ORIGINATION FORM

Date: June 29, 2012
Originator: Jeff Morgan
Contact Information: Traffic Engineering and Operations, Traffic Systems Section
850-410-5600

Specification Title: PULL, SPLICE, AND JUNCTION BOXES.
Specification Section, Article, or Subarticle Number: 635

Why does the existing language need to be changed? The specification must be updated for technical content and to consolidate material specifications from the Minimum Specifications for Traffic Control Signals and Devices (MSTCSD) into the Standard Specifications for Road and Bridge Construction (SSRBC).

Summary of the changes: The changes significantly update content based upon information gathered during product evaluations at the TERL and Structures Lab, project usage feedback, and consultation with multiple product manufacturers. The changes also incorporate content formerly contained in the MSTCSD Section A635 into the SSRBC Section 635.

Are these changes applicable to all Department jobs? If not, what are the restrictions? Applicable to jobs where pull, splice, or junction boxes are required.

Will these changes result in an increase or decrease in project costs? If yes, what is the estimated change in costs? No significant increase or decrease in project costs is expected.

With who have you discussed these changes? Traffic Engineering and Operations staff, Specifications Office staff, Structures Office Staff, product manufacturers.

What other offices will be impacted by these changes? Specifications and Estimates, Construction, Maintenance, and Roadway Design.

Are changes needed to the PPM, Design Standards, SDG, CPAM or other manual? No.

Is a Design Bulletin, Construction Memo, or Estimates Bulletin needed? No.

Contact the State Specifications Office for assistance in completing this form.
Trey Tillander 850-414-4140 trey.tillander@dot.state.fl.us
Frances Thomas 850-414-4101 frances.thomas@dot.state.fl.us
Debbie Toole 850-414-4114 deborah.toole@dot.state.fl.us
Andy Harper 850-414-4127 clifton.harper@dot.state.fl.us

Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

M E M O R A N D U M

DATE: November 1, 2012

TO: Specification Review Distribution List

FROM: Trey Tillander, State Specifications Engineer

SUBJECT: Proposed Specification: **6350000 Pull, Splice, and Junction Boxes.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

The changes are proposed by the Traffic Operations, Product Evaluation, and Specifications Offices as part of an ongoing effort to consolidate the Minimum Specifications for Traffic Control Signals and Devices (MSTCSD) and Standard Specifications for Road and Bridge Construction.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965TT or trey.tillander@dot.state.fl.us. Comments received after **November 29, 2012,** may not be considered. Your input is encouraged.

TT/dt
Attachment

PULL*, SPLICE,* AND JUNCTION BOXES.
(REV *10-~~1824~~29-12~~7-28-10~~2-14-~~121119~~*) ~~(FA 8-3-10) (1-11)~~

SECTION 635 (Pages ~~749 – 750~~*792 - 793*) is deleted and the following substituted:

SECTION 635
PULL*, SPLICE,* AND JUNCTION BOXES

635-1 Description.

Furnish and ~~I~~install pull*, splice,* and junction boxes ~~for traffic signals~~*as shown in the Plans*.

635-2 Materials.

635-2.1 Pull and Splice Boxes:

635-2.1.1 General: Use ~~P~~*p*ull and ~~Junction S~~*splice* ~~B~~*b*oxes ~~*that meet the requirements of these specifications and are*~~ listed on the Department's Approved Product List (APL). ~~*Ensure concrete pull and splice boxes and covers are m*~~*Manufacture*~~*d*~~*rs seeking inclusion on the APL shall meet the requirements of 105-3 and this Section and be*~~*in a plant*~~ *listed on the Department's list of Incidental Precast Concrete Producers with Accepted Quality Control Programs.* ~~*Producers seeking inclusion on the list shall meet the requirements of 105-3.*~~

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

Ensure boxes have an open bottom design.

~~Ensure that all Pull and Junction Boxes are marked in accordance with Section 603 and the markings are visible after installation.~~

635-2.1.2 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 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 and is visible after installation when the cover is removed.

635-2.1.3 Dimensions: *Unless otherwise shown in the Plans, provide pull and splice boxes with the following dimensions.*

~~*Provide pull boxes f*~~*For signalized intersection applications, provide pull boxes with a nominal cover dimension of no less than 13 inches wide by 24 inches long and no*

less than 12 inches deep ~~unless otherwise shown n the lans~~. Ensure the inside opening area is a minimum of 240 square- inches and no one inside dimension is less than 12 inches.

~~Provide pull boxes f~~For fiber optic cable applications, provide pull boxes with a nominal cover dimension of no less than 24 inches wide by 36 inches long and no less than 24 inches deep ~~unless otherwise shown n the lans~~. Deviations from these minimum dimensions may be approved by the Engineer as long as the bending radius required by the fiber optic cable manufacturer is not exceeded ~~and the box is listed on the APL~~.

Provide rectangular splice boxes with a nominal cover dimension of no less than 30 inches wide by 60 inches long and no less than 36 inches deep ~~unless otherwise shown n the lans~~. -Provide round splice boxes with a nominal cover diameter of 36- inches and no less than 36- inches deep ~~unless otherwise shown in plans~~.

***635-2.1.4 Fabrication:** Provide box covers constructed of concrete, polymer concrete, cast iron or other materials meeting the requirements of this ~~specification~~Section. Provide cast iron covers meeting the requirements of ASTM A48, Class 20.*

Provide box bodies constructed of concrete, polymer concrete, high-density polyethylene (HDPE), a combination of hand lay-up fiberglass and polymer concrete collar or other materials meeting the requirements of this ~~specification~~Section.

Provide box covers with lifting slots and a flush-seating lockdown mechanism. Use penta-head lockdown bolts, 3/8 inch or 1/2 inch in diameter. Ensure lockdown bolts and lifting slots are Type 316 or 304 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. Ensure at least one alternative vandal-resistant option is provided for securing the cover to the box body.

***635-2.1.5 Testing Requirements:** Ensure pull and splice boxes meet the American National Standard /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. Use ASTM D790 in all environmental tests, except the simulated sunlight exposure test, to measure ultimate flexural strength of unreinforced or reinforced plastics.

3. Use conditions corresponding to one cycle of Cycle- 1 in Table- X2.1 of ASTM- G154 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 sample (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 sample.

635-2.2 Junction Boxes:

***635-2.2.1 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.

635-2.2.1.1 Aerial Junction Boxes: *Unless otherwise shown in the Plans, ~~P~~provide aerial junction boxes with- minimum inside dimensions of 8 inches wide by 8 inches long and at least 3 inches deep ~~unless otherwise shown n the lans~~. Ensure aerial junction boxes attached to cable support wire are the type used by the American telephone industry.*

635-2.2.1.2 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 high by 10 inches wide and at least 3 inches deep ~~unless otherwise shown n the lans~~.

For base mounted installations, provide junction boxes with -minimum inside dimensions of 21 inches high by 10 inches wide and at least 8 inches deep ~~unless otherwise shown n the lans~~.

635-2.2.1.3 Embedded Junction Boxes: *Provide weatherproof embedded junction boxes for use in concrete substructures or superstructures in accordance with NEC requirements.- 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.

635-2.2.2 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 ~~Pull Boxes~~ Installation.

635-3.1 General: *Do not pull signal or interconnect cable through a pull box used for loop termination. Use separate pull boxes for signal and interconnect cables.*

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 adequately sized for the amount of cable to be placed inside.* Ensure that the pull box cover is flush with the finished grade or sidewalk. Do not install pull boxes in roadways, driveways, parking areas, ditches or public sidewalk curb ramps. *Avoid*

placing pull ~~boxes~~ and splice boxes on steep slopes where the cover cannot be leveled within a tolerance of 1 inch of drop to 1 foot of grade or in low-lying locations with poor drainage. Ensure that splice boxes are large enough to 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 ~~boxes~~ and splice boxes as shown in the ~~p~~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 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 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 90 degree turns in the conduit system.

7.

~~Ensure that all pull boxes and splice boxes are flush mounted at grade level, and are located n~~Near the base of a service pole or ~~near the~~ communication ~~equipment cabinet serving the ITS field device~~ to provide:

1. A transition point between the fiber optic conduits extending from the fiber backbone and the conduit feeding the communication cabinet.

2. An assist point for the installation of fiber optic drop cable.

3. Storage of slack fiber optic drop cable.

630-3.2.2 Electronic Box Marker: *Equip all pull ~~boxes~~ and splice boxes buried below finish grade with an electronic box marker inside the pull ~~box~~ 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.*

~~635-4 Junction Boxes Installation.~~

635-~~4.1~~*3.3* Aerial Junction Boxes: Install aerial junction boxes in accordance with the Design Standards, Index- No. 17733.

635-~~4.2~~*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-~~4.3~~*3.5* Cable Terminations: Make cable terminations in junction boxes in accordance with Section 632. Rout*e* and form the cable to allow access to the terminal screws. Do not cover the terminal identification numbers with the cable.

~~**635-5 General Requirements.**~~

~~Do not pull signal or interconnect cable through a pull box used for loop termination. Use separate pull boxes for signal and interconnect cables.~~

~~Use embedded junction boxes that include junction boxes, conduit, conduit expansion couplings, and miscellaneous hardware to make a complete and accepted installation.~~

~~Ground all metal covers in accordance with Section 620.~~

~~When specified in the Contract Documents, disregard the grounding requirements for metal covers for pull and junction boxes powered strictly by battery or a combination of battery and solar energy or used exclusively for vehicle loop wires where signal or 120V interconnect power is not present.~~

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.

635-~~4~~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~~es~~, furnished and installed, will consist of the pull*, splice,* and junction box~~es~~ 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:

~~Item No. 635- 1- Pull, *Splice*, and Junction Boxes - each.~~

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

Item No. 635- 3- Junction Boxes - each.