

## **SECTION 635**

### **PULL, SPLICE, AND JUNCTION BOXES**

#### **635-1 Description.**

Furnish and install pull, splice, and junction boxes as shown in the Plans.

#### **635-2 Materials.**

**635-2.1 General:** Use pull and splice boxes listed on the Department's Approved Product List (APL).

##### **635-2.2 Pull and Splice Boxes:**

**635-2.2.1 General:** Manufacturers of concrete pull and splice boxes and covers seeking inclusion on the APL shall meet the requirements of 105-3 and this Section and be listed on the Department's list of Incidental Precast/Prestressed Concrete Producers with Accepted Quality Control Programs.

Ensure box bodies and covers are free of flaws such as cracks, sharp, broken, or uneven edges, and voids.

Ensure in-ground boxes have an open bottom design.

**635-2.2.2 Marking:** Ensure the following information is permanently cast into the top surface of all pull and splice box covers:

1. Unless otherwise shown in the Plans, mark application as follows:

FDOT TRAFFIC SIGNAL for signalized intersections

FDOT FIBER OPTIC CABLE for fiber optic cable

FDOT LIGHTING for highway lighting

FDOT TRAFFIC MONITORING for traffic monitoring

FDOT ELECTRICAL for other electrical applications

2. Manufacturer's name or logo

3. FDOT APL approval number

4. TIER rating

Ensure the date of manufacture (month/day/year, or date code) is permanently located on the top or bottom of the cover. Ensure the interior of the box body has a permanent marking that includes the manufacturer part/model number and date of manufacture near the top of box in a location that is visible after installation when the cover is removed.

**635-2.2.3 Dimensions:** Unless otherwise shown in the Plans, provide pull and splice boxes with the following dimensions.

For signalized intersection and lighting applications, provide pull boxes with nominal dimensions of 13 inches wide by 24 inches long (cover) and no less than 12 inches deep. Ensure the inside opening area is a minimum of 240 square inches and no inside dimension is less than 12 inches.

For fiber optic cable applications, provide pull boxes with nominal dimensions of 24 inches wide by 36 inches long (cover) and no less than 24 inches deep.

Provide rectangular splice boxes with nominal dimensions of 30 inches wide by 60 inches long (cover) and no less than 36 inches deep. Provide round splice boxes with a nominal diameter of 36 inches (cover) and no less than 36 inches deep.

**635-2.2.4 Fabrication:** Provide box covers constructed of concrete, polymer concrete, cast iron or other materials meeting the requirements of this Section. Provide cast iron covers meeting the requirements of ASTM A48, Class 20.

Provide box covers with lifting slots and a flush-seating lockdown mechanism. Use penta-head lockdown lag bolts. Ensure lockdown bolts and lifting slots are Type 316, 304, or 302 passivated stainless steel or brass. Ensure lockdown bolt assembly is designed to prevent seizing and can be removed without damaging the cover or box body. Ensure the lockdown bolt threaded insert/nut assembly is field replaceable.

**635-2.2.5 Testing Requirements:** Ensure pull and splice boxes meet the American National Standards Institute/Society of Cable Telecommunications Engineers (ANSI/SCTE) 77 2010 Specification for Underground Enclosure Integrity for TIER 15 loading with the following additional clarifications and requirements:

1. Apply all environmental tests to the box and its cover.
2. All flexural testing must be conducted in accordance with an appropriate ASTM standard and clearly stated in the report.
3. Perform repetitions of Cycle 1 in Table X2.1 of ASTM G154 for a minimum duration of 1000 hours for the simulated sunlight exposure test.
4. Use deflection-measuring devices positioned to measure vertical and lateral deflection (wherever maximum deflection occurs) for the vertical sidewall load test.

When testing pull and splice boxes of various sizes (width x length x depth), the cover impact test, internal equipment protection test, coefficient of friction test, and all environmental tests, can be completed using a single representative box/cover (instead of samples from all box/cover sizes) as long as the test report indicates the following:

1. Materials of construction, compositions, and manufacturing processes are identical for all box and cover sizes submitted for listing on the APL.
2. Size (width x length x depth) of the representative box/cover.

### **635-2.3 Junction Boxes:**

**635-2.3.1 Fabrication:** Provide galvanized steel, aluminum or NEMA 4X non-metallic junction boxes. Ensure all attachment hardware is Type 316 or 304, passivated stainless steel.

Ensure the outside surface has a smooth, uniform finish. Ensure boxes are free of burrs, pits, sharp corners and dents. Ensure all welds are neatly formed and free of cracks, blow holes, and other irregularities.

**635-2.3.1.1 Aerial Junction Boxes:** Unless otherwise shown in the Plans, provide aerial junction boxes with minimum inside dimensions of 8 inches wide by 8 inches long and at least 3 inches deep.

**635-2.3.1.2 Mounted Junction Boxes:** Provide mounted junction boxes fabricated of 5052 sheet aluminum alloy with a minimum thickness of 1/8 inch. Ensure all mounted junction boxes have a hinged door and lock as specified in Section A676.

Unless otherwise shown in the Plans, provide mounted junction boxes for the following installations:

For pole and cabinet mounted installations, provide junction boxes with minimum inside dimensions of 13 inches long by 10 inches wide and at least 3 inches deep.

For base mounted installations, provide junction boxes with minimum inside dimensions of 21 inches long by 10 inches wide and at least 8 inches deep.

**635-2.3.1.3 Embedded Junction Boxes:** Provide weatherproof embedded junction boxes for use in concrete substructures or superstructures. Include gasketed weatherproof covers made of the same material as the box and Type 316 or 304, stainless steel,

tamper resistant screws for securing the cover. Fabricate galvanized steel boxes and their covers from steel meeting the requirements of ASTM A36 and galvanized in accordance with ASTM A123.

For embedded junction boxes not exposed to vehicular impacts, provide the following types of junction boxes. Where the structure's environmental classification is slightly or moderately aggressive, provide a galvanized steel or NEMA 4X (non-metallic) box, as approved by the Engineer. Where the structure's environmental classification is extremely aggressive, provide a NEMA 4X (non-metallic) box, unless otherwise directed by the Engineer.

For embedded junction boxes exposed to vehicular impacts, provide a galvanized steel box regardless of the structure's environmental classification.

**635-2.3.2 Barrier Terminal Blocks:** Provide a barrier terminal block with a minimum of ten positions and rated at 600 V AC in all aerial and mounted junction boxes. Ensure each terminal block position has two screws electrically connected by a shorting bar or other Department approved method. Ensure all terminal block positions are numbered sequentially.

### **635-3 Installation.**

**635-3.1 General:** Do not install power and communication cables in the same box unless otherwise shown in the Plans.

When signal or 120V (or greater) power is present, ground all metal covers in accordance with Section 620.

**635-3.2 Pull and Splice Boxes:** Install pull and splice boxes in accordance with the Design Standards, Index No. 17700. Ensure pull and splice boxes are sized for the amount of cable to be placed inside. Ensure that the pull or splice box cover is flush with the concrete apron or sidewalk. Do not install pull or splice boxes in roadways, driveways, parking areas, ditches or public sidewalk curb ramps. Avoid placing pull and splice boxes in low-lying locations with poor drainage. Ensure that pull and splice boxes house fiber optic cable without subjecting the cable to a bend radius less than 14 times the diameter of the cable.

**635-3.2.1 Placement and Spacing:** Place pull and splice boxes as shown in the Plans and at the following locations, unless directed otherwise by the Engineer:

1. At all major fiber optic cable and conduit junctions.
2. Approximately every 2,500 feet for fiber optic cable applications in rural areas with any continuous section of straight conduit if no fiber optic cable splice is required.
3. At a maximum of 1,760 feet for fiber optic cable applications in metropolitan areas.
4. At each end of a tunnel, and on each side of a river or lake crossing.
5. On each side of an aboveground conduit installation, such as an attachment to a bridge or wall.
6. At all turns in the conduit system.
7. Near the base of a service pole or communication cabinet to provide:
  - a. A transition point between the fiber optic conduits extending from the fiber backbone and the conduit feeding the communication cabinet.
  - b. An assist point for the installation of fiber optic drop cable.
  - c. Storage of slack fiber optic drop cable.

**635-3.2.2 Electronic Box Marker:** Equip all pull and splice boxes buried below finish grade with an electronic box marker inside the pull or splice box to mark the location.

Ensure that the electronic box marker is a device specifically manufactured to electronically mark and locate underground facilities. Ensure that the electronic box marker includes circuitry and an antenna encased in a waterproof polyethylene shell. Ensure that the outer shell is impervious to minerals, chemicals, and temperature extremes normally found in underground plant environments. Ensure that the electronic box marker does not require any batteries or active components to operate. Ensure that electronic box markers used to mark fiber optic cable and general telecom applications are orange in color and operate at 101.4 kHz. Ensure that the electronic box marker's passive circuits produce an RF field when excited by a marker locator to direct the locator to the marker's position. Ensure that the electronic box marker has a minimum operating range of 5 feet from the marker locator.

**635-3.3 Aerial Junction Boxes:** Install aerial junction boxes in accordance with the Design Standards, Index No. 17733.

**635-3.4 Mounted Junction Boxes:** Install mounted junction boxes in accordance with the Design Standards, Index No. 17841. Ensure that the bottom surface of pole mounted junction boxes is a minimum of 4 feet above the finished grade.

**635-3.5 Cable Terminations:** Make cable terminations in junction boxes in accordance with Section 632. Route and form the cable to allow access to the terminal screws. Do not cover the terminal identification numbers with the cable.

#### **635-4 Relocation of Pull, Splice, and Junction Boxes.**

Relocation of pull, splice, and junction boxes shall consist of removing an existing box and installing the box at the location shown in the Plans. Restore the area of the box removal and relocation to the condition of the adjacent area. The costs for restoration will be included in the Contract unit price of the relocation.

Boxes damaged due to the Contractor's operations must be replaced by the Contractor at no cost to the Department. Replacement boxes must be of the same material and size of the existing box, unless directed otherwise by the Engineer.

#### **635-5 Warranty.**

Ensure all pull, splice, and junction boxes have a manufacturer's warranty covering defects for a minimum of one year from the date of final acceptance in accordance with 5-11 and Section 608. Ensure the warranty includes providing replacements, within 30 calendar days of notification, for defective parts and equipment during the warranty period at no cost to the Department or the maintaining agency.

#### **635-6 Method of Measurement.**

**635-6.1 General:** Measurement for payment will be in accordance with the following work tasks:

**635-6.2 Furnish and Install:** The Contract unit price each for pull, splice, and junction box, furnished and installed, will consist of the pull, splice, and junction box including all required hardware for the type of box and location as specified in the Contract Documents, and all labor and materials necessary for a complete and accepted installation.

**635-6.3 Furnish:** The Contract unit price each for pull, splice, and junction box, furnished, will include the cost of the pull, splice, and junction box including covers, doors, locks and keys, and any necessary miscellaneous hardware specified in the Contract Documents, plus all shipping and handling costs involved in delivery as specified in the Contract Documents.

**635-6.4 Install:** The Contract unit price each for pull, splice, and junction box, installed, will include the cost of all labor, equipment, miscellaneous hardware and materials necessary to make a complete and accepted installation of the type box and at locations as shown in the Plans. The Engineer will supply a complete box as specified in the Contract Documents.

**635-6.5 Relocate:** The Contract unit price each for pull, splice, and junction box, relocate, will include the removal of the box and relocation to the location shown in the Plans. This includes the cost of all labor, equipment, miscellaneous hardware and materials necessary for a complete and accepted installation.

**635-7 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section, except grounding. Payment for embedded junction boxes will not be made separately.

The Contractor shall include the cost of embedded junction boxes in the Contract unit price for the concrete substructure or superstructure items.

Payment will be made under:

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|------------------|--------------------------------|
| Item No. 635- 2- | Pull, and Splice Boxes - each. |
| Item No. 635- 3- | Junction Boxes - each.         |