all areas inaccessible

to rollers. Operate pneumatic or other mechanical tampers in accordance with the manufacturer's recommendations.

- e. Perform operations in a manner that minimizes soil erosion and employs appropriate storm water pollution prevention measures during all construction operations.
- f. Maintain work areas in a neat, clean, and orderly condition at all times.
- g. Upon completion of conduit/cable placing operations and any other work in an area, remove all debris, materials, tools, and equipment from the area and restore the disturbed area(s) to original or better condition within 24 hours or as soon as practicable as determined by the Engineer. Backfill all excavations and grade all disturbed areas during the restoration process.
- h. Remove and dispose of rock and debris excavated and remaining after backfilling as directed by the Engineer.
- i. Immediately repair or replace any unauthorized disturbance or damage. Replace improved landscaping, lawns, shrubs, and hedge removed or damaged during construction in a manner acceptable to the Engineer. Re-sod damaged lawns using like grasses.

#### **6. Multiple Duct Installation**

Install multiple ducts, in continuity, at locations indicated in the contract documents unless authorized in writing by the Engineer.

#### **7. Plowing**

- a. Use equipment and construction methods subject to the approval of the Engineer that cause minimal displacement of the soil.
- b. Furnish competent supervision at all times at the site of plowing operations to assure compliance with the contract documents.
- c. The equipment shall be capable of extending the plow in order to maintain the required minimum depths under all terrain conditions.
- d. The reel carrier shall be of adequate size and be configured so that the reel sizes being used can be safely handled.
- e. Avoid damaging any paved surfaces, ditches, or other similar surface features. Immediately repair any damage to such features to the satisfaction of the Engineer.
- f. Perform plowing in accordance with standard industry practices using a prime mover with hydrostatic type steering and a vibratory plow. The design of the plowshare shall be such that the buried conduit passing through the plow shall not bind and shall not be bent in a radius less than 20 times the outside diameter of the conduit and maintains the structural integrity of the conduit. The feed chute shall have a removable gate for the purpose of inspection and to allow the conduit to be removed from or inserted into the feed chute at any intermediate point between splice locations. The conduit path inside the feed chute shall have low friction surfaces and be free of burrs and sharp edges to prevent damage to the conduit as it passes through. Smooth any welds before use. Internal guide rollers shall not be used. Exercise care during the plowing operation to avoid conduit damage. Feed the conduit into the ground through the plow loose and at no tension.
- g. Excavate as needed start and finish pits and pits at points of intersection in advance of plowing. Expose ends of casings and crossings of foreign utilities before the start of plowing operations for a conduit segment. Exercise care in the use of trenching and excavating tools and equipment to avoid damaging installed and intersecting conduits or other facilities.
- h. Restore plow furrowed areas to conform to the surrounding terrain using a rubber tired tractor or heavy truck or a vibratory roller having a weight of 3 tons and a drum width between 4 and 6 feet or by other suitable means approved by the Engineer.

#### **8. Conduit in Trench**

- a. Use equipment and construction methods subject to the approval of the Engineer that cause minimal displacement of the soil.
- b. Excavate open trench straight as practicable. Shape the trench to be smooth, free from any sharp edges, and clear of debris and loose rock. Excavate only gradual grade changes.

- c. Do not leave trenches unattended at any time or open during non-working hours unless approved in writing by the Engineer. Install barriers or other protective measures to prevent livestock or persons from falling into an open trench when appropriate.
- d. Notify the Engineer immediately if solid rock is encountered at any location. Excavate rock trenches using a rock saw or other suitable equipment. The excavation, backfill, and road crossings in solid rock areas shall conform to the requirements stated above unless specifically exempted in this section.
- e. Rock excavation shall be considered extra work and shall be paid as a separate cost item. Obtain approval from the Engineer before commencing any rock excavation.

**9. Bored Crossings**

- a. Use equipment and construction methods subject to the approval of the Engineer that cause minimal displacement of the soil.
- b. Bore all crossings beneath roadways, streets, other paved surfaces, railroads, or other structure in accordance with requirements and regulations of the authority having jurisdiction and as directed in the contract documents.
- c. Limit bore hole sizes to the outside diameter of the conduit being placed.
- d. Locate bore pits a minimum of 2 feet from the edge of pavement or shoulder unless otherwise directed by the Engineer.

**C. Method of Measurement & Basis of Payment**

- 1. Measurement and payment for all HDPE conduit shall be paid for at the contract unit price per linear foot for the pay items Conduit, Furnish and Plow, HDPE, 2 Inch; and Conduit, Furnish and Plow, HDPE, 3 Inch.
- 2. Payment is full compensation for:
  - The furnishing and installation of all HDPE conduits per the contract documents,
  - Including all surface excavations or surface preparation work, repair or restoration of any disturbed areas to pre-construction conditions, proper water/moisture drainage materials,
  - Conduit mounting on new or existing infrastructure, and
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**2.06 Poles**

Furnish all work, apparatus, and materials to construct and install the device poles designed to mount future ITS equipment to as required for the planned ITS system.

All ITS poles shall be a 45 feet tall, conventional type, tapered steel pole. All poles shall be either round, 12 sided, or 16 sided.

**A. Materials**

Contractor shall supply all necessary materials and incidental items required to install the steel, black painted pole furnished by the Iowa DOT. Contractor shall contact Tony Taylor, 515-239-1902, TONY.TAYLOR@DOT.IOWA.GOV, to procure poles for installation. Contractor shall notify Iowa DOT upon receiving contract.

**B. Construction**

**1. Pole Erection**

- a. Erect poles and securely bolt to the foundation base plate such that the pole is vertically plumb.
- b. Use leveling nuts on each anchor bolt installed below the pole flange. Adjust the pole's vertical position by adjusting both the upper and lower nuts. Nuts shall be tightened per the manufacturer's recommendation.

- c. For bridge-mounted poles, the pole shall be set plumb on the foundation and fastened to the anchor bolts with self-locking nuts or double nuts (two per anchor bolt) and washers. Flat washers shall be installed below and above the isolation washer. A 0.5 inch minimum isolation pad and a 0.5 inch minimum leveling plate shall be installed between the light pole base plate and the bottom nut (leveling nut) with a steel washer between the leveling nut and the leveling plate. The nuts shall be tightened in compliance with torque specifications recommended by the manufacturer of the isolation pad. See plans for attachment detail.
- d. The space between the finished top of the foundation and the bottom of the base plate of the pole shall be enclosed with an expanded metal screen made of stainless steel. The mesh of the screen shall be 0.250 inch or less as approved by the Engineer. The screen shall be held in place with bands made of stainless steel. At least two bands shall be installed around the pole base plate. The bands shall be held tight by a ratchet-type device. Grouting shall not be used to enclose the above described space.

## **2. Bridge Mounted Pole Accessories**

When mounted on bridges, a vibration isolation mounting pad, isolation washers, and a galvanized steel leveling plate shall be included with the pole. The pad and leveling plate shall have the same shape as the bottom of the pole base with appropriate bolt holes and opening for the center of the pole. Included with the pad shall be four washers. The pad and washers shall be made from a rugged elastomeric material with a minimum thickness of 0.5 inches or as recommended by the manufacturer. The ultimate breakdown of the pad and washers under compressive load shall be not less than 10,000 psi for the specified thickness without extrusion or detrimental reduction in thickness. The material shall also have a Shore-A Durometer reading of not less than 85. The isolation washers shall be installed with galvanized steel washers of the same diameter and adequate thickness top and bottom to prevent overstressing of the isolation washer. The leveling plate shall be according to AASHTO M 270 Grade 50 or 50S and shall be galvanized according to AASHTO M 111.

## **C. Method of Measurement & Basis of Payment**

1. Measurement and payment for all steel poles shall be paid for at the contract unit price per each for the pay item Pole, Steel Black Painted, 45 Foot, Install Only.
2. Payment is full compensation for:
  - The installation of all poles and accessories,
  - Including fitting the appropriate bolt pattern to the foundation base plate, all conduit entrances and attachments, all necessary electric grounding materials, and
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

## **2.07 Meter Pedestals**

### **A. Materials**

Meter pedestals shall comply with the requirements of the contract documents and all generally accepted standards and requirements for the electrical components entering and exiting the pedestal.

### **B. Construction**

1. Install meter pedestals in accordance with the contract documents, local utilities, and all NEC requirements. Locate and orient meter pedestals as shown in the plans.
2. Contractor shall provide all conduit and power cable from the meter pedestal to the device cabinet.

3. Unless otherwise directed by the Engineer, the Contractor shall install the meter pedestal at the location and obtain power from the electrical service location shown in the contract documents.
4. All electrical service cables shall be continuous runs with no splices between the meter pedestal and the cabinet.
5. All connections to power sources owned by the power providers, as identified in the contract documents, shall be completed by the individual power companies.
6. The Contractor shall complete all required power terminations at the meter pedestal and device cabinet.
7. The Contractor is responsible for permits, coordinating and scheduling all locally required inspections of electrical work prior to putting a location into service.
8. The Contractor shall coordinate with the Engineer and power provider to request that electrical service at a device location be initiated.

**C. Method of Measurement & Basis of Payment**

1. Measurement and payment for all meter pedestals shall be paid for at the contract unit price per each for the pay item Meter Pedestal.
2. Payment is full compensation for:
  - The furnishing and installation of all meter sockets and meter pedestals,
  - Including the proper installation of the wire and cable into existing conduit and new conduit systems installed, supply and installation of cable splices and connectors, circuit breakers, and slack, coiled, or stored cables, and
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**2.08 Power Connections**

**A. Materials**

Power connections shall comply with the requirements of NEC, the contract documents and all generally accepted standards and requirements for the electrical components and power terminations in the individual power source.

**B. Construction**

1. Install power connections in accordance with the contract documents and all NEC requirements.
2. Contractor shall coordinate installations in advance as noted on the contract documents.
3. Contractor shall provide all conduit, breaker enclosures, circuit breakers, wiring and accessories, neutral bars and accessories, ground bars and accessories, terminations and grounding in the power source.
4. Unless otherwise directed by the Engineer, the Contractor shall install the power connections as illustrated in the contract documents.
5. The Contractor is responsible for coordinating and scheduling all locally required inspections of electrical work prior to putting a location into service.

6. The Contractor shall coordinate with the Engineer and power provider to request that electrical service at a device location be initiated.

**C. Method of Measurement & Basis of Payment**

1. Measurement and payment for all power connections shall be paid for at the contract unit price per each for the pay item Power Connection.
2. Payment is full compensation for:
  - The furnishing and installation of all power connection accessories as shown in the contract documents,
  - Including the proper installation of the conduit, breaker enclosures, circuit breakers, wiring and accessories, neutral bars and accessories, ground bars and accessories, terminations, and grounding in the power source, and
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**2.09 Step-Down Transformers**

**A. Materials**

Step-down transformers shall comply with the requirements of the contract documents and all generally accepted standards and requirements for the electrical components entering and exiting the transformer.

1. All step-down transformers shall be dry-type distribution, general purpose, factory assembled, air-cooled, single phase, with ratings as indicated on the plans.
2. Transformer winding shall be Aluminum for transformers with a rating higher than 2kVA.
3. Primary voltage shall be 480V stepped down to secondary voltage 120V.
4. Step-down transformers shall be UL listed and conform to the requirements of ANSI/National Fire Protection Association (NFPA).
5. Transformer enclosure shall be NEMA 3R compliant.
6. Step-down transformers shall be capable of mounting to electrical rack without compromising rack structural integrity and such mounting shall be effectively sealed to prevent the entry of rain, dust, and dirt.
7. Transformers shall be capable of carrying a continuous 15% overload without exceeding 239°F rise in a 104°F ambient.
8. Provide grounding in accordance with the Standard Specifications.

**B. Construction**

1. Install step-down transformers in accordance with the contract documents, local utilities, and all NEC requirements. Locate and orient step-down transformers as shown in the plans.
2. Contractor shall coordinate installations in advance as noted on the contract documents.
3. The Contractor is responsible for coordinating and scheduling all locally required inspections of electrical work prior to putting a step-down transformer into service.

4. The Contractor shall coordinate with the Engineer and power provider to request that electrical service at a device location be initiated.

**C. Method of Measurement & Basis of Payment**

1. Measurement and payment for all step-down transformers shall be paid for at the contract unit price per each for the pay item Step Down Transformer, Furnish and Install, 15 kVA.
2. Payment is full compensation for:
  - The furnishing and installation of all step-down transformer accessories as shown in the contract documents,
  - Including the proper installation of the conduit, breaker enclosures, circuit breakers, wiring and accessories, neutral bars and accessories, ground bars and accessories, terminations, and grounding in the transformer, and
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**2.10 Electrical Rack**

**A. Materials**

1. All concrete shall meet the requirements of Article 2403 of the Standard Specifications. Use Class C concrete for electrical rack footings.
2. Electrical rack framing channels and fittings shall be galvanized in accordance with ASTM A653 Grade 115, and shall be intended for outdoor installation.
3. All electrical enclosures shall be NEMA 3R compliant, and furnished with lockable lids.
4. Provide electrical racks equipped and configured with internal power components as shown in the contract documents.
  - a. One 125 Amp load center, 120VAC, 8 space.
  - b. One 125 Amp breaker (Main).
  - c. One 30 Amp breaker per cabinet circuit.
  - d. One 7 TAP Ground Bar.
  - e. One 7 TAP Neutral Bar.
5. Safety disconnect switches shall be fusible, heavy duty, rated for design shown in contract documents, UL 1741 approved, and intended for outdoor installation.
6. All exposed conduit on electrical rack shall be rigid galvanized steel and shall meet the requirements of Article 4185.10, B of the Standard Specifications.
7. Expansion fittings shall be watertight to 200psi.

**B. Construction**

1. Install electrical racks in accordance with the contract documents, local utilities, and all NEC requirements. Locate and orient electrical racks as shown in the plans.
2. Rack footings shall securely rest on firm undisturbed ground and set level and to the proper elevation. Form concrete footings where the excavation is irregular in shape to provide proper dimensions. Forming materials shall be level and braced to avoid displacement, warping, or deflection from the specified pattern during construction and curing.

3. Electrical rack frame anchors shall be securely mounted to foundations with post-installed mechanical concrete anchors or cast-in-place inserts. Frame anchors shall be centered in foundations.
4. Electrical rack frame shall be vertically plumb with electrical equipment mounted.
5. All electrical rack enclosures shall be effectively sealed to prevent the entry of rain, dust, and dirt.
6. Contractor shall provide all conduit and power cable within the electrical rack system.
7. All electrical cables shall be continuous runs with no splices between equipment shown on electrical rack.
8. The Contractor shall complete all required power terminations at the electrical rack.
9. The Contractor is responsible for permits, coordinating and scheduling all locally required inspections of electrical work prior to putting an electrical rack into service.

**C. Method of Measurement & Basis of Payment**

1. Measurement and payment for all meter pedestals shall be paid for at the contract unit price per each for the pay item Electrical Rack.
2. Payment is full compensation for:
  - The furnishing and installation of all electrical racks,
  - Including the proper installation of the foundation, frame, conduit, fittings, enclosures, wiring into new conduit systems installed, supply and installation of cable splices and connectors, circuit breakers, and slack, coiled, or stored cables, and
  - Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**ESTIMATE REFERENCE INFORMATION**

Item No.	Item Code	Description
1	2301-0685550	BRIDGE APPROACH PAVEMENT, AS PER PLAN Includes all items associated with the pay limits for bridge approach pavement as shown on Modified Road Plan BR-203, Modified Road Plan BR-211, and Modified Road Plan BR-231. See U sheets for details and tabulations.
2	2435-0250804	INTAKE, SW-508, TOP ONLY See Tab 104-5a on C sheets. See U sheets for location. Per note 1 of Standard SW-508, modify dimensions to match 6" sloped curb
3	2435-0254804	BARRIER INTAKE, SW-548, TOP ONLY See Tab. 104-5a on C Sheets. See U Sheets for locations.
4	2511-6745900	REMOVAL OF SIDEWALK See Tab. 110-5 on C Sheets. Item is for removing sidewalk along US 67 and Mississippi Blvd, to facilitate pier construction.
5	2511-7526004	SIDEWALK, P.C. CONCRETE, 4 IN. See Tab. 113-1 on C Sheets. Item is for replacing sidewalk along US 67 and Mississippi Blvd, removed due to pier construction.
6	2518-6910000	SAFETY CLOSURE Hazard closures for Pier and Abutment Construction, 16 piers on viaduct, 3 piers on Ramp B Bridge, 1 for I-74 WB mainline abutment, 2 for Ramp D abutment and 1 for Ramp B abutment, estimated at 220 LF per pier closure and 75 LF per abutment closure.
8	2523-0000200	ELECTRICAL CIRCUITS Roadway and Aesthetic Lighting (P Sheets): Bid to include 600 volt fuses at 5 amperes for luminaire supply (L-1 connectors) and 20 amperes for tap circuit protection (Y-1 connectors) located in the junction boxes or handholes. Included are 44 type L-1 connectors, 116 Y-1 connectors, 36 type Y-3 connectors, and 22 type L-2 connectors. Electrical circuit length is calculated from plan dimensions as the linear, one-way length of both new and existing embedded conduits. No allowance has been added to this quantity. Allowances have been added to all wire and cable quantities listed in Tab 108-12 on sheet P.2. Conduit shall not be included as part of this pay item, but paid for separately.
9	2523-0000310	HANDHOLES AND JUNCTION BOXES The following estimate reference information is for junction boxes called for in the lighting plans (P.sheets). Junction boxes shall be mounted on the surface of a structure or embedded in a structure as shown on the plans. The junction box shall be furnished with a cover, gasket, and hardware. Hardware furnished for the cover shall be stainless steel.  A grounding lug shall be provided in every junction box. A stainless steel conduit fitting shall be used to connect to a stainless steel junction box.  Junction box covers shall have a continuous formed, seamless, urethane, oil-resistant gasket. The gasket shall be placed directly onto the junction box cover. The gasket shall adhere to the cover without the use of adhesives. Junction box covers shall be attached to the box with un-slotted hex head screws. For boxes mounted on bridge structures, the cover shall be furnished with a retaining chain and captive screws.  All junction boxes to be sized according to LI-104 and shall be made of stainless steel, unless otherwise noted.  The stainless steel junction box shall be made of Type 304 stainless steel, not less than 14 gauge with all seams continuously welded with a stainless steel weld wire and ground smooth. Exterior surfaces shall have a smooth polished finish. The box shall be according to NEMA Type 4X and be UL 50 "Junction and Pull Box", "Junction Box", or "Pull Box."  The galvanized steel junction box shall be made of galvanized steel, NEMA Type 3R and be listed. It shall be hot-dip galvanized according to ASTM A 653 (A 653M).  When specified for attachment to a structure, the box shall be suitable for surface mounting, complete with external mounting lugs or brackets of similar material welded to the box. The box shall have an overlapping cover that is secured to the box with a continuous hinge, both of similar material to the junction box, and a minimum of four captive stainless steel clamps utilizing captive stainless steel hex-head bolts or deep slotted stainless steel screws.  When specified for embedment in structure, the box shall be constructed with the cover arranged to fit flush with the structure surface. The cover shall be attached with stainless steel unslotted hex-head screws.  Junction boxes which are located in the bridge concrete barrier railing are included in the cost of the bridge plans. The cost of the concrete inserts required to support the junction boxes suspended from the bridge deck are included with the cost of the bridge plans. The cost of the hanger rods and assemblies is incidental to the cost of the junction boxes.
10	2523-0000400	CONTROL CABINET Control cabinet per LI-152, of the size specified.
11	2528-8445110	TRAFFIC CONTROL See Tab. 108-23A on J Sheets.
14	2537-6746000	REMOVAL OF UNDERGROUND TANKS Assume 1 tank- 4 ft dia. X 8ft length at 8ft depth at Site # 2 on Sheet C.8.
15	2537-6911020	SAMPLING AND TESTING FOR PETROLEUM CONTAMINATION (WATER AND SOIL SAMPLES FOR REMOVAL OF UNDERGROUND TANKS) Assume 1 tank- 4 ft dia. X 8ft length at 8ft depth at Site # 2 on Sheet C.8, 3 each per tank.

**ESTIMATE REFERENCE INFORMATION**

Item No.	Item Code	Description
16	2537-8820900	WATER SAMPLING WELL Assume 1 tank- 4 ft dia. X 8ft length at 8ft depth at Site # 2 on Sheet C.8, 3 each per tank.
17	2599-9999005	AESTHETIC LIGHT, INSTALL ONLY (TYPE "LC") See P sheets for locations, details, and additional tabulations  DESCRIPTION This work shall consist of receiving, assembling, and installing a Aesthetic Luminaire as shown on the plans. The work includes but is not limited to required submittals, unloading, storing, and all other miscellaneous work required for complete installation. Included in this item is coordination with the Aesthetic Luminaire Supply Contractor for delivery and installation requirements. All work shall conform to Section 2523 of the Standard Specifications, except as specified in the Special Provisions.  CONSTRUCTION Refer to the Special Provisions for LIGHTING.  MATERIALS Refer to the Special Provisions for LIGHTING.  METHOD OF MEASUREMENT The Aesthetic Luminaire will be measured by the unit "Each", complete. All related apparatus shall be included.  BASIS OF PAYMENT This work will be paid for at the contract unit price per each for AESTHETIC LIGHT, INSTALL ONLY (TYPE "LC"), which price shall include all material, hardware, storage, and labor required for complete installation of the Aesthetic Luminaires, as shown on the contract plans and as specified herein.
18	2599-9999005	AESTHETIC LIGHT, INSTALL ONLY (TYPE "LD") See P sheets for locations, details, and additional tabulations  DESCRIPTION This work shall consist of receiving, assembling, and installing a Aesthetic Luminaire as shown on the plans. The work includes but is not limited to required submittals, unloading, storing, and all other miscellaneous work required for complete installation. Included in this item is coordination with the Aesthetic Luminaire Supply Contractor for delivery and installation requirements. All work shall conform to Section 2523 of the Standard Specifications, except as specified in the Special Provisions.  CONSTRUCTION Refer to the Special Provisions for LIGHTING.  MATERIALS Refer to the Special Provisions for LIGHTING.  METHOD OF MEASUREMENT The Aesthetic Luminaire will be measured by the unit "Each", complete. All related apparatus shall be included.  BASIS OF PAYMENT This work will be paid for at the contract unit price per each for AESTHETIC LIGHT, INSTALL ONLY (TYPE "LD"), which price shall include all material, hardware, storage, and labor required for complete installation of the Aesthetic Luminaires, as shown on the contract plans and as specified herein.
19	2599-9999005	AESTHETIC LIGHT, INSTALL ONLY (TYPE "LE") See P sheets for locations, details, and additional tabulations  DESCRIPTION This work shall consist of receiving, assembling, and installing a Aesthetic Luminaire as shown on the plans. The work includes but is not limited to required submittals, unloading, storing, and all other miscellaneous work required for complete installation. Included in this item is coordination with the Aesthetic Luminaire Supply Contractor for delivery and installation requirements. All work shall conform to Section 2523 of the Standard Specifications, except as specified in the Special Provisions.  CONSTRUCTION Refer to the Special Provisions for LIGHTING.  MATERIALS Refer to the Special Provisions for LIGHTING.  METHOD OF MEASUREMENT The Aesthetic Luminaire will be measured by the unit "Each", complete. All related apparatus shall be included.  BASIS OF PAYMENT This work will be paid for at the contract unit price per each for AESTHETIC LIGHT, INSTALL ONLY (TYPE "LE"), which price shall include all material, hardware, storage, and labor required for complete installation of the Aesthetic Luminaires, as shown on the contract plans and as specified herein.

## GENERAL NOTES

1. THE CONTRACTOR'S BID SHALL INCLUDE ALL LABOR, EQUIPMENT, AND MATERIAL NECESSARY TO PROVIDE A COMPLETE AND FUNCTIONAL ITS INSTALLATION IN CONFORMANCE WITH THE PLANS AND SPECIFICATIONS.
2. THE PLAN LOCATIONS OF UNDERGROUND UTILITIES, WHEN SHOWN, ARE APPROXIMATE ONLY. IN ADDITION, A PORTION OF UTILITY INFORMATION MAY NOT HAVE BEEN PROVIDED. ALL UTILITIES SHALL BE LOCATED AND MARKED PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING UTILITIES AND LOCATOR SERVICES AND SCHEDULING THE LOCATION OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL ALSO CONTACT ANY AND ALL UTILITIES AND LOCAL GOVERNMENT AGENCIES NOT PARTICIPATING IN LOCATION SERVICES.
3. PROPOSED ITS EQUIPMENT LOCATIONS ARE APPROXIMATE AND MAY REQUIRE MODIFICATION TO AVOID CONFLICTS WITH UNDERGROUND UTILITIES OR OTHER OBSTRUCTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ANY CONFLICTS WITH EXISTING UTILITIES AT SITES IN THE FIELD PRIOR TO INITIATION OF CONSTRUCTION AT THAT SITE. AS THE CCTV AND SENSOR LOCATIONS ARE LOCATION SENSITIVE, THE CONTRACTOR SHALL RECEIVE WRITTEN APPROVAL FROM THE ENGINEER PRIOR TO REVISING THE PLAN LOCATION OF ANY CONDUIT, POLES, FOUNDATIONS, OR CABINETS.
4. ABOVE GROUND RISERS SHALL BE RIGID STEEL CONDUIT. ALL OTHER CONDUIT SHALL BE HDPE CONDUIT, RIGID P.V.C. CONDUIT (SCHEDULE 40 OR AS APPROVED) MAY BE SUBSTITUTED FOR CONDUIT RUNS UNDER 50 FEET.
5. ANY AND ALL IMPROVEMENTS SUCH AS ASPHALT OR CONCRETE PAVEMENTS, CURBS, GUTTERS, WALKS, DRAINAGE DITCHES, CULVERTS, DRAIN TILES, EMBANKMENTS, SHRUBS, TREES, GRASS, SOD, ETC., IF DAMAGED, SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITIONS (OR BETTER) AS DIRECTED BY THE ENGINEER.
6. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR EXISTING CONDUIT, CONDUCTORS, OR OTHER FACILITIES DAMAGED DURING CONSTRUCTION. ALL EXISTING INFRASTRUCTURE REMOVED OR DAMAGED BY THE CONTRACTOR SHALL BE REPLACED IN KIND BY THE CONTRACTOR, WITH NO ADDITIONAL COMPENSATION.
7. THE CONTRACTOR SHALL NOT DISTURB ANY EXISTING UTILITIES EXCEPT AS SPECIFICALLY DEFINED WITHIN THE SCOPE OF WORK FOR THIS CONTRACT. WHERE WORK AFFECTS OR IS AFFECTED BY THE EXISTING UTILITIES, THE WORK SHALL BE COORDINATED WITH THE UTILITY COMPANY AND/OR OWNER. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE DOT.
8. UTILITY COMPANIES WHOSE FACILITIES ARE SHOWN ON THE PLANS OR KNOWN TO BE WITHIN THE CONSTRUCTION LIMITS SHALL BE NOTIFIED BY THE CONTRACTOR OF THE STARTING CONSTRUCTION DATE.
10. ALL CONDUIT SHALL BE PLACED AT A 48 INCH MINIMUM COVER UNLESS OTHERWISE SPECIFIED ON THE PLANS.
11. THE CONTRACTOR SHALL BORE UNDER ANY EXISTING ASPHALT OR CONCRETE PAVEMENT, RAILROAD, OR OTHER STRUCTURE.
12. THE CONTRACTOR SHALL PLOW ALL CONDUIT WHERE EXISTING CONDITIONS ALLOW UNLESS OTHERWISE SPECIFIED ON THE PLANS. THE CONTRACTOR MAY BORE IN LIEU OF PLOWING AT THE CONTRACTOR'S EXPENSE.
13. THE MINIMUM BENDING RADIUS OF CONDUIT AND MULTIDUCT SYSTEMS SHALL BE THE LARGER OF THE FIBER OPTIC CABLE MANUFACTURER'S RECOMMENDATION OR NATIONAL ELECTRIC CODE (NEC) REQUIREMENTS. ALL CONDUIT SWEEP RADIUS SHALL BE GREATER AND/OR EQUAL TO 15 INCHES.
14. ALL WIRING AND GROUNDING SYSTEMS SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE.
15. THIS PROJECT DOES NOT INCLUDE PURCHASING, OR INSTALLTION OF, ANY CAMERA OR SENSOR EQUIPMENT.

## GENERAL NOTES

16. LINEAR MEASUREMENTS ARE TAKEN BETWEEN POLE BASE, HANDHOLE, AND JUNCTION BOX CENTERS AND DO NOT INCLUDE ALLOWANCES FOR VERTICAL RISES OR SPLICES.
17. MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF ALL APPLICABLE SECTIONS INCLUDING BUT NOT LIMITED TO SECTION 2523 AND 2525 OF THE "IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, SERIES 2015" PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS.
18. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ANTICIPATE, COMMUNICATE, AND COORDINATE THIS WORK WITH ADJACENT CONSTRUCTION PROJECTS THAT INCLUDE BUT ARE NOT LIMITED TO ADJACENT APPROACH BRIDGE, VIADUCT, AND ROADWAY PROJECTS.
19. ITS ELECTRICAL CIRCUITS IN PROJECT IM-NHS-074-(I197)5--03-82 (APPROACH BRIDGES) AND PROJECT IM-NHS-074-(I200)5--03-82 (EB VIADUCT) ARE SERVICED BY THE PROPOSED POINT OF SERVICE ON LADY LUCK PKWY LOCATED WITHIN THE PROJECT IM-NHS-074-(I199)5--03-82 LIMITS. THE PROJECT IM-NHS-074-(I199)5--03-82 CONTRACTOR SHALL NOTIFY THE PROJECT IM-NHS-074-(I197)5--03-82 CONTRACTOR AND THE PROJECT IM-NHS-074-(I200)5--03-82 CONTRACTOR WHEN THE POINT OF SERVICE IS ACCESSIBLE THROUGH THE WB VIADUCT ITS INFRASTRUCTURE.
20. CONTRACTOR SHALL FURNISH AND INSTALL CONDUIT EXPANSION FITTINGS AT A MINIMUM OF EVERY 300 FEET AND AT EVERY JUNCTION BOX IN THE PVC COATED RIGID GALVANIZED STEEL CONDUIT SPECIFIED IN THE HANGER SYSTEM FOR THIS PROJECT.
21. CONTRACTOR SHALL FURNISH AND INSTALL AT LEAST ONE EXPANSION FITTING PER VERTICAL CONDUIT RUN.
22. GALVANIZED HINGED EXTENSION SPLIT CONDUIT CLAMPS SHALL BE USED TO SECURE AND SUPPORT CONDUIT ATTACHED TO PIERS. CONDUIT SHALL BE SECURED AND SUPPORTED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE. COST OF CONDUIT CLAMPS IS INCLUDED IN THE COST OF THE CONDUIT.
23. ALL MECHANICAL CONCRETE ANCHORS OR MECHANICAL INSERTS FOR PIERS SHALL CONFORM TO MATERIALS IM 453.09. ALL COMPONENTS OF THE ATTACHMENT ASSEMBLIES TO CONCRETE SHALL BE HOT DIP OR MECHANICALLY GALVANIZED STEEL ONLY. ELECTRODEPOSITED ZINC COATING WILL NOT BE ALLOWED. ALL CONCRETE ANCHORS SHALL BE POST-INSTALLED MECHANICAL CONCRETE ANCHORS OR CAST-IN-PLACE INSERTS. CONTRACTOR SHALL AVOID ALL REINFORCING WHEN DRILLING HOLES FOR CONCRETE ANCHORS. COST OF CONCRETE ANCHORS FOR PIERS IS INCLUDED IN THE COST OF PIER CONCRETE.
24. CONCRETE INSERTS, HANGER RODS, AND ALL HANGER SYSTEM HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. SEE P SHEETS FOR ADDITIONAL INFORMATION REGARDING THE INSERT AND HANGER SYSTEM.
25. FIELD WELDING OF ITS ATTACHMENTS TO THE VIADUCT STRUCTURE IS NOT ALLOWED.
26. POWER IS PROVIDED BY MIDAMERICAN ENERGY AND DESIGN REQUIRES 480 VOLT SERVICE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAKE THE NECESSARY CONTRACTS WITH UTILITY COMPANY WITH REGARD TO CONNECTIONS TO THE SERVICE DROP.

## ITS LEGEND

### INFRASTRUCTURE

---	PLOWED CONDUIT
---	BORED CONDUIT
	FIBER TERMINATION CABINET
	CABINET
	STEP DOWN TRANSFORMER
	HANDHOLE (COMM)
	HANDHOLE (POWER)
	JUNCTION BOX (COMM)
	JUNCTION BOX (POWER)
	45 FOOT ITS POLE
	POWER SOURCE
	METER PEDESTAL

### DEVICES\*

	MOTOR VEHICLE DETECTOR SENSOR (MVDS)
	ITS CLOSED CIRCUIT TELEVISION CAMERA (CCTV)
	NON-ITS CLOSED CIRCUIT TELEVISION CAMERA (SSTV)

\*SEE NOTE 15.

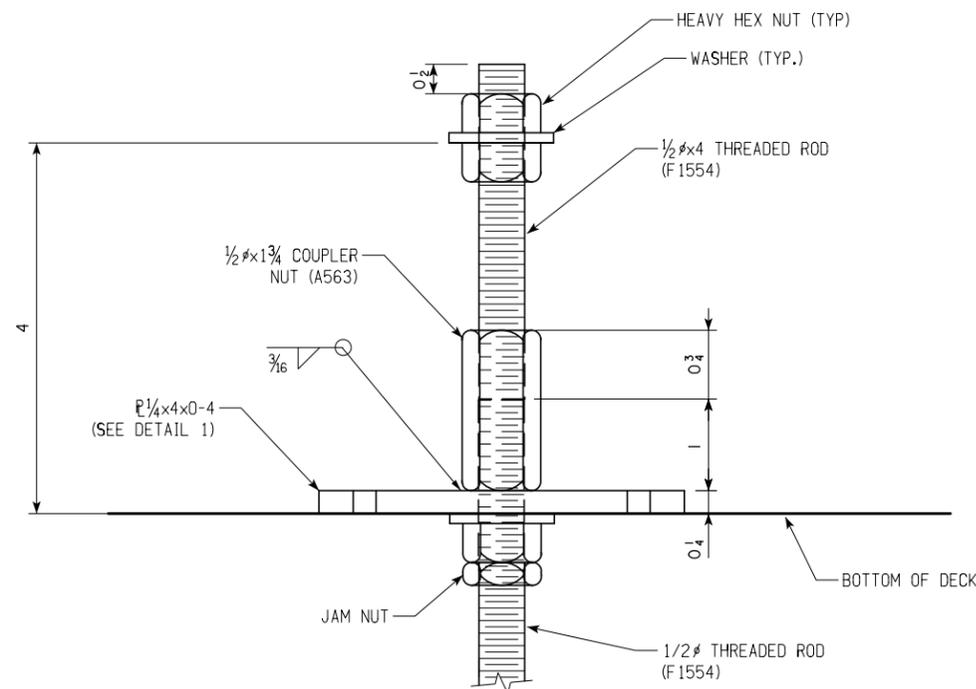
## ITS GENERAL NOTES

### ROADWAY LIGHTING GENERAL NOTES

- A. ALL ELECTRICAL WORK SHALL CONFORM TO NATIONAL, STATE, AND LOCAL CODES.
- B. IT IS THE INTENT OF THESE PLANS AND SPECIFICATIONS TO PROVIDE A COMPLETE AND PROPERLY OPERATING ELECTRICAL LIGHTING SYSTEM. THE EQUIPMENT SHALL BE FURNISHED AS SPECIFIED AND SHALL INCLUDE ALL INCIDENTAL ITEMS NECESSARY TO PROVIDE A COMPLETE WORKING SYSTEM. INCIDENTAL ITEMS SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING ITEMS: ANCHORAGES, MOUNTING HARDWARE, CONNECTORS, LUGS, FUSES, ETC.
- C. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS, QUANTITIES, AND TYPE OF UTILITIES IN AREAS TO BE EXCAVATED PRIOR TO THE COMMENCEMENT OF ANY WORK AND SHALL HAND EXCAVATE AS REQUIRED IN ORDER TO NOT INTERRUPT ANY EXISTING SERVICES. IF, IN PERFORMING WORK, DAMAGE TO EXISTING UTILITIES OCCURS, THE CONTRACTOR SHALL NOTIFY UTILITY IMMEDIATELY AND PAY ANY COST INCURRED FOR REPAIR OR REPLACEMENT.
- D. ELECTRICAL EQUIPMENT, RACEWAY, ETC. ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. CONTRACTOR SHALL INSTALL ELECTRICAL EQUIPMENT, RACEWAYS, ETC. WHERE DIRECTED BY THE ENGINEER IN ORDER TO BEST SUIT JOB CONDITIONS.
- E. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING STATE OWNED LIGHTING AND/OR TRAFFIC SIGNAL UTILITIES WITHIN THE PROJECT LIMITS.
- F. ALL REPLACEMENT AND TEMPORARY WIRING SHALL BE EQUAL TO OR GREATER THAN THE EXISTING WIRE GAUGE. ALL PERMANENTLY INSTALLED CURRENT CARRYING CONDUCTORS SHALL BE TYPE RHW.
- G. NO SPLICING OF EXISTING-TO-NEW WIRING IS ALLOWED INSIDE ELECTRICAL DUCTS. ALL WIRING INTERCONNECTIONS SHALL BE INSTALLED IN ACCESSIBLE AREAS AND SHALL BE MADE WITH IOWA DOT APPROVED CONNECTORS.

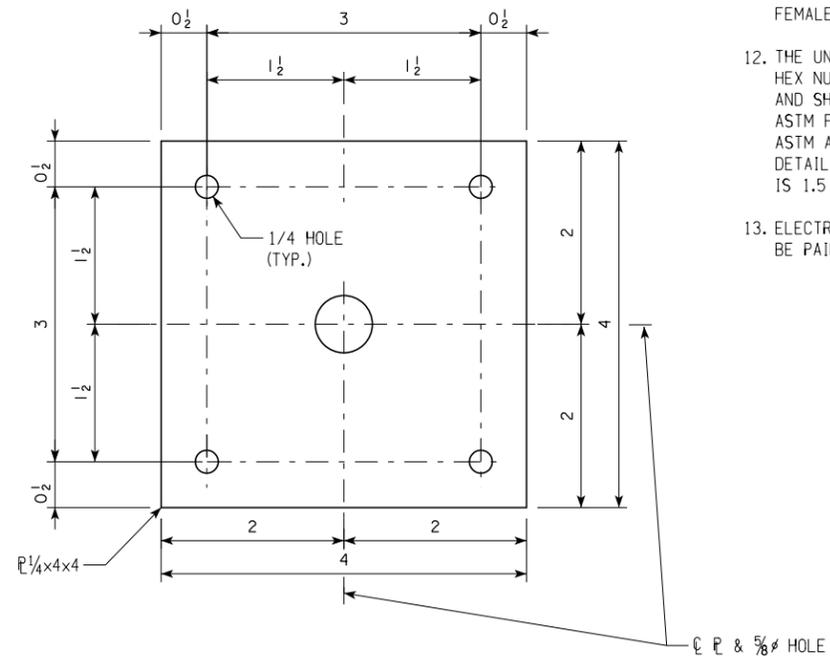
### ELECTRICAL PLAN NOTES

- 1. STATE LIGHTS INSTALLED ON BRIDGE PARAPETS/RETAINING WALLS/BARRIER WALLS: INSTALL PROPOSED LIGHT POLE, MAST ARM AND LUMINAIRE. LIGHT POLE SHALL BE MOUNTED ON BRIDGE PARAPET/RETAINING WALL/BARRIER WALL AS PER THE DETAIL ON SHEET P.29. ASSOCIATED EMBEDDED JUNCTION BOX NOT SHOWN FOR CLARITY.
- 2. UNDERDECK LIGHTING: INSTALL PROPOSED UNDERDECK LIGHTING PER DETAIL SHOWN ON SHEET P.30. THE JUNCTION BOX ATTACHED BEHIND THE UNDERDECK LIGHT IS NOT SHOWN IN PLAN VIEW FOR CLARITY. THE UNDERDECK LIGHT SHALL BE INSTALLED WITH A 0° TILT ANGLE.
- 3. INSTALL PROPOSED CONTROL CABINET (PAD MOUNTED) AND FOUNDATION PER LI-152.
- 4. INSTALL PRECAST HANDHOLE, TYPE 1, PER LI-103.
- 5. INSTALL EMBEDDED RISER IN PIER PER DETAIL. PIER RISER DETAILS ARE SHOWN ON LIGHTING SHEETS P.23 AND P.28.
- 6. CONDUIT SHALL BE CAPPED AND SEALED FOR FUTURE CONNECTION.
- 7. INSTALL EMBEDDED JUNCTION BOX FOR FUTURE UNDERDECK LIGHTING. SEE STRUCTURAL PLANS.
- 8. PULL CIRCUIT TO END LOCATION. INSTALL FEMALE PORTION ONLY OF L-2 CONNECTOR. TAPE AND SEAL FOR FUTURE CONNECTION.
- 9. EMBEDDED CONDUIT SHALL BE INCIDENTAL TO EITHER CONCRETE BARRIER RAILING OR STRUCTURAL CONCRETE (BRIDGE) OR HIGH PERFORMANCE STRUCTURAL CONCRETE OR HIGH PERFORMANCE SELF CONSOLIDATING CONCRETE (HP-SCC). SEE STRUCTURAL PLANS. CABLE SHALL BE PAID FOR AS PART OF "ELECTRICAL CIRCUITS", WITH THE DIVISION AS NOTED.
- 10. JUNCTION BOXES EMBEDDED IN THE CONCRETE BARRIER RAIL SHALL BE INCIDENTAL TO CONCRETE BARRIER RAILING. SEE STRUCTURAL PLANS.
- 11. INSTALL MALE CONNECTORS ON PROPOSED CONDUCTORS AND CONNECT TO EXISTING FEMALE CONNECTORS ON THE EXISTING CONDUCTORS.
- 12. THE UNIVERSAL CONCRETE INSERT AND ALL COMPONENTS INCLUDING THE THREADED ROD, HEX NUTS, JAM NUTS, WASHERS AND STEEL PLATES SHALL BE HOT-DIPPED GALVANIZED AND SHALL COMPLY WITH ASTM F 2329. THREADED RODS SHALL COMPLY WITH ASTM F1224. HEAVY HEX NUTS, JAM NUTS AND COUPLER SHALL COMPLY WITH ASTM A 563 GRADE A. WASHERS SHALL COMPLY WITH ASTM F436. SEE CONCRETE INSERT DETAIL, THIS SHEET FOR DETAILS. THE ALLOWABLE LOAD (AS DEFINED IN I.M. 453.09) IS 1.5 KIPS.
- 13. ELECTRICAL CIRCUIT HERE SHALL BE PAID FOR UNDER DIVISION 2. THE CONDUIT SHALL BE PAID FOR UNDER DIVISION 1.



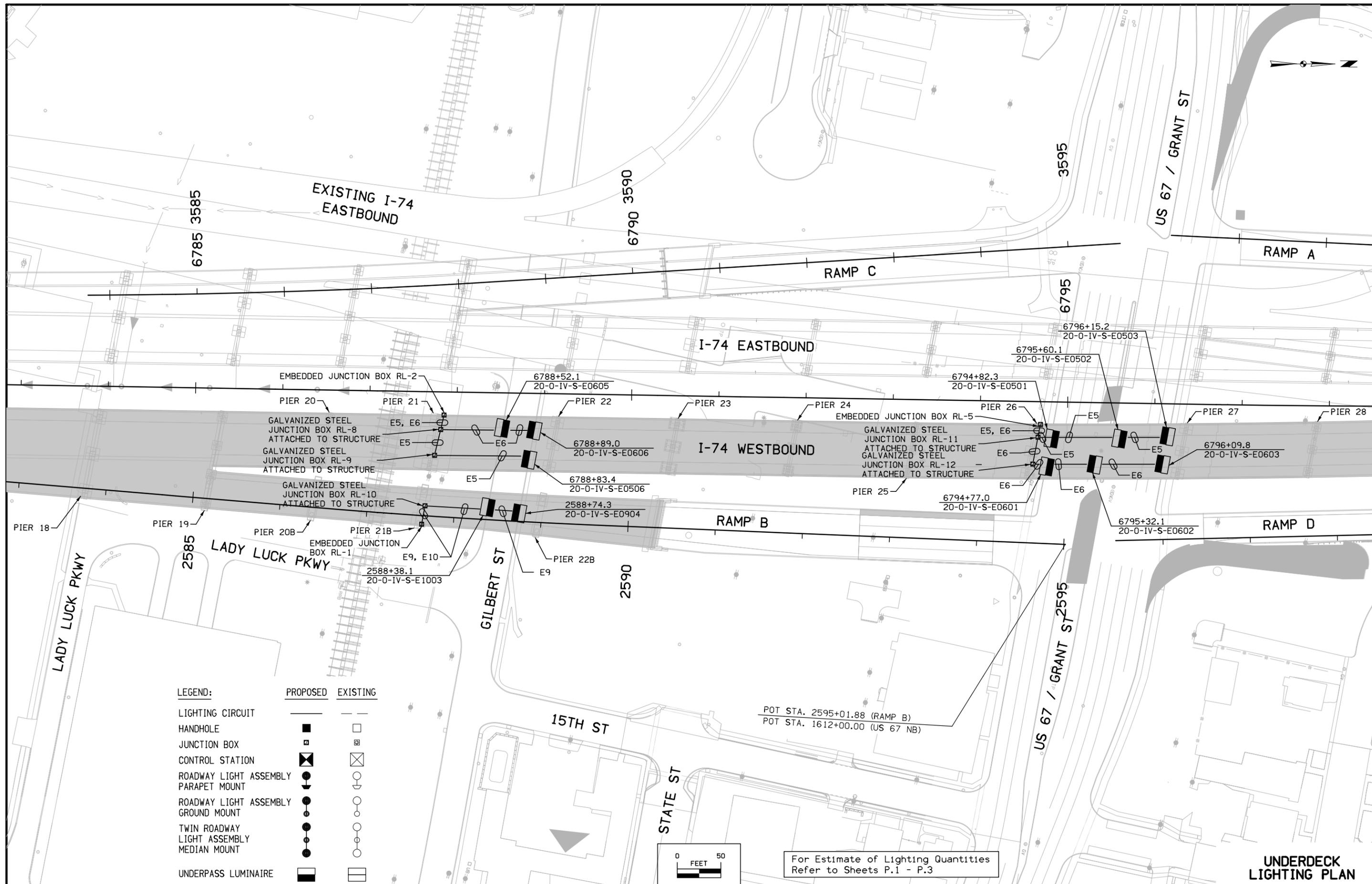
**UNIVERSAL CONCRETE INSERT DETAIL**

NOTE: PLANS MAY SHOW A DIFFERENT DEPICTION OF THE UNIVERSAL CONCRETE INSERT



**DETAIL 1**

### LIGHTING GENERAL & PLAN NOTES

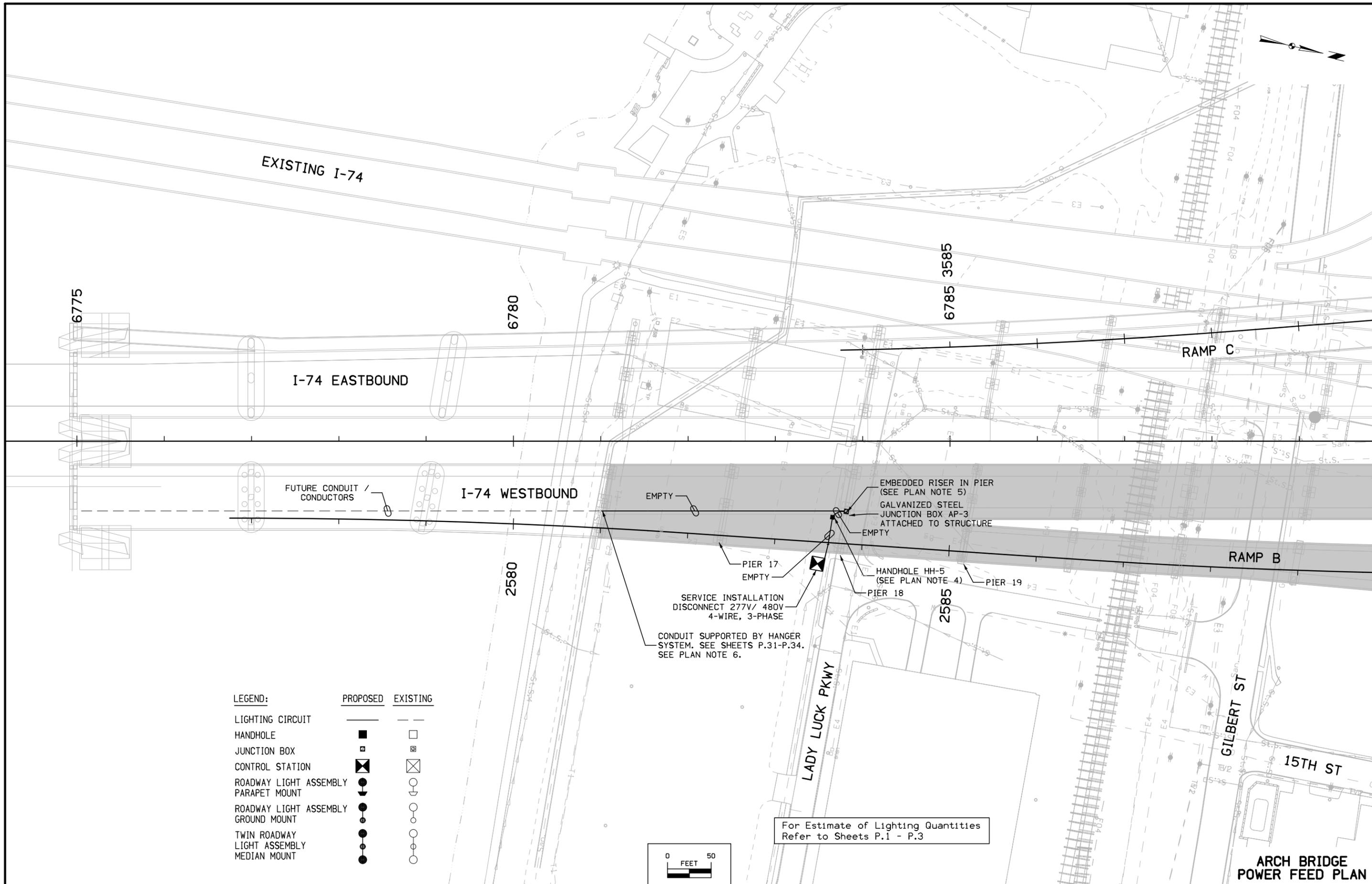


LEGEND:

	PROPOSED	EXISTING
LIGHTING CIRCUIT	—	—
HANDHOLE	■	□
JUNCTION BOX	■	□
CONTROL STATION	⊠	⊠
ROADWAY LIGHT ASSEMBLY PARAPET MOUNT	●	○
ROADWAY LIGHT ASSEMBLY GROUND MOUNT	●	○
TWIN ROADWAY LIGHT ASSEMBLY MEDIAN MOUNT	●	○
UNDERPASS LUMINAIRE	■	□

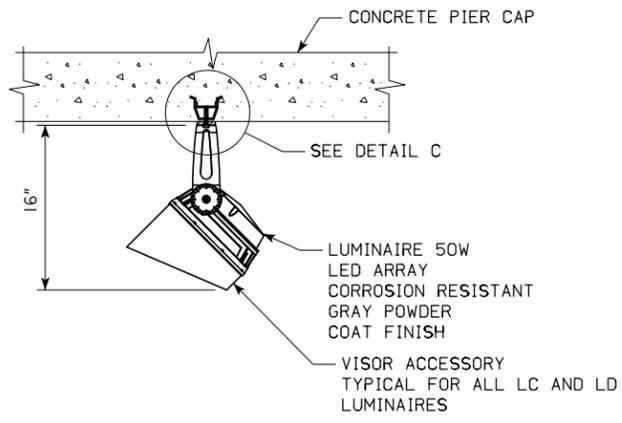
For Estimate of Lighting Quantities  
Refer to Sheets P.1 - P.3

**UNDERDECK  
LIGHTING PLAN**

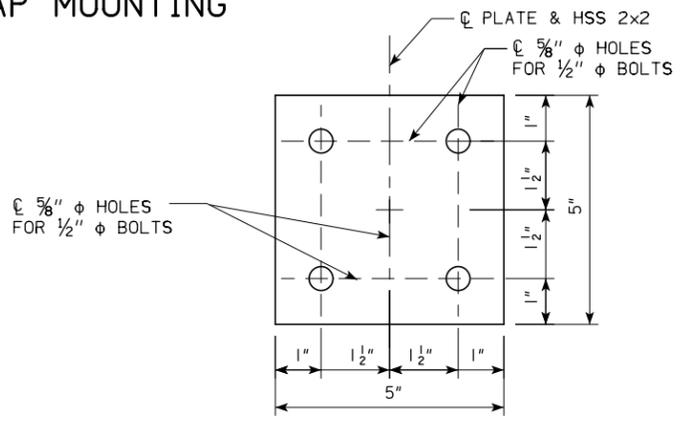


**ARCH BRIDGE POWER FEED PLAN**

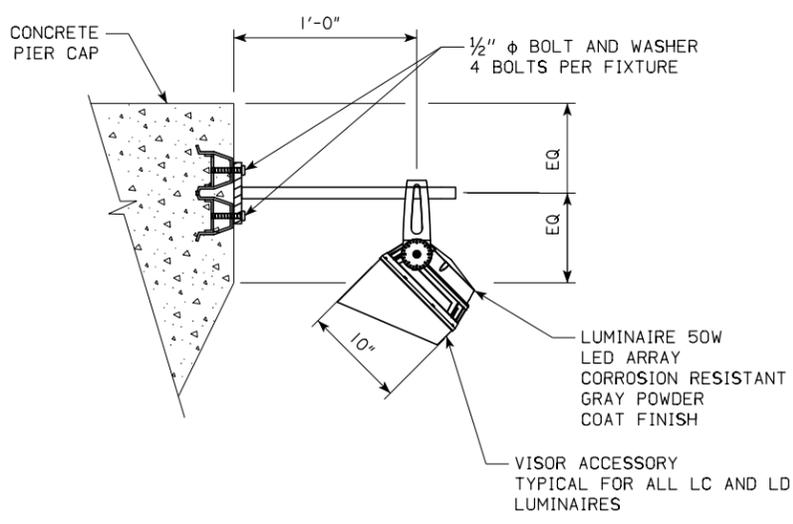
Changed by Addenda



**DETAIL B**  
RIVER PIER CAP MOUNTING

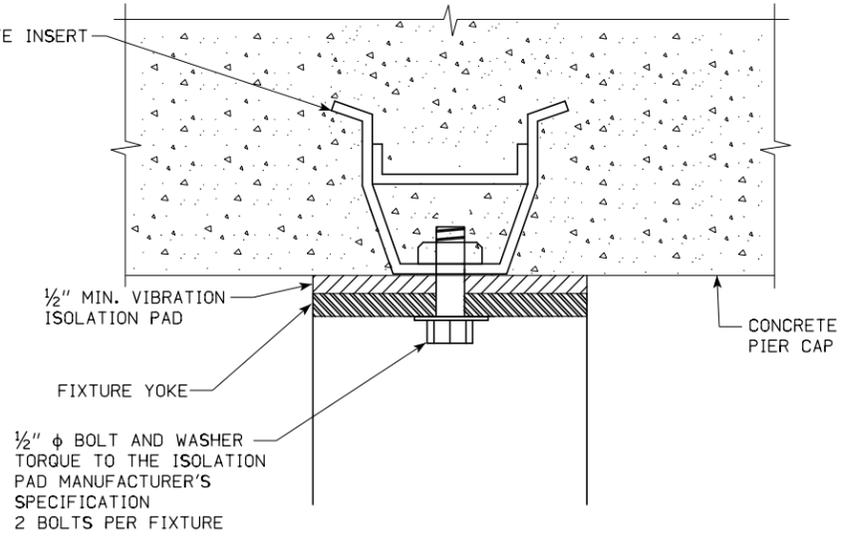


**BASE PLATE DETAIL**

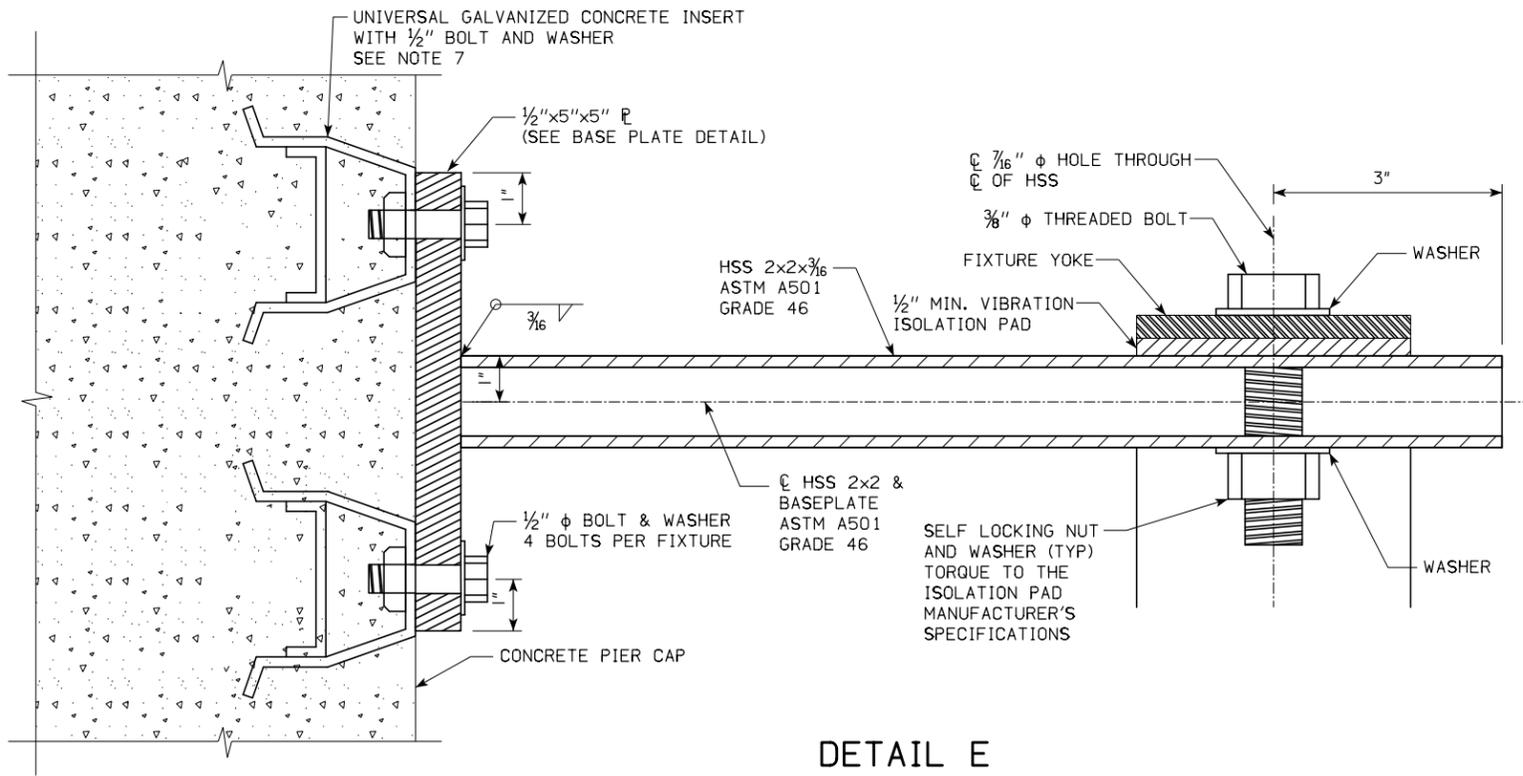


**DETAIL D**  
RIVER PIER CAP OUTER MOUNTING  
FOR FIXTURE ATTACHMENT, SEE DETAIL E

UNIVERSAL GALVANIZED CONCRETE INSERT WITH 1/2"  $\phi$  BOLT AND WASHER SEE NOTE 7



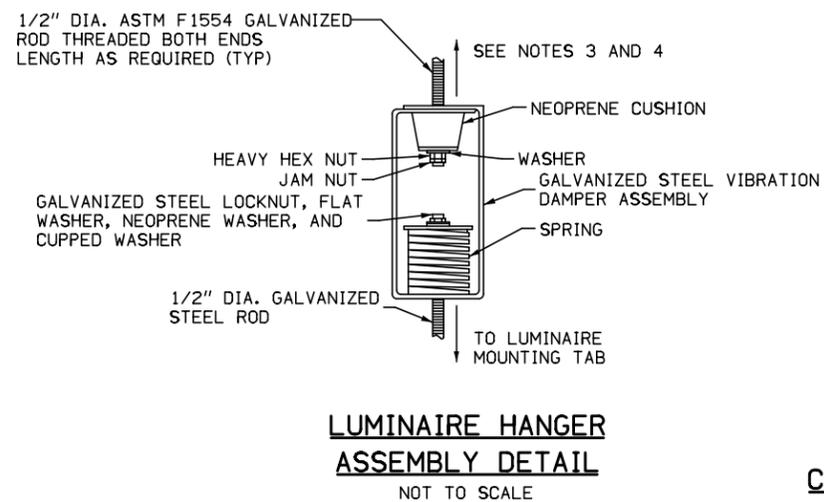
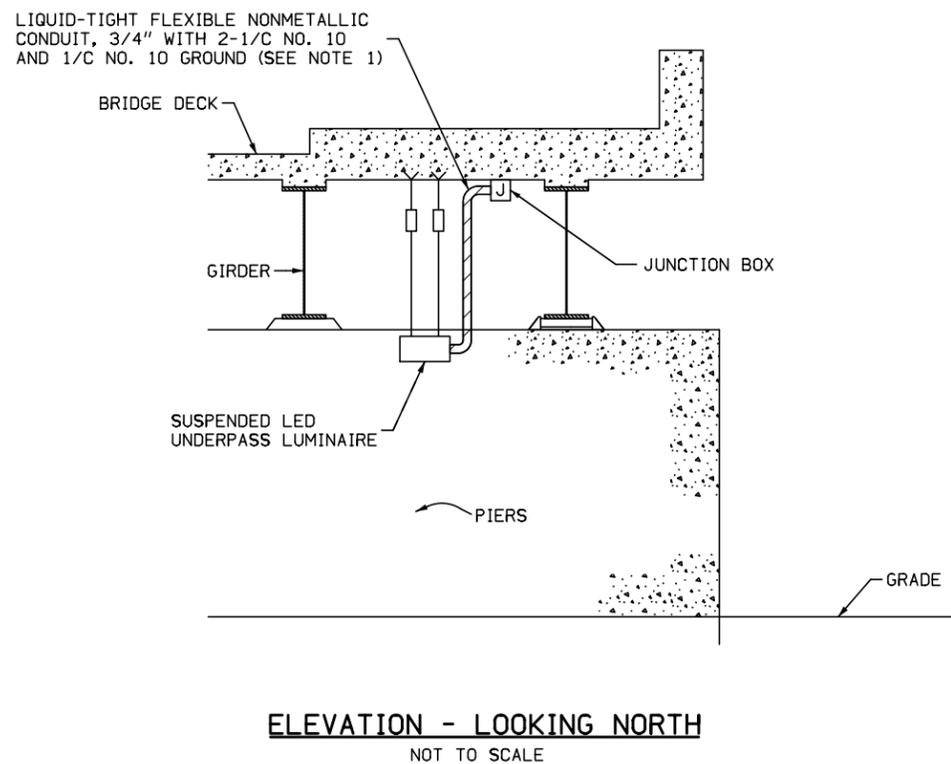
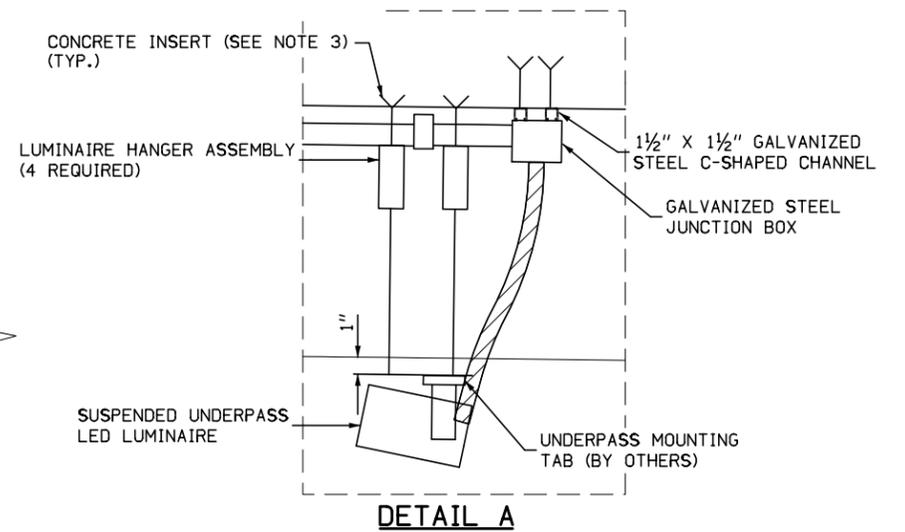
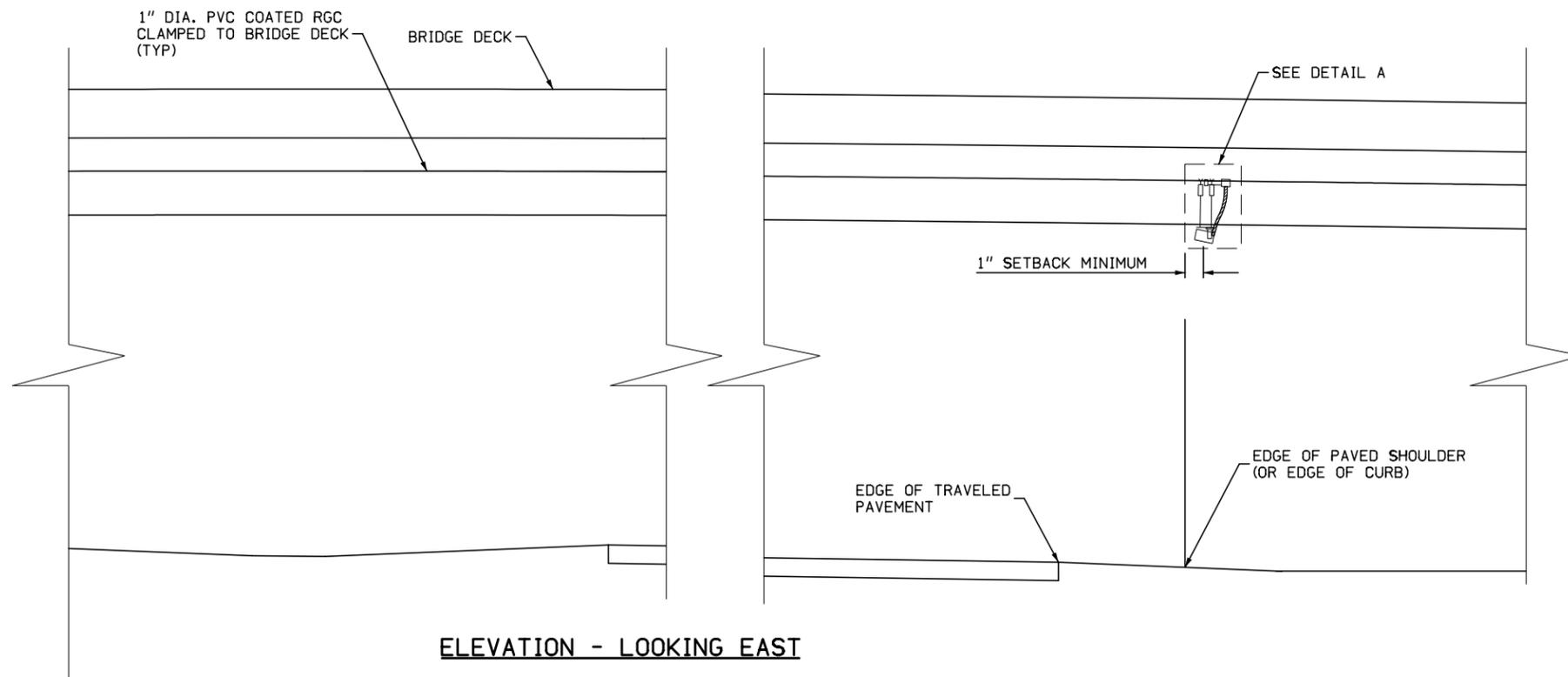
**DETAIL C**  
RIVER PIER CAP FIXTURE ATTACHMENT



**DETAIL E**  
RIVER PIER CAP OUTER FIXTURE ATTACHMENT

**NOTES:**

1. SEE SHEET NUMBER P.18 AESTHETIC LIGHTING RIVER PIERS 17-18 ELEVATION AND PLAN FOR FIXTURE LOCATIONS AND AIMING INFORMATION.
2. AESTHETIC LUMINAIRE AND ISOLATION PAD SHALL BE SUPPLIED BY OTHERS. SEE SPECIAL PROVISION FOR "AESTHETIC LIGHT, INSTALL ONLY".
3. BRACKET ASSEMBLIES SHALL BE GALVANIZED STEEL, WITH A NATURAL (NO PAINT) FINISH.
4. SUBMIT SHOP DRAWINGS FOR LUMINAIRE BRACKET ASSEMBLIES.
5. BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE TO ASTM A 307. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM F2329.
6. ALL STRUCTURAL STEEL, EXCEPT AS NOTED, SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND CONFORM TO ASTM A709 GRADE 36.
7. UNIVERSAL CONCRETE INSERTS SHALL BE PER PLAN NOTE 12 AND DETAIL ON SHEET P.4.
8. ALL COMPONENTS OF THE ATTACHMENT ASSEMBLIES TO CONCRETE SHALL BE HOT-DIP OR MECHANICALLY GALVANIZED STEEL ONLY. ELECTRODEPOSITED ZINC COATING WILL NOT BE ALLOWED.
9. COST OF CONCRETE UNIVERSAL INSERT IS INCLUDED IN THE COST OF STRUCTURAL CONCRETE (BRIDGE).



**PVC COATED CONDUIT BEAM CLAMP**  
NOT TO SCALE

**NOTES:**

1. LIQUID TIGHT FLEXIBLE NONMETALLIC CONDUIT, MAXIMUM LENGTH 6'-0", TYPICAL FOR EACH INSTANCE AS SHOWN. PROVIDE PVC COATED RIGID GALVANIZED STEEL CONDUIT AS REQUIRED NOT TO EXCEED 6'-0" OF FLEXIBLE LIQUID TIGHT NONMETALLIC CONDUIT. LIQUID TIGHT FLEXIBLE NONMETALLIC CONDUIT AND CABLING WILL BE INCLUDED IN THE COST OF THE UNDERPASS LUMINAIRE IT CONNECTS TO.
2. CABLING SHALL BE 2-1/C NO. 10 WITH 1/C NO. 10 GROUND IF ADJACENT LUMINAIRE IS FINAL LUMINAIRE IN SERIES. SEE PLANS FOR CABLING REQUIREMENTS.
3. FOR CONCRETE INSERTS AND HARDWARE, SEE ELECTRICAL PLAN NOTES AND DETAILS ON SHEET P.04.
4. THE THREADED RODS, WASHERS, HEAVY HEX NUTS, JAM NUTS SHALL BE INCLUDED IN THE COST OF THE "UNDERDECK LIGHTING, INSTALL ONLY."
5. ALL ITEMS MOUNTED TO CONCRETE BRIDGE DECK SHALL BE OFFSET FROM THE STRUCTURE USING GALVANIZED STEEL C-SHAPED CHANNEL.

**UNDERDECK LIGHTING DETAIL**