

# EXPECTED IMPLEMENTATION (FY 2023-24)

## 639 ELECTRICAL POWER SERVICE ASSEMBLIES (REV 9-14-22) (FA 9-16-22) (FY 2023-24)

ARTICLE 639-3 is expanded by the following new Subarticle:

### 639-3 Materials.

**639-3.1 Weatherhead:** Use a weatherhead made of a copper free aluminum alloy with three electrical service wire entrance holes, meeting National Electric Code (NEC) requirements.

**639-3.2 Conduit:** Use conduit meeting the requirements of Section 630. Meet the requirements of Section 562 for coating all field cut and threaded galvanized pipe.

**639-3.3 Electrical Service Wire:** For signal and ITS service points, use stranded copper wire with XHHW (cross-linked polyethylene (XLPE) high heat-resistant, water-resistant) insulation, rated at 600 V in dry and wet conditions, no smaller than No. 6 AWG for connections between service disconnect and traffic and ITS cabinets, unless otherwise shown in the Plans.

For lighting service points, use single-conductor cable Type THWN-2 no smaller than No. 6 AWG for connections between service disconnect and load center.

**639-3.4 Meter Base:** Use meter bases approved by the local electric power company.

### 639-3.5 Service Disconnect:

**639-3.5.1 Enclosure (Cabinet):** Use an enclosure conforming to National Electrical Manufacturers Association (NEMA) Standards for Type 3R, Type 3S or Type 4, made of galvanized steel, aluminum, stainless steel or other materials approved by the Engineer. Ensure that the enclosure has a hinged door which can be locked with a padlock. Provide padlock and two keys. Do not use external handles or switches. Ensure that the inside dimensions meet NEC requirements.

**639-3.5.2 Circuit Breaker:** Use a manually resettable circuit breaker which has a current rating above the current rating of the circuit breaker to which electrical power is provided. Do not use less than a 40A circuit breaker.

**639-3.6 Surge Protective Device:** Use a lightning arrester rated for a maximum permissible line to ground voltage of 175 V<sub>AC</sub>.

**639-3.7 Electrical Power Transformer:** Provide a dry type, air-cooled, factory assembled transformer. All units must be UL listed under the requirements of UL 5085 and UL 1561, IEEE Standard 259, and meet the requirements of NEMA ST-20. Provide transformers for the primary and secondary voltages indicated on the Plans. Provide two 2.5% full capacity below normal taps and two 2.5% above normal taps on the primary side. All taps are full capacity taps.

**639-3.7.1 Enclosure:** Use an enclosure conforming to NEMA Standards for Type 3R, made of hot-dip galvanized steel, aluminum, stainless steel or other materials approved by the Engineer.

**639-3.7.2 Electrical Rating:** Transformer electrical ratings may range from 3 KVA to 300 KVA, 120V to 600 V, single phase or three phase, primary or secondary, as shown in the plans.

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**639-3.7.3 Temperature classifications:** Transformers rated less than 15 KVA shall utilize Class 180 or 185 insulation systems, with a 115°C or lower winding temperature rise. Transformers rated 15 KVA and greater shall utilize Class 220 insulation systems, with a 150°C or lower winding temperature rise. The transformer shall utilize an insulation system that has been properly temperature classified in accordance with NEMA ST-20.

Encapsulated transformers rated 15KVA to 25KVA using a Class 180 or 185 insulation system with a 115°C or lower winding temperature rise may be utilized if approved by the Engineer. Transformer windings shall be all aluminum or all copper.

**639-3.7.4 Load rating:** Furnish and install transformers with load ratings as described in the Plans. Transformers shall be capable of operating continuously at 100 percent of nameplate rating in an ambient temperature not exceeding 40°C. Transformers 5 KVA and above shall be capable of meeting overload requirements per ANSI C57.96 with normal life maintained.

**639-3.7.5 Sound rating:** Sound levels shall not exceed the following:

Table 639-1	
Transformer Rating (KVA)	Average Sound Level Decibels per NEMA ST-20
0-9	40
10-50	45
51-150	50
150-300	55

**639-3.8 Attachment Hardware:** Use attachment hardware that meets the requirements of Section 603.

ARTICLE 639-4 is expanded by the following new Subarticle:

## **639-4 Installation Requirements.**

**639-4.1 General:** Meet the following requirements for the installation of individual components of the electrical power service assembly:

Use extreme care and caution in the installation of all components of the electrical power service assembly.

Follow installation procedures recommended by NEC and National Electrical Safety Code (NESC).

Consider the location of electrical power service assemblies as shown in the Plans to be approximate, and coordinate with the appropriate electrical power company authority to determine the exact locations of each assembly.

Do not use transformers or spliced electrical wire on a traffic signal power service.

**639-4.2 Weatherhead:** Securely attach the weatherhead to the upper end of the conduit which extends upward from the meter base (or service disconnect if a meter base is not required) to a minimum height of 22 feet above grade.

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**639-4.3 Conduit:** Securely attach all conduit to the pole or cabinet with a maximum distance of 5 feet between conduit attachment hardware.

**639-4.4 Electrical Service Wire:** Install the electrical service wire in a manner which will ensure that damage to the installation will not occur.

Ensure that the service wire is of sufficient length after installation in the conduit to provide for attachment to the power company service and for termination within the cabinet for which power is required.

Use waterproof gel-filled splices to splice electrical wires in pull boxes only when the length of the cable run prohibits use of continuous wire. Wire nuts and electrical tape splicing are not acceptable.

**639-4.5 Meter Base:** When a meter base is required, securely fasten the meter base to the pole or cabinet. Install pole mounted meter bases at a minimum height of 5-1/2 feet above grade when measured from the center of the meter base or meet the local electric power company requirement, whichever is greater.

**639-4.6 Service Disconnect:** Securely fasten the service disconnect to the pole (or cabinet with the Engineers approval), and electrically position the service disconnect between the service meter and the traffic control device cabinet to which electrical service is being supplied. Install pole mounted service disconnects a minimum of 4 feet above grade when measured from the bottom of the disconnect. For cabinet installations, mount the service disconnect at a height approved by the Engineer or as shown in the Plans.

**639-4.7 Electrical Power Transformer:** Follow installation procedures recommended by NEMA ST-20, National Electric Code (NEC), and National Electrical Safety Code (NESC). Set the ground mount transformer unit level on the pad and secured to the pad with bolts. Pole mount transformers are required to be fastened securely to the pole using bolts, stainless steel straps, or galvanized strut channel.

Conduct field acceptance testing in accordance with Section 611. Perform local field inspection at each site to verify and confirm the following:

1. Check wiring connections for damage and torque, as applicable, prior to energizing the transformer.
2. Check grounding and bonding of transformer enclosure. Ensure that separately derived systems, which are required to be grounded by the NEC 250.30 or the Plans, are fitted with an appropriately installed and sized system bonding jumper in accordance with the NEC 250.30.
3. Measure primary and secondary voltages under normal load conditions.

ARTICLE 639-5 is expanded by the following new Subarticle:

## **639-5 Method of Measurement.**

**639-5.1 General:** Measurement for payment will be in accordance with the following work tasks.

Payment for electrical service wire between service disconnect and traffic cabinet is based upon the distance of the cable run and includes payment for all conductors used in the run. For lighting applications, payment for service conductors will be made in accordance with Section 715.

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Payment for conduit and electrical service wire which is vertically attached to the electrical power assembly is considered incidental and paid under item 639-1.

**639-5.2 Furnish and Install:** The Contract unit price per foot of electrical service wire, or the Contract unit price each for electrical service disconnect, furnished and installed, will include furnishing all materials and hardware as specified in the Contract Documents, and all labor, equipment, and miscellaneous materials necessary for a complete and accepted installation.

**639-5.3 Furnish:** The Contract unit price per foot of electrical service wire, or the Contract unit price each, for electrical service disconnect, furnished, will include the cost of the required materials and hardware as specified in the Contract Documents, plus all shipping and handling costs involved in delivery as specified in the Contract Documents.

**639-5.4 Install:** The Contract unit price per foot of electrical service wire, or the Contract unit price each, for electrical service disconnect, installed, will include all labor, equipment, and miscellaneous materials necessary for a complete and accepted installation. The Engineer will supply electrical service wire or electrical service disconnect.

**639-5.5 Electrical Power Service:** The Contract unit price per assembly for electrical power service will include furnishing and installing all material and hardware as specified in the Contract Documents, and all labor and equipment necessary to make a complete and accepted installation.

**639-5.6 Electrical Power Transformer:** The Contract unit price for each Electrical Power Transformer will include furnishing, installing, and testing all materials and hardware as specified in the Contract Documents, and all labor, equipment, and miscellaneous materials necessary for a complete and accepted installation.

ARTICLE 639-6 is deleted and the following substituted:

## **639-6 Basis of Payment.**

Prices and payments will be full compensation for all work specified in this Section. Payment will be made under:

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|------------------|--|
| Item No. 639- 1- | Electrical Power Service - per assembly. |
| Item No. 639- 2- | Electrical Service Wire - per foot.      |
| Item No. 639- 3- | Electrical Service Disconnect - each.    |
| Item No. 639- 6- | Electrical Power Transformer - each.     |