

# New Jersey Turnpike Authority

P.O. Box 5042, Woodbridge, NJ 07095



January 9, 2024

## Document Change Announcement

### *2016 Standard Supplementary Specifications*

### *Electrical Qualification Criteria Updates*

**DCA2024SS-01**

#### **Subject: Revisions to**

Section 601 Common Electrical Provisions, Subsection 601.01 Description

Section 602 Power Distribution, Subsection 602.01 Description

Section 603 Lighting, Subsection 603.01 Description

Section 918 Electrical Materials, Subsection 918.01 General

#### **Description of Change:**

This DCA contains miscellaneous electrical updates and is released in conjunction with DCAs for the Design Manual and Standard Drawings. The changes to the Standard Supplementary Specifications clarify direction for wire/cable splicing and color-coding methods, and add qualification criteria for Splice Kits, Standard Luminaire Types, and Load Center Power Monitoring Unit (PMU). Material requirements for junction boxes, wire and cable, and miscellaneous equipment is clarified.

#### **Notice to New Jersey Turnpike Authority Staff and Design Consultants**

Effective immediately, all contracts currently in the design phase shall incorporate the revisions herein. For advertised contracts awaiting the opening of bids this revision shall be incorporated via addendum. Contact your New Jersey Turnpike Authority Project Manager for instruction.

The revisions may be accessed on the Authority's webpage: <https://www.njta.com/doing-business/professional-services>

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**NOTE: All text herein are REVISIONS, as indicated by the tracked changes, to the latest version of the 2016 Standard Supplementary Specifications.**

## SECTION 601 – COMMON ELECTRICAL PROVISIONS

### 601.02 Materials

~~The following is removed~~Remove the following: from the list:

~~Materials and equipment shall conform to Section 601 and to the following Subsections:~~

JUNCTION BOX FRAMES AND COVERS ..... ~~909.04~~; 918.17

~~The following is added~~Add the following: to the list:

~~Materials and equipment shall conform to Section 601 and to the following Subsections:~~

ARC FLASH STUDY ..... 918.20(I)

ANTI-SEIZE COMPOUND ..... 918.60

PRECAST REINFORCED CONCRETE JUNCTION BOX ..... 918.61

WIRE LABELS ..... 918.65

Replace the last paragraph with the following:

Portland cement concrete in boxes, bases, manholes, and foundations shall be Class B, meeting the requirements of Section 401.

### 602.03 Power

#### (E) Power Cables

Replace the second paragraph with the following:

All cable splicing for temporary and permanent facilities, shall be made by means of new ~~resin-encapsulated splice cable connector~~ kits All underground splices and splices that may be submerged shall be made by new resin-encapsulated splice kits. The Contractor shall only splice cables in pole bases, junction boxes, manholes, and designated electrical cabinets. The Contractor shall minimize the quantity of splices to the greatest extent as practical and may not be for The Contractor's convenience. Installation of resin splice kits shall conform to the manufacturer's installation instructions and as per the Authority's standard drawings. All above-ground cable connector kits, upon completion of installation, shall be wrapped with several layers of half-lapped jacket tape to insure positive water and -moisture ~~resistant proof and submersible type~~ connections.

In the 3<sup>rd</sup> paragraph, remove the word "test" from the first sentence.

Replace the 4<sup>th</sup> paragraph with the following:

Cables and wires provided in total Contract quantities over 500 feet shall be 100% impregnated solid factory color coded. For cables with quantities of 500 linear feet or greater, the method of factory color coding must be accomplished. No deviation from factory color coding requirements regarding manufacturer or material specifications will be permitted.

For cable provided in total Contract quantities less than 500 feet, use of heat shrink wrap application may be accepted for all phase conductors. Heat shrink wrap application may be accepted for neutral or ground conductors sized #4 AWG and larger. For these installations if the contractor wishes to use heat shrink wrapping:

- The contractor shall provide a list of each area, including start and end points as well as total length of run indicating total quantity is less than 500', for each section they are looking to use heat shrink wrapping. The designer will confirm or reject each run based upon review of this submission.



- Where approved, color heat shrink shall be accomplished such that all exposed conductors in all junction boxes shall be continuously identified by color within junction boxes, cabinets, etc. using heat shrink made from cross linked materials, flexible, flame retardant UV resistant, operating temperature of -67 degrees Fahrenheit to 275 degrees Fahrenheit, shrink temperature of 194 degrees Fahrenheit, flammability rating of Class 1 Self-extinguishing ASTM D2671 Procedure B Class 2 N/A, flued resistance per AMS-DTL-23053 1000 psi min tensile ASTM D638 400 V/mil min. ASTM D2671, and dielectric strength 500 V/MIL. (19.7 KV/mm) min. ASTM D2671. The color-coding heat shrink shall be installed for the entire length of cable from entry conduit to exit conduit, including all slack. The heat shrink shall be applied so as not to obliterate identification markings of the cable, as approved by the Engineer.

All cables and tabs shall be identified with wire tags with yellow background and 1" inch tall black lettering. Dedicated neutrals shall be labeled by circuit number, phase designation, and the letter 'N' e.g., "1AN" for circuit 1, phase A.

Replace the 5th paragraph with the following:

All cables in junction boxes, junction box foundations, cabinets, pull boxes, and at equipment terminal connections shall be tested for circuit connections, which shall be in conformity with those indicated on the Plans. After verification of circuit connections, these cables shall be provided with individual identification tags, as per Authority's standard drawings, with circuit and phase designations, such as 1A, 1B, 1C, 1AN, 1BN, etc. for multiple lighting circuits. The tags shall be securely attached to the cables with nylon ties. All lighting standards shall be securely bolted in a vertical position to concrete bases, junction box foundations, or lighting blisters. They shall be plumbed with luminaires perpendicular to the centerline of the roadway by means of stainless steel shims between the transformer bases and concrete bases or junction box foundations or between the base plates and lighting blister.

Label all medium voltage circuits with the applicable voltage rating in every installation requiring access by maintenance including, but not limited to, junction boxes, manholes, and cabinets. Provide this tag in addition to the tag identifying other required cable identification.

Each lighting standard, whether new or relocated, shall be identified by means of aluminum identification plate(s), which shall bear the lighting standard and circuit numbers and phase designation for multiple circuits, the lighting standard number, utilized Voltage, lighting standard and luminaire types, all as shown on the Plans. A separate identification plate shall be provided for each luminaire supported by the lighting standard. Existing identification plates on relocated lighting standards shall be replaced, where required.

The following is added:

#### **(F) Luminaire Installations**

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Replace the first paragraph with the following:

Work shall include installation of the luminaire, wiring within the lighting standard, cable connector kits, Luminaire Headframe ring assembly, luminaire lowering device and fuses for all lighting systems.

Replace the second paragraph with the following:

Various types of luminaries, to be used on the Project, shall be as listed on Plans. Prior to installation of each luminaire, the Contractor shall check and verify the catalog number, wattage, Voltage, ~~and the~~ photometric distribution type, tilt, and aiming direction to produce the specified light distribution.

## SECTION 918 – ELECTRICAL MATERIALS

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### 918.01 General

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Add the following language to the end of this Subsection:

Alternate and other equal materials shall be submitted by the Designer, Engineer, or Contractor to for approval by the Authority for approval.

### 918.04 Cable Connectors

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#### (A) In-Line Connectors.

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Delete the last paragraph.

#### (B) Wye Connectors

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Add the following paragraph at the end of this Paragraph:

Underground splice kits shall be waterproof fully resin-encapsulated and designed to insulate and seal wire connections in weather-exposed or direct burial locations. Splice kits shall be sized and rated according to the cables to be spliced.

#### (C) Through Splice Connectors

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Add the following paragraph at the end of this Paragraph:

Underground splice kits shall be waterproof fully resin-encapsulated and designed to insulate and seal wire connections in weather-exposed or direct burial locations. Splice kits shall be sized and rated according to the cables to be spliced.

The following Paragraph is added:

#### (D) Resin-Encapsulation Splice Kits

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All kits used to waterproof underground splices, or designated "waterproof" or "resin encapsulated," shall be fully resin-encapsulating power cable splicing kit (Resin Splice Kit), excluding multi-mold and kits that attach multiple splices via mesh, net, or other flexible means. Kits shall be designed for compression or crimped connectors, including terminal blocks.

Kit shall insulate and seal in-line or wye splices as needed and shall be rated for 1kV for multiple conductor cables or 5kV for single conductor wires. All Resin Splice Kits shall include all materials required for installation and shall fully encapsulate the entire splice with no internal voids or protruding parts.

Resin shall be a two-part epoxy encapsulating and insulating resin. The resin shall be mixed externally and have an exothermic reaction to facilitate its own curing process after injection into the splice cover. The insulating resin shall not run or melt after curing process is complete and shall be stable at elevated temperatures. Insulating resin shall bond to cable jackets and itself and shall be oil resistant.

### 918.07 Cable and Wire

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Delete the last sentence of the second paragraph and add the following:

For cable provided in total Contract quantities 500 feet or more, all multiple lighting and power cable shall have the outside cable jacket layer be continuous 100% factory-impregnated solid color-coded. Inner insulation is not required to be color-coded. For cable provided in total Contract quantities less than 500 feet, use of heat shrink wrap application may be accepted. For pass-through, Junction Box, and Junction Box Foundations, cables shall be taped in lieu of shrink wrap. Tape shall be applied to clean, dry cables and shall be concentrically wrapped such that the entire portion of cable in the JB or JBF is overlapped with no spaces without tape.



Replace the color-coding table with the following tables:

Phase	480Y/277V	460Y/265V*	208Y/120V
Phase A	Brown	Brown	Black
Phase B	Orange	Orange	Red
Phase C	Yellow	Yellow	Blue
Neutral	Grey	Grey	White
* Not a standard for new construction and used on some older systems.			

Leg	480V/240V	240V/120V
Leg A	Brown	Black
Leg B	Yellow	Red
Neutral	Grey	White

Delete the last paragraph under the color tables.

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## 918.17 Metallic Junction Boxes

Replace the first paragraph with the following:

Metallic junction boxes shall be of the types and sizes as indicated on the Plans. All metallic junction boxes for outdoor use or in tunnels shall be ~~corrosion-resistant materials~~ stainless steel.

## 918.20 Power Distribution and Control Equipment

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### (K) Contactor

Refer to the QPL.

Lighting Contactors shall be commercial off-the-shelf (COTS) contactors with 100amp frame and 120V magnetically held coil, without enclosure. Contactor poles and control circuit voltages shall be:

- (1) 2-Pole 120/240V contactor
- (2) 2-Pole 120/240V contactor
- (3) 2-Pole 120/240V contactor
- (4) 2-Pole 120/240V contactor

### (L) Load Center Power Monitoring Unit.

All new Load Centers shall be equipped with a data logging, power and energy monitoring unit, referred generically as Power Monitoring Unit (PMU). The PMU will be used in conjunction with The Authority's BMS system to remotely monitor Load Center performance and efficiency.

Refer to the QPL for approved manufacturers.

## 918.21 Roadway Lighting Luminaires

Replace the first paragraph with the following:

Luminaire Types and configurations shall be as indicated on the Plans. See the Qualified Products List for approved luminaires and suppliers.

### (A) LED Luminaires

Add the following after the fifth paragraph, just before Item 1:

When luminaires are to replace existing legacy luminaires in an existing installation, the replacement luminaires shall be designated as "retrofit". Retrofit luminaires shall closely match the form factor, lumen output, distribution type, and color temperature of the luminaire they replace. The retrofit luminaires shall be LED as below in 918.21(A)4, Type Z.

(1) Construction

Replace the second paragraph of ~~Item (1) Construction~~ with the following:

The maximum effective projected area shall not exceed 1.31. The housing shall be grey in color with a flat or semi-gloss sheen. Luminaire shall include a 7-pin NEMA photo-control receptacle.

Item (1), Replace the fifth, sixth, and seventh paragraphs with the following:

The luminaires shall be equipped with a universal slip fitter mounting device capable of adapting to 1-1/4 inch through 2-inch pipe size bracket arms or vertical tenons, without the need of separate mounting parts. As pole sizes vary, the slip fitter shall be sized appropriately to the pole it will be mounted on. See the Standard Drawings for mounting device construction and dimensions. Leveling and clamping of the luminaires to the bracket arm shall be accomplished by tightening of four bolts. The mounting end of luminaires shall be provided with an appropriate means of covering the opening to prevent bird infiltration into the luminaire housings. The luminaires may also be equipped such that the luminaire slips over the top of the light pole (4 inches to 6 inches diameter) and be secured.

The luminaires shall have adequate provisions for the dissipation of heat radiated from the electronic driver. All luminaires shall have a durable baked-on acrylic gray finish, inside and out, and shall be furnished with corrosion-resistant hardware.

When luminaires are to replace existing legacy luminaires in an existing installation, the replacement luminaires shall be designated as "retrofit". Retrofit luminaires shall closely match the form factor, lumen output, distribution type, and color temperature of the luminaire they replace. The retrofit luminaires shall be LED as below in 918.21(A)4, Type Z.

(2) Electrical Requirements

Add the following language to the end of Item (2)(a):

In a system in which there is a neutral conductor shared by multiple phase conductors (primarily retrofit installations)-the luminaire shall be protected from overvoltage up to 500V from a loss of neutral or other overvoltage event via the LED driver or transformer, fully contained within the luminaire. External transformers will not be approved.

Add the following to the end of Item 2:

(f) Lighting System upgrades shall include new wiring such that each phase conductor has a discrete neutral conductor. In the rare case where an installation is approved without neutral upgrade(s), the lighting system will remain at-risk to an overvoltage condition.

(3) Photometric Requirements

Replace the first and second paragraphs of ~~Item (3) Photometric Requirements~~ with the following:

The luminaires shall produce light distributions in conformance with the current ANSI/IES classifications indicated in the Luminaire Types in this section and shall meet the photometric requirements shown on the Plans. Additional distributions for glare control shall be utilized when direct source must be mitigated. Mitigation utilizing shielding elements shall require approval from the Authority. Optical assemblies shall have a minimum efficiency of 85% regardless of distribution type.

As part of the shop drawing submittal, the contractor shall include the IES files (.ies) for each luminaire type to be installed. The following information shall also be included in the shop drawing submittal, if not in the catalog cut(s) and/or photometric file:

Add the following to the end of Item (3):



- (d) Unless otherwise noted in descriptions below, all roadway luminaires shall have a color temperature of 4000°-5000°K and Color Rendering Index (CRI) of 65 or higher.

The following is added as Item (4):

~~(1)~~(4) Luminaire Types

The following is a list of the Standard Luminaires for the Turnpike and Parkway. The list contains the general illumination characteristics. Luminaire type designations are based on the design area they are primarily intended to illuminate, as well as lumen output and light distribution. When submitting a luminaire to the Authority, the Authority shall make the final determination of the catalog number of each approved make and model luminaire to be used for the Luminaire Types listed here. Those who are submitting luminaires for approval should initially make a determination what luminaire catalog number fits best for each Authority "LP", "LH", "LW", or other luminaire designation.

Pole spacing listed is for straight roadway or a roadway with a radius of greater than 1000 feet. All luminaires listed shall perform to the specifications below with a zero-degree (0°) tilt and one-sided pole spacing arrangement. Target illumination levels for qualification purposes are 0.70 fc - 0.85 fc, with a minimum average illumination level of 0.70 fc, maximum average illumination of 1.20 fc, minimum point illumination value of 0.20 fc, and uniformity ratio of 4.0:1 or better.

Any luminaire to be considered for addition as a Standard Luminaire shall be determined to be acceptable by demonstration that it has close similarity to and within the limits of illuminance performance and uniformity to the luminaire type it is to be considered.

Approved luminaires may be found in the Qualified Products List.

- a. Type LP1 Luminaire - Pole-top roadway luminaire with for Design Areas less than 48 feet in total width utilizing a Type III roadway distribution, nominal mounting height of 26 feet, standard offset from edge of pavement, and 75-120 foot pole spacing. Type III optics
- b. Type LP2 Luminaire - Pole-top roadway luminaire with for Design Areas less than 48 feet in total width utilizing a Type II roadway distribution, standard offset from edge of pavement, 100-175 foot pole spacing at 26' nominal mounting height, and 75-120 foot pole spacing at 40 feet nominal mounting height. Type II optics
- c. Type LP3 Luminaire - Pole-top roadway luminaire with for Design Areas less than 60 feet in total width utilizing a Type III roadway distribution, 100-150 foot pole spacing at a nominal mounting height of 40 feet, and standard offset from edge of pavement. Type III optics
- d. Type LP4 Luminaire - Pole-top roadway luminaire with for Design Areas less than 60 feet in total width utilizing a Type II roadway distribution, 135-190 foot pole spacing at a nominal mounting height of 40 feet, and standard offset from edge of pavement. Type II optics
- e. Type LP5 Luminaire - Pole-top roadway luminaire with for Design Areas less than 60 feet in total width utilizing a Type III roadway distribution, 170-235 foot pole spacing at a nominal mounting height of 40 feet, and standard offset from edge of pavement. Type III optics
- f. Type LP6 Luminaire - Pole-top roadway luminaire with for Design Areas 48 feet or greater in total width utilizing a Type III roadway distribution, 200-250 foot pole spacing at a nominal mounting height of 40 feet, and standard offset from edge of pavement. Type LP6 may also be used at toll plaza approaches and areas with special geometry. Type III optics
- g. Type LP7 Luminaire - Pole-top roadway luminaire with for Design Areas 48 feet or greater in total width utilizing a Type III roadway distribution, a nominal mounting height of 40 feet, and standard offset from edge of pavement. The primary use for the Type LP7 luminaire is toll plaza approaches. The Type LP7 luminaire may also be used for special geometry where other approved luminaires are proven to not meet criteria. Type III optics
- h. Type LP8 Luminaire - Pole-top roadway luminaire with for Toll Plaza Design Areas and special geometry areas with 25,000-40,000 lumens, utilizing a Type IV (forward throw) roadway distribution, a nominal mounting height of 40 feet, and standard offset from edge of pavement. Type IV optics



- i. Type LP9 Luminaire - Pole-top roadway luminaire with for special geometry areas with 10,000-25,000 lumens, utilizing a Type IV (forward throw) roadway distribution, a nominal mounting height of 26 or 40 feet, and standard offset from edge of pavement. Type IV optics
- j. Type LC Luminaire - Toll Canopy luminaire with for use under toll and fuel canopies with 4500-7500 lumens or 8500-15000 lumens and Type V square or long distribution. Type V optics
- k. Type LW1 Luminaire - Under Bridge luminaire with Low to medium lumen (4500-7500 lumens) luminaire with square or round Type V distribution, mounted above the roadway and typically attached to the underside of the bridge via fabricated supports. Type V optics
- l. Type LW2 Luminaire - Under Bridge luminaire with Low to medium lumen (4500-7500 lumens) luminaire with forward throw Type IV distribution, mounted above the roadway and typically attached to the underside of the bridge via fabricated supports. Type IV optics
- m. Type LW3 Luminaire - Under Bridge luminaire with high lumen (8500-15,000 lumens) luminaire with square or round Type V distribution, mounted above the roadway and typically attached to the underside of the bridge via fabricated supports. Type V optics
- n. Type LW4 Luminaire -- Under Bridge luminaire with High Mast type luminaire with square or round Type V distribution and 15,000-65,000 lumens, mounted above the roadway and typically attached to the underside of the bridge via fabricated supports. Type V optics
- o. Type LH1 Luminaire -- High Mast roadway luminaire with low lumen (25,000-35,000 lumens) square or round Type V medium-to-wide distribution. Type V optics
- p. Type LH2 Luminaire -- High Mast roadway luminaire with medium lumen (35,000-50,000 lumens) square or round Type V medium-to-wide distribution. Type V optics
- q. Type LH3 Luminaire -- High Mast roadway luminaire with high lumen (50,000-65,000 lumens) square or round Type V Wide distribution. Type V optics
- ~~r. Type LS Luminaire - Sign Lighting luminaire with Type IV optics and 5000°k color temperature~~
- ~~Type S1 Luminaire - Under Bridge Structure mount luminaire with Type III optics~~
- ~~Type S2 Luminaire - Under Bridge Structure mount luminaire with Type IV optics~~
- ~~Type S3 Luminaire - Under Bridge Structure mount luminaire with Type V optics~~
- ~~Type S4 Luminaire - Under Bridge Structure mount luminaire with Type IV optics~~
- ~~w. Type S5 Luminaire - Under Bridge Structure mount luminaire with Type V optics~~
- x. Type SP Luminaire -- Security Perimeter luminaire with dual heads and battery backup.
- ~~y. Type TN Luminaire - Tunnel luminaire~~
- z. Retrofit LED Cobrahead luminaire - Retrofit luminaires shall utilize mast arm mounting where replacing legacy Types A, B, C, and D "Cobrahead" luminaires. Retrofit luminaires shall have a color temperature between 2700° Kelvin (K) and 3300° K, shall have a similar light distribution as the luminaire they replace, and may include options such as House Side Shield to achieve the same distribution. See approved retrofit luminaires of various optics in the QPL.

#### **(B) HID Luminaires**

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Delete this Paragraph in its entirety.

#### **(C) Ballast Assemblies**

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Delete this Paragraph in its entirety.

#### **(D) Retrofit Luminaires**

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Refer to the QPL.

### **918.22 Sign Lighting Luminaires.**

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Delete the first paragraph and replace it with the following:

Sign lighting luminaires shall be designated as Type LS, as described in this section. The Contractor may submit an alternate luminaire for approval by submitting photometric calculations to the Engineer as a shop drawing process in accordance with Section 104.08.

## 918.23 Underbridge Lighting Luminaires

### (A) LED Luminaires

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#### (4) Luminaire Types

The following is a list of the Standard Under Bridge Luminaires for the Turnpike and Parkway. The list contains the general illumination characteristics.

- a. Type S1 Luminaire - Under Bridge Structure mount luminaire with low to medium lumen (4500-7500 lumens) luminaire with Type III roadway distribution, typically mounted to walls, piers, or abutments.
- b. Type S2 Luminaire - Under Bridge Structure mount luminaire with low to medium lumen (4500-7500 lumens) luminaire with Type IV roadway distribution, typically mounted to walls, piers, or abutments.
- c. Type S3 Luminaire - Under Bridge Structure mount luminaire with low to medium (4500-7500 lumens) lumen luminaire with Type V roadway distribution, typically mounted to walls, piers, or abutments.
- d. Type S4 Luminaire - Under Bridge Structure mount luminaire with high (8500-15000 lumens) lumen luminaire with Type IV roadway distribution, typically mounted to walls, piers, or abutments.
- e. Type S5 Luminaire - Under Bridge Structure mount luminaire with high (8500-15000 lumens) lumen luminaire with Type V roadway distribution, typically mounted to walls, piers, or abutments.

## 918.61 Precast Reinforced Concrete Junction Box

Precast reinforced Junction Box (also Junction Box Foundation) frame and cover shall be as detailed in the Standard Drawings, with split cover and handle for each side. Frame shall be gray iron ASTM A48, class 30B, hot dipped galvanized in accordance with ASTM A153. Frame shall be supplied with a copper one-hole ground lug secured with a 3/8 inch diameter x 16 NC Type 304 stainless steel bolt and lock washer (in accordance with ASTM A193, Grade B8). Cover shall be ductile iron ASTM A536, Grade 65-45-12, hot dipped galvanized in accordance with ASTM A153. Cover shall have a load rating that meets or exceeds AASHTO H20-44.~~concrete junction boxes, junction box foundations, and manholes shall be as specified in Section 601 and as shown in the Standard Drawings. Frames or covers, i.~~ Installation aids, and hardware shall be incidental to the cost of the junction box, junction box foundation, or manhole.

### (A) Frame and Cover

As detailed in the Standard Drawings. Refer to the QPL.

### (B) Lifting Tool

Lifting Tools shall be provided at a quantity of \_\_\_\_\_. Refer to the QPL.

## 918.62 Manual Transfer Switch with Generator Docking Station

Manual Transfer Switch with integrated external Generator Docking Station (MTS-DS) shall consist of (2) two mechanically interlocked molded case circuit breakers, cam-style male connectors, power distribution block, solid neutral plate, and grounding terminals, all housed within a padlockable enclosure. Current rating and number of poles as indicated on drawings. An External Generator Docking Station (GDS) will be same construction of the MTS-DS, but without the MTS portion. The GDS

~~Manual transfer switch~~The MTS-DS enclosure shall be Type 3R, constructed of continuous seam-welded, stainless steel. The main access shall be through an interlocked, hinged door that extends the full height of the enclosure. Access for portable generator cables with female cam-style plugs shall be via cable entry openings in the bottom of

enclosure. A hinged flap door shall be provided to cover the cable openings when cables are not connected; the hinged flap door shall allow cable entry only after the main access door has been opened.

Cam-style male connectors (inlets) shall be UL Listed single-pole separable type and rated 400 amps at 600VAC. Cam-style male connectors shall be color coded. Cam-style male connectors shall be provided for each phase and for ground and shall also be provided for neutral unless otherwise noted. Each of the phase cam-style male connectors within the enclosure shall be factory-wired to a molded case circuit breaker. The ground cam-style male connectors shall be bonded to the enclosure, and a ground lug shall be provided for connection of the facility ground conductor. The neutral cam-style male connectors shall be factory wired to a power distribution block. None of the cam style male connectors shall be accessible unless both molded case circuit breakers are in the "OFF" position and the main access door is open.

A power distribution block shall be provided for load-side field wiring. The power distribution block shall be factory wired to the molded case circuit breakers.

Molded case circuit breakers shall be UL Listed, and the short circuit interrupt rating shall be a minimum of 35kAIC at 480VAC. Trip rating of the molded case circuit breakers shall be as shown on the drawings. One molded case circuit breaker shall be fed from normal power; the other molded case circuit breaker shall be fed from the cam-style male connectors to supply power from a portable generator. Both molded case circuit breakers shall include UL Listed door-mounted operating mechanisms, preventing the opening of the main access door unless both breakers are in the "OFF" position. Both molded case circuit breakers shall be mounted behind a deadfront panel. The load-side of the molded case circuit breakers shall not be energizable unless the main access door is closed and one of the molded case circuit breakers is in the "ON" position. The (2) molded case circuit breakers shall be safety interlocked by mechanical means to ensure that only one breaker may be energized at any given time.