

Blue Sheet Materials

The "Submittals for Field Qualification: Electrical Equipment and Materials" (commonly referred to as the "Blue Sheets") contain a list of pre-approved materials and equipment that are normally inspected & approved by the Inspector. The contractor must submit a copy of the current version of the Blue Sheets **within 30 calendar days after execution of the contract** (00960.02).

The Blue Sheets are updated frequently by the Traffic Signal Standards Unit. Use the current version that is in effect on the date of advertisement (00960.02). Verify the date of the version online* or contact the State Traffic Signal Engineer.

The inspector is responsible for:

- Reviewing the contractor's submittal and submitting any write-in materials to the State Traffic Signal Engineer for approval prior to starting work.
- Obtaining Certificate of Materials Origin (CMO), if required. This is documented on the blue sheet's "CMO Required" box for all applicable materials.
- Inspecting and accepting all materials that are incorporated into the project. This is documented on the blue sheet's "CTIS Inspected & Accepted" box for each material.

Materials arriving at the project site should be accompanied by proper certifications. See the Non Field-Tested Materials Acceptance Guide* for requirements. No materials shall be installed until certifications are received and checked for compliance by the Inspector. Field verify that materials to be installed on the project match approved items on the Blue Sheets.

Cut Sheets/Write-in Materials

If the contractor proposes to use a material that is not listed in the Blue Sheets (write-in material), the contractor shall submit documentation as required by the Blue Sheet Qualifications* (typically a manufacturer's cut sheet showing the product meets requirements shown in the Blue Sheet Qualifications). The cut sheet shall identify the specific product intended to be used; manufacturer's name, identifying number, size, detailed scale drawings, wiring diagrams, etc. **Send proposed write-in materials & cut sheet(s) to the STATE TRAFFIC SIGNAL ENGINEER (NOT the Engineer of Record) for initial approval of the material.**

**Read the instructions included in the Blue Sheets carefully.
They are up-to-date and always printed with the sheets.**

*website link provided on Pg. 208

Blue Sheet Example

Page 2: Lists all materials that are pre-approved and instructions for use

The contractor will check box if the material is on the project. This will open a new page to allow inspection of material (see Pgs. 8 & 9 for example).

Blue Sheet Materials

Items Used on Project

Initial Submittal
The Contractor will:
 1.) Check off all approved items to be used on the contract ON THIS SHEET ONLY. *DO NOT check off any products on the specific material page (this will be done by the CTSI Inspector during Construction)*
 2.) If proposing any write-in items, check off the box under ***write-in items*** and follow the instructions on the ***write-in items*** page.
 3.) Electronically submit this form prior to starting work.

The CTSI Inspector will:
 1.) Verify all items checked off ON THIS SHEET ONLY will be used on the contract. Work with contractor to correct any errors/omissions prior to starting work according to Specification 00960.02.
 2.) If ***write-in items*** is checked, follow instructions on the ***write-in items*** page for initial approval from the State Traffic Signal Engineer.
 3.) When this sheet only is verified as correct and write-in item initial approval is received (if applicable), notify the contractor the submittal is ***approved***.

Construction
The Contractor will:
 1.) Install approved items and approved write-in items only.
 2.) Required CMO's will be submitted prior to materials being installed.

The CTSI Inspector will:
 1.) Verify and document installed materials match approved material(s) and are installed per plan and specification. **Check off box for each product installed. Check off box and date received for CMO's (This field will only be visible for applicable items).**
 2.) Document inspection/installation details as necessary on each specific materials page.
 3.) When each specific material has been entirely inspected and accepted on the project, fill out the "CTSI Inspected & Accepted" info on the specific materials page.
 4.) Submit a copy of this form to the State Traffic Signal Engineer after construction.

TEMPORARY FEATURES	MISC. MOUNTINGS	PEDESTRIAN EQUIPMENT	CABINETS & APPURTENANCES (SERVICE, TERMINAL, ETC.)
<input type="checkbox"/> Temporary Covers	<input type="checkbox"/> Radio Mount	<input type="checkbox"/> Pedestrian Signal & Mount	<input type="checkbox"/> Riser Frame
<input type="checkbox"/> Temporary Meter Base Socket	<input type="checkbox"/> Video Detection Mount	<input type="checkbox"/> LED Module (Pedestrian Signal)	<input type="checkbox"/> Base Mounted Service Cabinet
<input type="checkbox"/> Temporary Service Cabinet	SPAN WIRE EQUIPMENT	<input type="checkbox"/> Pushbutton & Mount	<input type="checkbox"/> Terminal Cabinet
<input type="checkbox"/> Temporary Pre-cast 332s Foundation	<input type="checkbox"/> Cable Ties	VEHICLE SIGNAL EQUIPMENT	<input type="checkbox"/> Terminal Blocks
POLES AND PEDESTALS	<input type="checkbox"/> Messenger, Tether, & Stabilizer Cable	<input type="checkbox"/> Vehicle Signal (housing, backboard, & visor)	SIGNS
<input type="checkbox"/> Chase Nipple	<input type="checkbox"/> Eyebolt, Turnbuckle, Strandvise, S-Hook	<input type="checkbox"/> LED Module (Vehicle Signal)	<input type="checkbox"/> PTR Sign
<input type="checkbox"/> Pipe Plugs	<input type="checkbox"/> Span Wire Hanger	<input type="checkbox"/> Vehicle Signal Bracket	<input type="checkbox"/> Sign Bracket
<input type="checkbox"/> Pedestal (Pedestrian)	<input type="checkbox"/> Tether Clamps	<input type="checkbox"/> Louver	
<input type="checkbox"/> Pedestal (Vehicle)	<input type="checkbox"/> Tri-Stud Adaptor	<input type="checkbox"/> Tattle Tale Light	
CONDUIT & APPURTENANCES	CABLES, WIRES, GROUNDING/BONDING & APPURTENANCES	LOOP DETECTION	
<input type="checkbox"/> Conduit (Non-metallic)	<input type="checkbox"/> Bond Wire	<input type="checkbox"/> Loop Feeder Cable	
<input type="checkbox"/> Conduit Bushings	<input type="checkbox"/> Ground Rod & Clamp	<input type="checkbox"/> Loop Wire	
<input type="checkbox"/> Conduit Plug	<input type="checkbox"/> Control Cable	<input type="checkbox"/> Loop Splice	
<input type="checkbox"/> Condulet	<input type="checkbox"/> Industrial Ethernet Cable	ILLUMINATION	
<input type="checkbox"/> Expansion Fitting	<input type="checkbox"/> Interconnect Cable	<input type="checkbox"/> In-Line Fuse Holder	
<input type="checkbox"/> Pull Line	<input type="checkbox"/> TFFN, THWN & XHHW wire	<input type="checkbox"/> TC Cable	
<input type="checkbox"/> Underground Warning Tape	<input type="checkbox"/> Strain Relief	<input type="checkbox"/> Photoelectric Cell	
JUNCTION BOX		WRITE-IN ITEMS (Includes ITS Items)	
<input type="checkbox"/> Junction Boxes		<input checked="" type="checkbox"/> See last page for information	

If there are any write-in items, the contractor will check this box. (See next page)

Always check the revision date!
Use the most current version.

All write-in materials will be entered under this section

Click this button to create a new material page for **each** write-in item

State Traffic Signal Engineer approval is always required **PRIOR TO INSTALLATION** for all write-ins!

Write In Items

Initial Submittal

The Contractor will:

- 1.) Click on the "add write-in item" button for each proposed write-in. List all proposed write-in items before starting work. An item can be deleted if necessary by clicking on the "oops! delete write-in item" button located next to each item.
- 2.) Submit documentation for each item as required in the [Blue Sheet Qualification/Specification Information](#) (typically a manufacturer's cut-sheet) or specifications. Note that the Blue Sheet Qualification/Specification information lists several items that do not allow write-in products due to an extensive testing period.

The CTSI Inspector will:

- 1.) Submit this form (with the required documentation) to the State Traffic Signal Engineer **(for EOR for ITS Category ONLY)** for initial approval prior to starting work.

Construction

Follow "Construction" instructions on page 2

Add Write-In Item

The screenshot shows a web form for adding write-in items. On the left is a 'CONTRACTOR INPUT' section with fields for Category, Item Name, Brand/manufacturer, Part No., and a checkbox for 'Documentation (typically a cut sheet) is included with the initial submittal'. Below this is a 'Oops! Delete Write-In Item' button. The main form area contains several sections: 'State Traffic Signal Engineer Approval Required Prior to Installation. Approval will specify if CMO is needed for write-in item. (For ITS Category ONLY; EOR Approval Required)' with 'Received' and 'Date' fields and a 'CMO?' dropdown; 'CTSI Inspected & Accepted (For ITS Category ONLY; EOR completes this portion. Use PE license number instead of CTSI No.):' with instructions to verify material and fill out Name, CTSI No., and Date; 'CTSI Remarks/Comments:' with a text area; and a 'CMO Required' section with 'Received' and 'Date Received' fields. A red bracket groups the contractor input fields and the CMO Required section. A yellow callout points to the CMO Required section, stating that approval will indicate if a CMO is required and that the info will disappear if not required. Another yellow callout points to the 'Add Write-In Item' button, stating that State Traffic Signal Engineer approval is always required prior to installation for all write-ins.

Contractor enters information here. A separate cut sheet showing the proposed product meets requirements is also required.

Blue Sheet Example

Conduit (Non-metallic)

Approved Products:

PVC	
Brand/Manufacturer	Catalog/Part No.
<input type="checkbox"/> PW Pipe	Sch. 40 & 80
<input type="checkbox"/> Carlon/Prime Conduit	Sch. 40 & 80
<input type="checkbox"/> Cantex	Sch. 40
<input type="checkbox"/> J-M Manufacturing	Sch. 40 & 80
<input type="checkbox"/> Kraloy	Sch. 40
<input type="checkbox"/> Ipex/Scepter	Sch. 40
<input type="checkbox"/> Cresline Northwest	Sch. 40
<input type="checkbox"/> Ridgeline	Sch. 40
<input type="checkbox"/> Heritage Plastics Central	Sch. 40 & 80
<input type="checkbox"/> Rocky Mountain Colby Pipe	Sch. 40 & 80
<input type="checkbox"/> Allied-Heritage	Sch. 40 & 80
<input type="checkbox"/> Raceways Technology & Manufacturing	Sch. 40 & 80

HDPE	
Brand/Manufacturer	Catalog/Part No.
<input type="checkbox"/> Carlon	Sch. 40 & 80
<input type="checkbox"/> Amco/Dura-Line	Sch. 40 & 80
<input type="checkbox"/> PERMA-GUARD	Sch. 40 & 80

Fiberglass	
Brand/Manufacturer	Catalog/Part No.
<input type="checkbox"/> Champion Fiberglass	Sch. 40 & 80
<input type="checkbox"/> FRE Composites	Sch. 40 & 80
<input type="checkbox"/> United Fiberglass of America	Sch. 40 & 80
<input type="checkbox"/> Raceways Technology & Manufacturing	Sch. 40 & 80

Each Material is listed in the title.

All approved materials are listed for each sub-category (3 sub-categories shown: PVC, HDPE, and Fiberglass).

The CTSI Inspector (**NOT THE CONTRACTOR**) will check boxes for each product verified, inspected & accepted on project during construction.

- Write-in Item Used
(Go to Write-In Section to Enter Info)

If a Write-Item for this material is installed, CTSI Inspector will check this box and fill out inspected & accepted information in the write-in section

Blue Sheet Example

CTSI Inspector to complete the "CTSI Inspected & Accepted" when material has been installed for the entire project.

Follow RED instructions for filling this info out if Write-in items are installed.

Note: If Approved Product(s) are also installed in addition to write-in items, enter information below for the Approved Product(s) only. Then go to the Write-in Section to enter information for the write-in item.

If only write-in items are installed, leave information below blank and go to the Write-in Section to enter information.

CTSI Inspected & Accepted

1. Check box next to all materials incorporated into project & verified
2. Fill out Name, CTSI No., & Date when all material has been Inspected & Accepted

Name	CTSI No.	Date
<input type="text"/>	<input type="text"/>	<input type="text"/>

CTSI Remarks/Comments:

Provide remarks on quantities, any materials rejected, etc. as necessary for documentation of installation and partial payments.

CMO Required

Received	Date
<input type="checkbox"/>	<input type="text"/>

If CMO is required for a material, this check box will appear on the page. CTSI Inspector will check "Received" box and date when CMO form is received from contractor.

CTSI Inspector to use this area as needed to make remarks/comments about the installation.

Temporary Covers

DESCRIPTION: Yellow prefabricated nylon “bag”. Includes a fine mesh insert for testing pedestrian and vehicle signals. Integral elastic bands and clips to secure the covers.

USE: To cover vehicle and pedestrian signal heads until the signal is turned on. To cover pushbuttons that are inactive.

Typical Sources of Info:

Specs: 00990.45 & 00990.46

Std. Dwg: NO

Plan Sheets: NO

Additional Installation Info: Pgs. 160, 164, & 166

Cover for Vehicle Signal



Cover for Pushbuttons



Cover for Pedestrian Signals



Temporary Meter Base Socket

DESCRIPTION: Socket into which the power company’s meter will be installed. Stainless steel or powder coated base.

USE: For power companies to meter power. Used between power source and service cabinet for temporary signals only (located on a temporary signal pole).

Note: For permanent installations, the meter base is inclusive to the “Base Mounted Service Cabinet” (see Pg. 61 for more info).

Typical Sources of Info:

Specs: 00960.60 & 00960.70

Std. Dwg: TM455 & TM485

Plan Sheets: YES

Additional Installation Info: Pg. 152

MS



Temporary Service Cabinet

DESCRIPTION: Stand-alone cabinet (temporary installations only). Includes circuit breakers, contactors, test switches, neutral and ground bars. Stainless, powder coated aluminum, or galvanized steel cabinet.

USE: Used to provide fused electrical service for permanent installations.

Typical Sources of Info:

Specs: 00960.70

Std. Dwg: TM455 & TM485

Plan Sheets: YES

Additional Installation Info: Pg. 152



Stand Alone Service Cabinet Types:

- **SC: Signal Only**
- **SCL: Signal & Illumination**

Temporary Pre-Cast 332S Foundation

DESCRIPTION: Polymer pre-cast foundation.

USE: Used to provide a foundation for 332S controller cabinet for temporary installations.

Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: NO



Chase Nipple

DESCRIPTION: UL listed, galvanized steel electrical fitting threaded on one end with a formed, flat locknut affixed at the other end.

USE: Creates a path for wires (wire entrance) between two attachments:

1. Used from vehicle signal bracket into mast arm (1 inch diameter).
TM462
2. Used from terminal cabinet to large signal pole (2 ½ inch diameter).
TM488

Note: The chase nipple for the entrance from the pushbutton mount to the pole is part of the pushbutton mount assembly supplied by the manufacturer (see TM467).

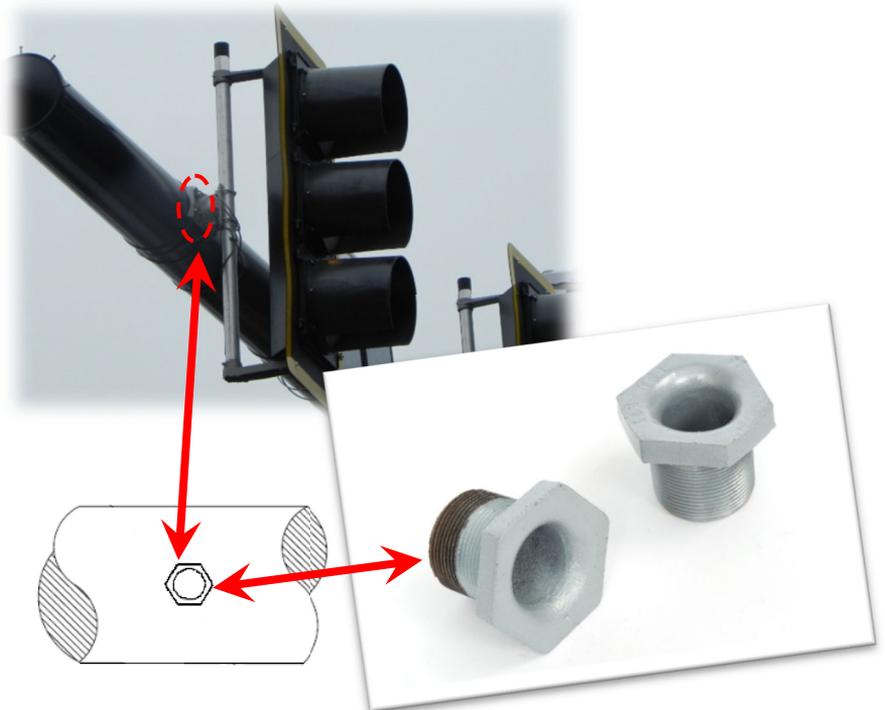
Typical Sources of Info:

Specs: NO

Std. Dwg: TM462 & TM488

Plan Sheets: NO

Additional Installation Info: Pgs. 144 & 168



DESCRIPTION: Stainless steel, hexagon or square head with threaded end.

USE: To plug holes in steel poles and mast arms. Typically required when existing signal head, pedestrian head or pushbutton locations are modified.

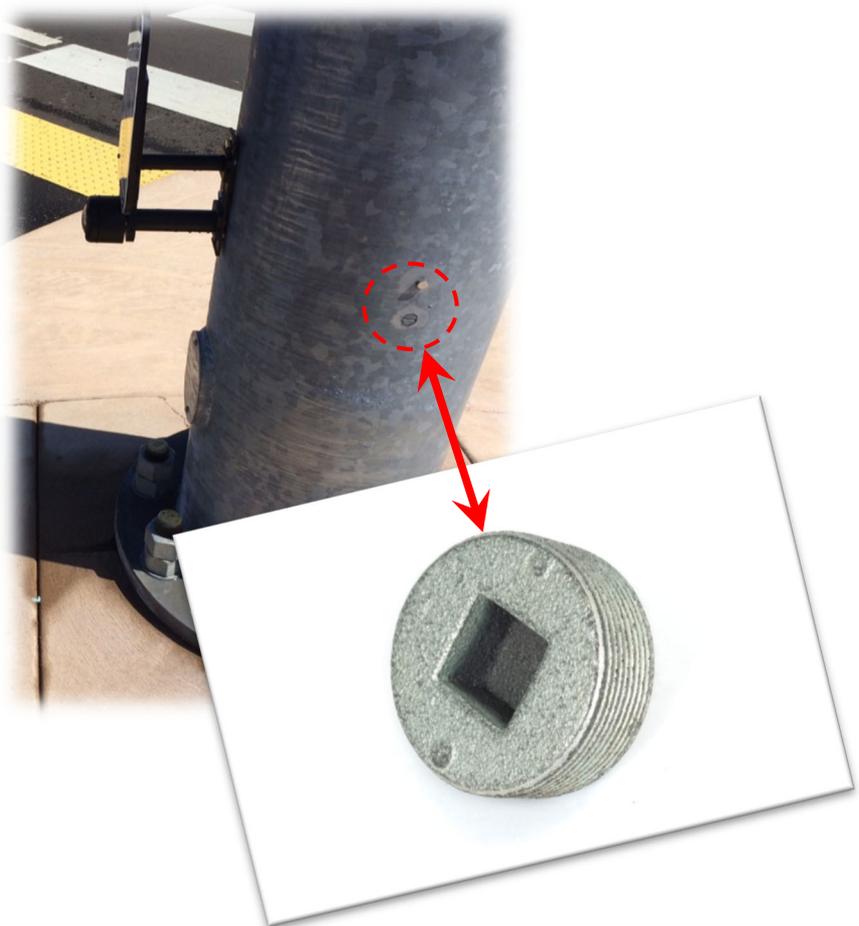
Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: NO



Pedestal (Pedestrian)

DESCRIPTION: 4 inch diameter galvanized steel pipe mounted on a cast aluminum or galvanized cast iron base.

USE: Freestanding pole for mounting of pedestrian signals.

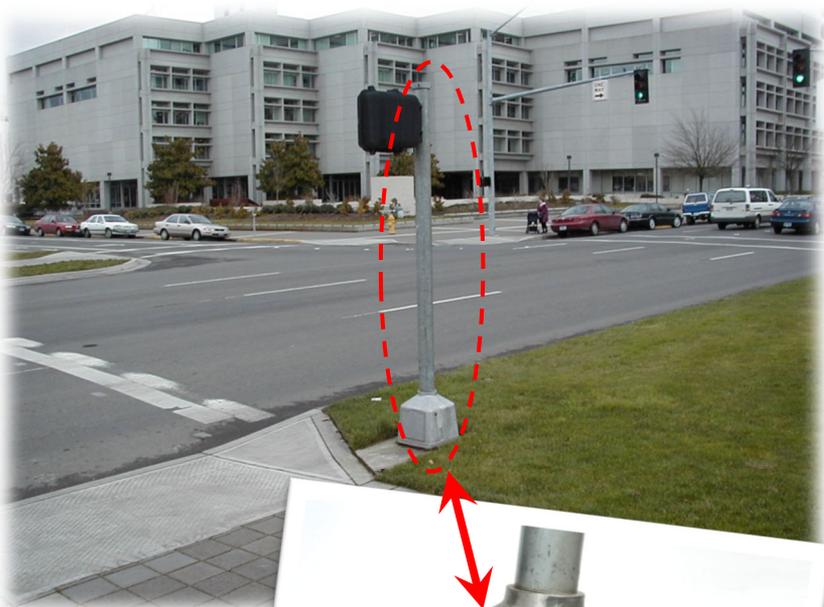
Typical Sources of Info:

Specs: NO

Std. Dwg: TM457

Plan Sheets: YES

Additional Installation Info: Pgs. 116, 118, 126, & 138



DESCRIPTION: 4 inch diameter galvanized steel pipe with welded base plate bolted to a cast aluminum or galvanized cast iron transformer base.

USE: Freestanding pole for mounting vehicle signals. Other equipment may be mounted with vehicle signal.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM457

Plan Sheets: YES

Additional Installation Info: Pgs. 116, 118, 126, & 138



Conduit (Non-Metallic)

DESCRIPTION:

- High Density Polyethylene (HDPE), schedule 40 standard
- Fiberglass, schedule 40 Standard
- PVC (marked for electrical use, typically Grey), schedule 40 standard
- Liquid-Tight Flexible (Used only for conduit mounted on temporary wood poles)

USE: Houses electrical conductors.

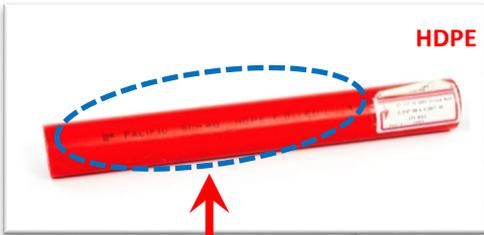
Typical Sources of Info:

Specs: 00960.41 & 00960.42

Std. Dwg: TM471

Plan Sheets: YES (size & location), Typically NO (material type)

Additional Installation Info: Pgs. 118, 128, 130, & 132



HDPE



Fiberglass



PVC



Liquid-Tight Flexible

ID Stamp

Only for mounting on temp. wood poles

Blue Sheet Materials

DESCRIPTION: Conduit bushings with insulated throat but no bonding lug.

USE: Used on the ends of conduit to protect the electrical wiring.

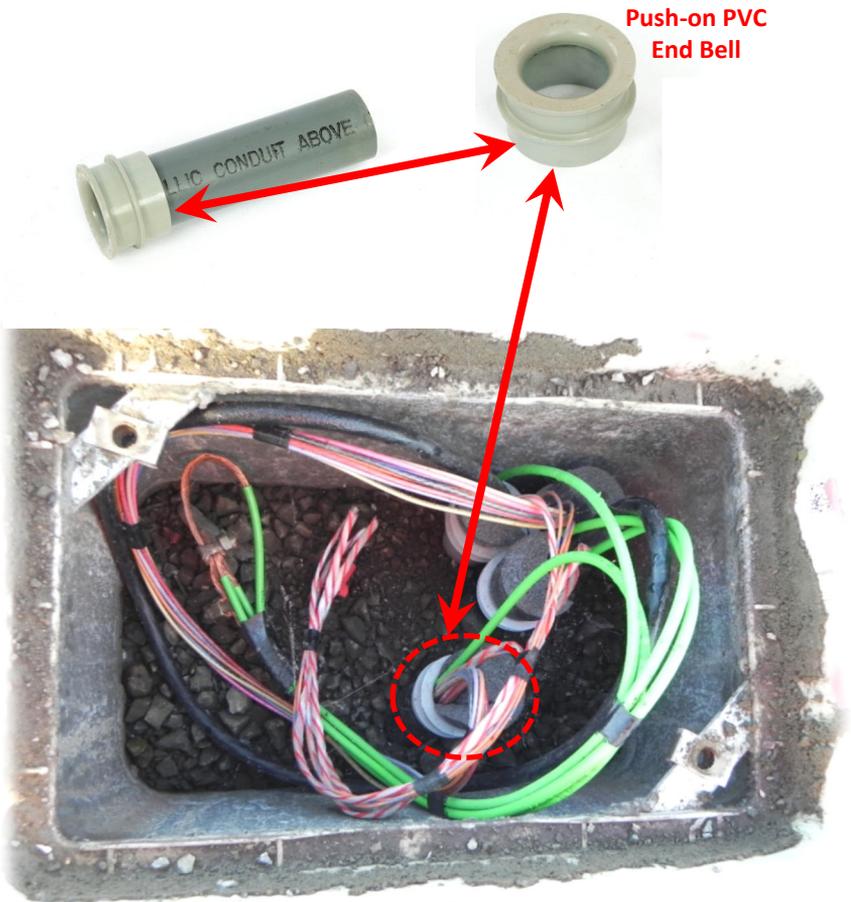
Typical Sources of Info:

Specs: NO

Std. Dwg: TM471

Plan Sheets: NO

Additional Installation Info: Pg. 156



Conduit Plug

DESCRIPTION: Closed cell polyethylene foam style pre-formed for a specific conduit size. Spray foam not allowed. Cut to a supplier suggested length for conduit sizes.

USE: Inserted into exposed end of conduit in foundations and junction boxes, to keep debris out of the conduit. Not watertight.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM471

Plan Sheets: NO

Additional Installation Info: Pgs. 130, 132 & 156



DESCRIPTION: Malleable iron conduit body hot dip galvanized with cover and moisture-proof gasket.

USE: To provide a conduit transition/pull point. Typically used for installing a photoelectric cell.

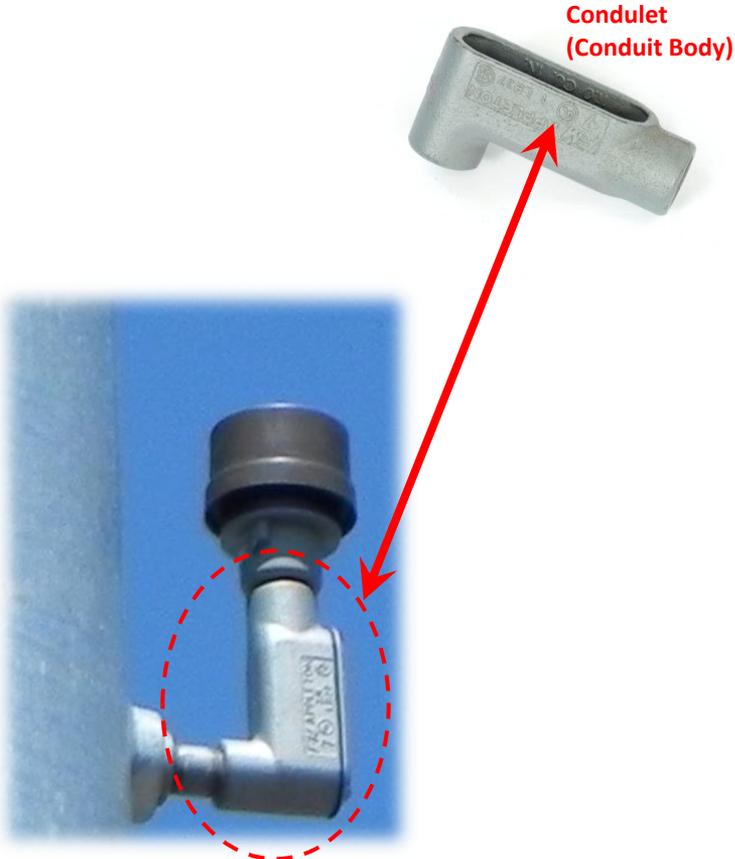
Typical Sources of Info:

Specs: NO

Std. Dwg: TM465

Plan Sheets: NO

Additional Installation Info: Pg. 184



Expansion Fitting

DESCRIPTION: Weatherproof, malleable iron with a hot-dip galvanized finish.

USE: To provide for limited conduit expansion movement when crossing expansion joints in/on structures and between fitted enclosures.

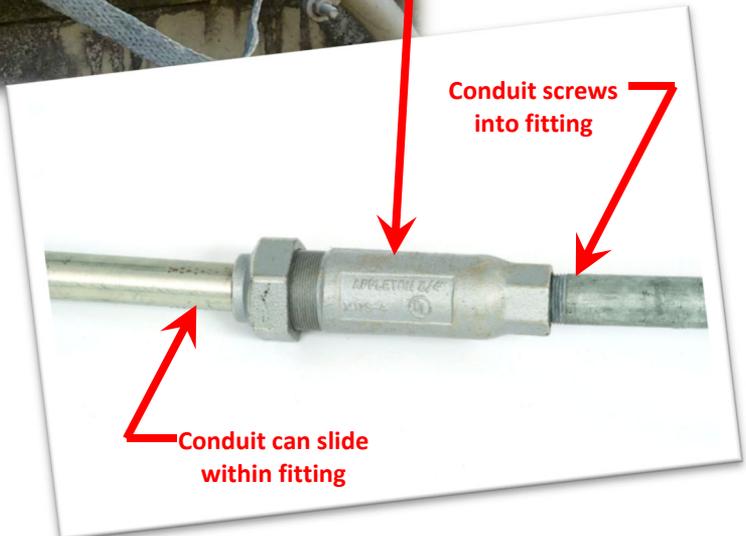
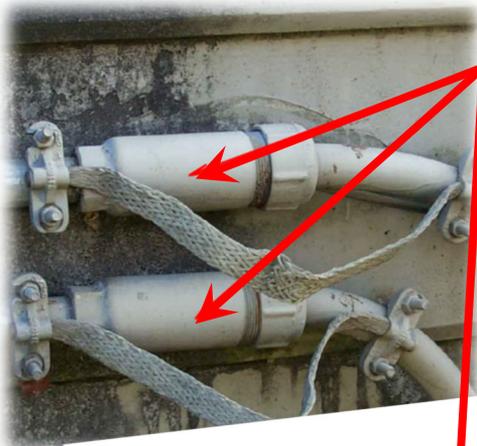
Typical Sources of Info:

Specs: 00960.42(f)

Std. Dwg: NO

Plan Sheets: Typically NO

Additional Installation Info: Pg. 130



DESCRIPTION: Polyethylene or polypropylene rope with 1,200 pound break strength resistant to mildew and rot.

USE: Installed in conduit for future use to allow for easy installation of wire/cables in the future.

Typical Sources of Info:

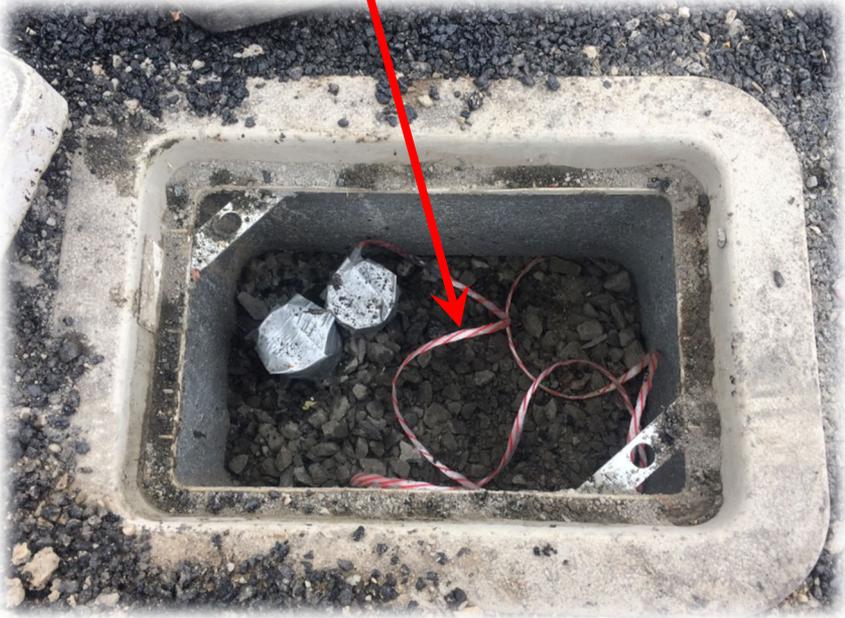
Specs: NO

Std. Dwg: TM470

Plan Sheets: NO

Additional Installation Info: Pgs. 130 & 156

Pull line in Conduit for future use



Underground Warning Tape

DESCRIPTION: Red polyethylene film, 6 inch wide, 4 mils thick. Printed with "CAUTION BURIED ELECTRICAL LINE" legend (or similar legend).

USE: To warn of buried electrical line for any conduit located outside of the paved roadway. Placed the full length of the conduit, 6 inch below the ground surface.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM471

Plan Sheets: NO

Additional Installation Info: Pg. 132



Junction Boxes (Concrete & Hybrid)

DESCRIPTION: Open-bottom boxes of pre-cast reinforced concrete with brass or stainless steel fasteners. Polymer concrete also allowed.

USE: As a pull point or wire access point.

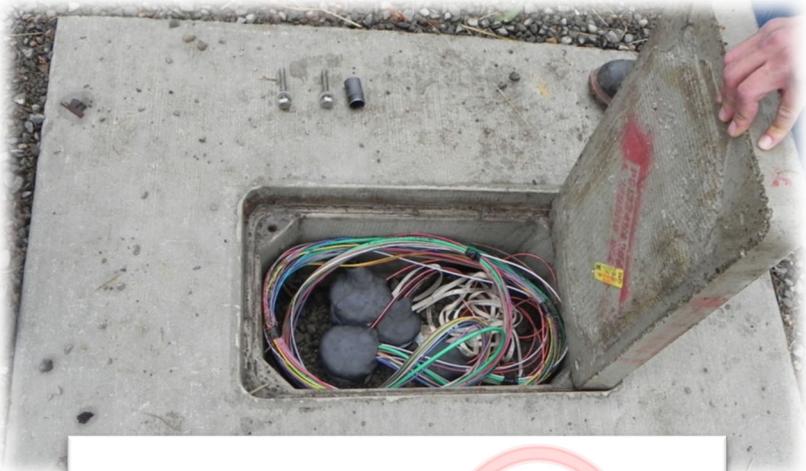
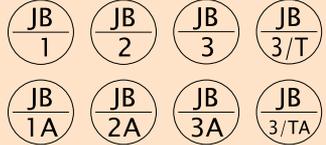
Typical Sources of Info:

Specs: NO

Std. Dwg: TM472

Plan Sheets: YES

Additional Installation Info: Pgs. 134 & 136



Junction Boxes (Hand Hole)

DESCRIPTION: Open bottom boxes made of polymer, fiberglass, and/or polymer concrete.

USE: As a pull point/wire access point for communication cables like fiber optic, etc.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM472

Plan Sheets: YES

Additional Installation Info: Pgs. 134 & 136



DESCRIPTION: Mount that attaches to a pole and accepts an 1 ½ inch tube to mount a radio. Similar to a vehicle signal bracket, but without the arms.

USE: Mounting radio equipment.

Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: NO



Video Detection Mount

DESCRIPTION: Mount that attaches to a pole, mast arm or luminaire arm. One piece with 23 inch tube.

USE: Mount for video detection equipment.

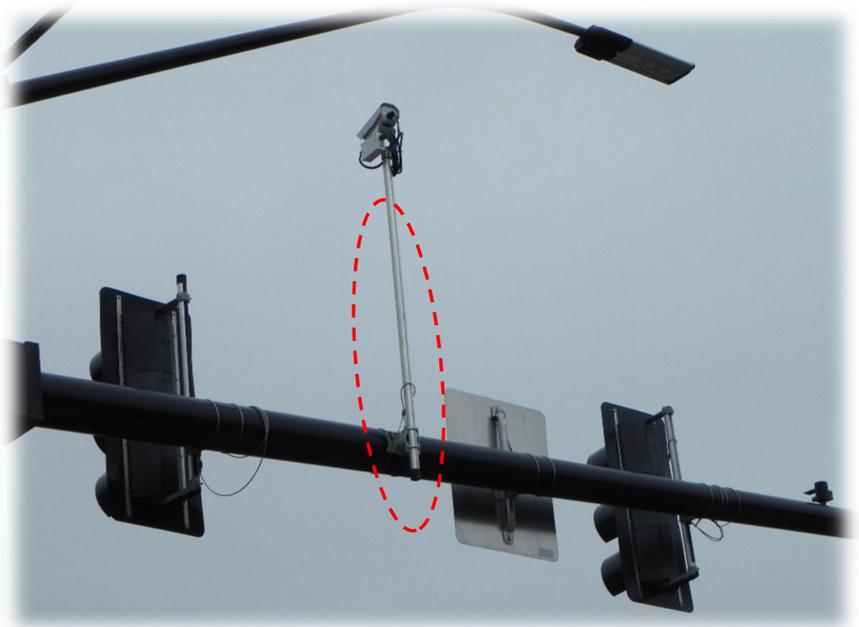
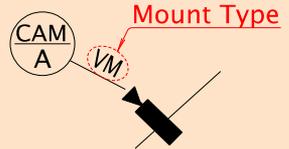
Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: Pg. 180



DESCRIPTION: Black nylon or plastic strips UV resistant, with a positive, non-release binding. No metal grippers allowed.

USE: Strapping control cable/wire to messenger cable on spans. Installed at 6 inch spacing.

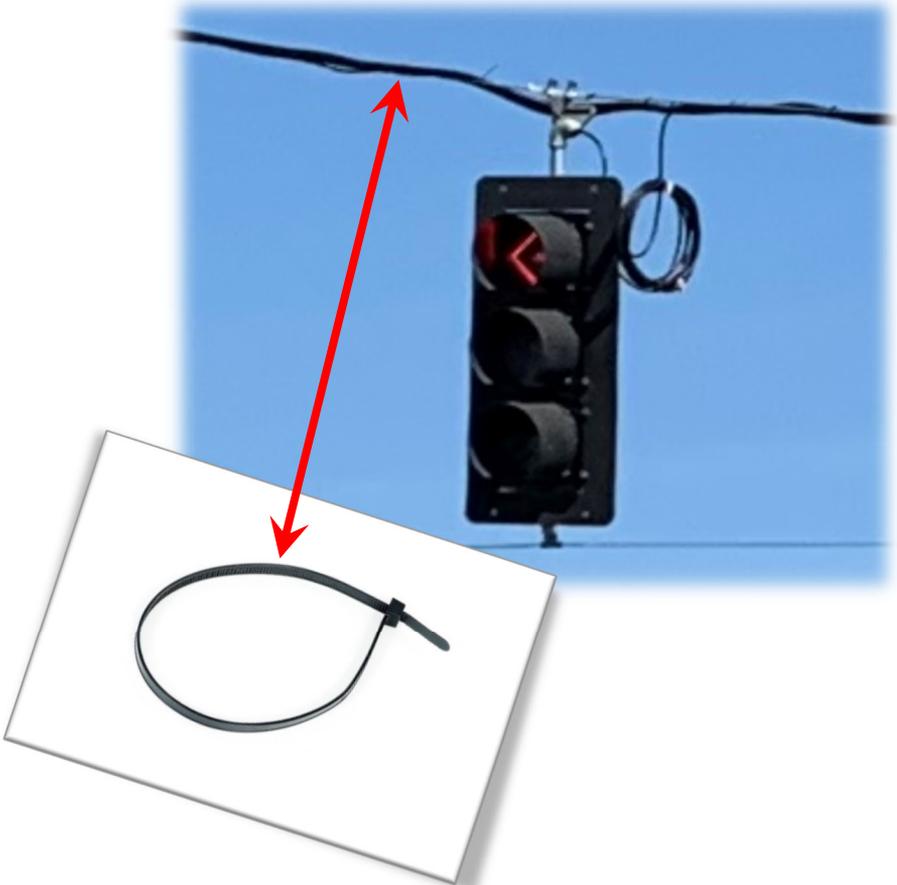
Typical Sources of Info:

Specs: NO

Std. Dwg: TM452

Plan Sheets: NO

Additional Installation Info: Pg. 158



Messenger Cable

DESCRIPTION: Bare steel cable comprised of 7 strands of galvanized wire. Utilities grade 3/8 inch diameter with 11,500 lbs. break.

USE: Supports control cables, signal heads and signs on a spanwire installation.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM452

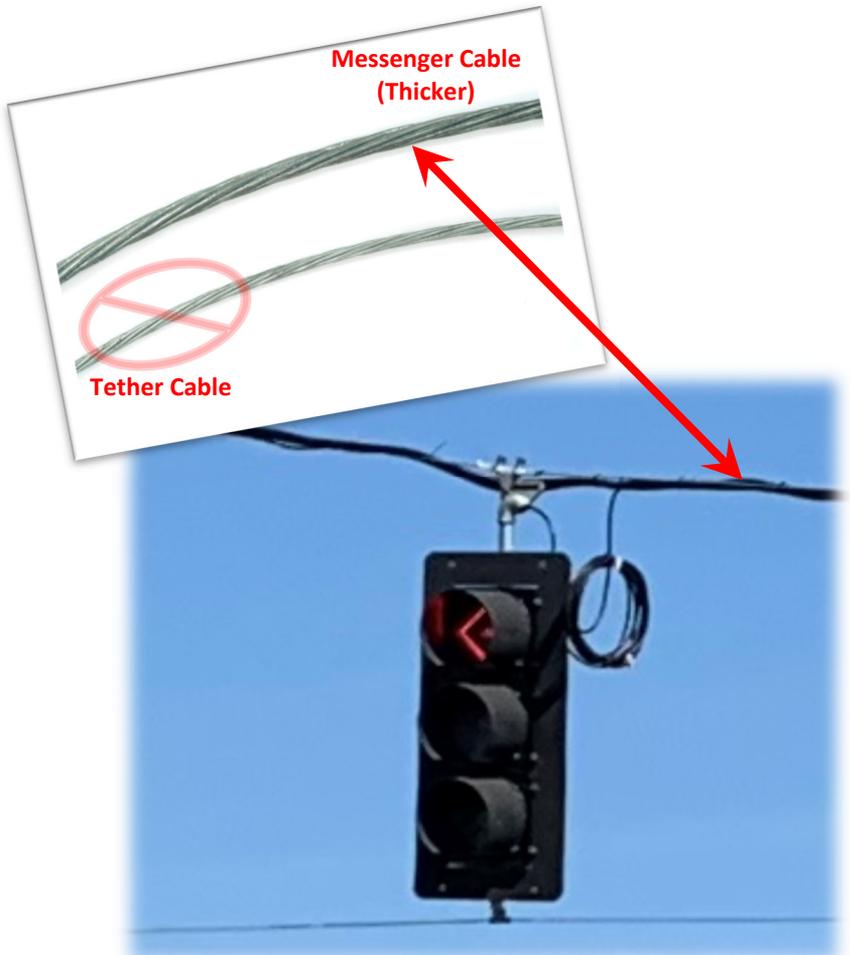
Plan Sheets: YES

Additional Installation Info: Pg. 146

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DESCRIPTION: ¼ inch galvanized steel cable comprised of 7 strands of galvanized wire. Class A coating conforming to ASTM A 475.

USE: Attached at the bottom of equipment to stabilize and prevent wind movement.

Typical Sources of Info:

Specs: NO

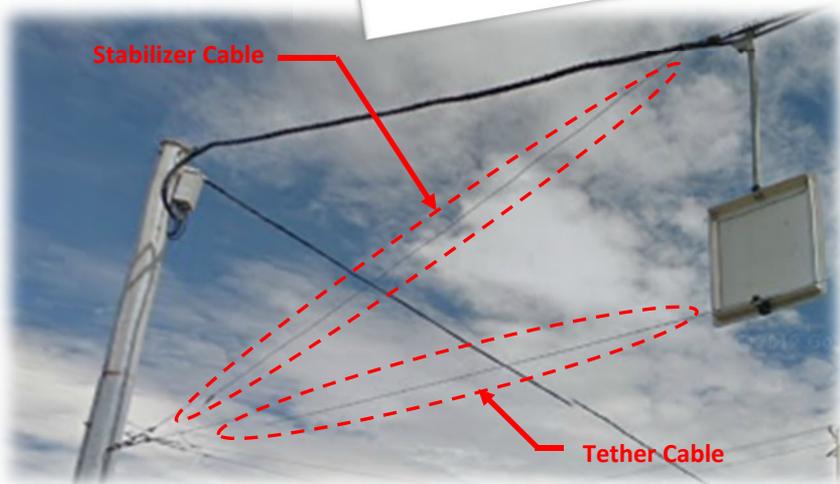
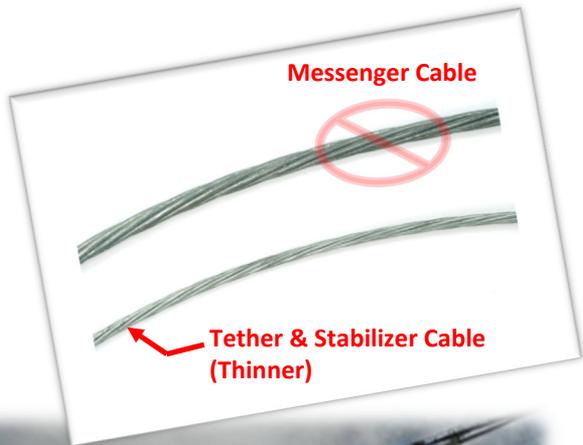
Std. Dwg: TM452

Plan Sheets: YES

Additional Installation Info: Pg. 148

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Eyebolt, Turnbuckle, Strandvise

DESCRIPTION: Hardware for attaching spanwire installations to strain poles. Hot-dip galvanized.

USE:

- To hang messenger cable (cable above signal heads): An eyebolt + strandvise.
- To hang tether cable (cable below signal heads): An eyebolt + “S” hook + turnbuckle + strandvise. The “S” hook is State supplied and designed to yield if the tether cable is struck by a high load.

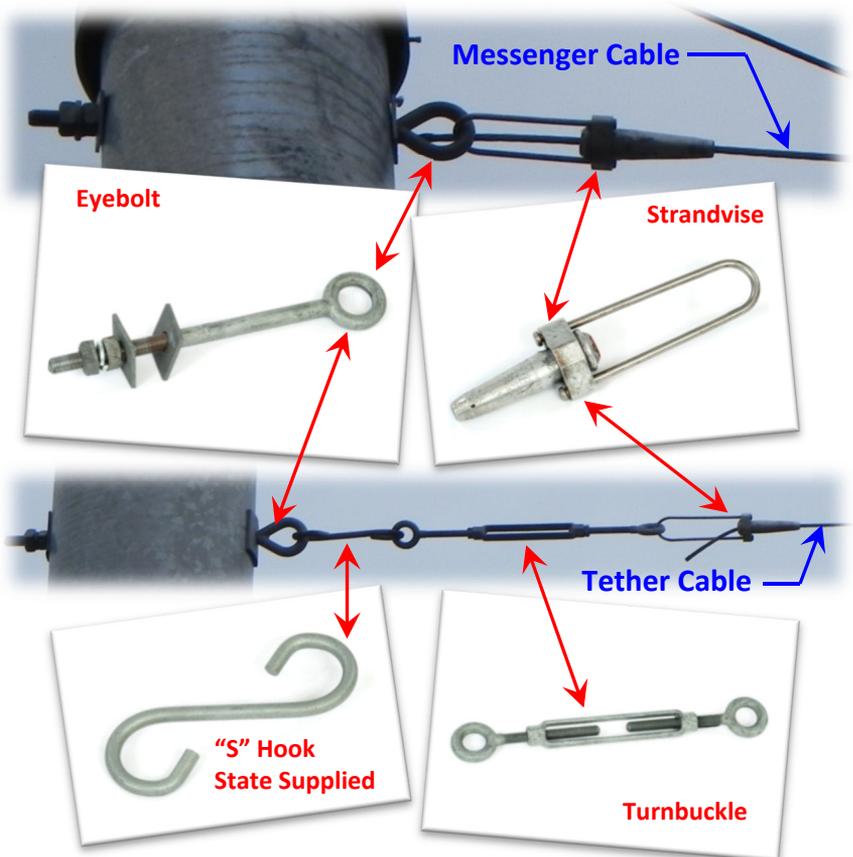
Typical Sources of Info:

Specs: NO

Std. Dwg: TM452

Plan Sheets: NO

Additional Installation Info: Pgs. 146 & 148



DESCRIPTION: A fitting of cast bronze that attaches to the messenger cable with two “U” bolts. A wire outlet body hangs from this with a clevis pin through adjustable slot. All fasteners shall be type 304/316 stainless steel.

USE: To mount vehicle signal and signs on span wires. Allows equipment to hang plumb from spanwire, provides cable entrance when wire is installed with correct drip loop.

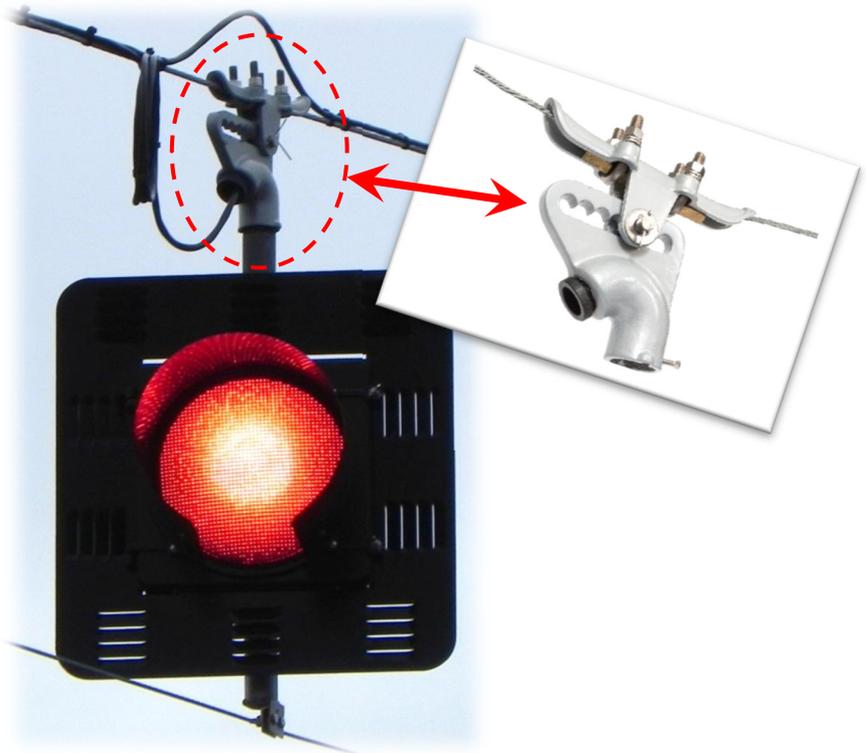
Typical Sources of Info:

Specs: NO

Std. Dwg: TM463

Plan Sheets: NO

Additional Installation Info: Pg. 150



Tether Clamp

DESCRIPTION: Fitting on bottom of span mounted signal or sign constructed of 1 ½ inch galvanized steel pipe or galvanized metal conduit with plate welded on bottom, tether wire keeper bolted to plate. Galvanized after fabrication. All fasteners type 304/316 stainless steel.

USE: To attach tether cable to vehicle signals and signs.

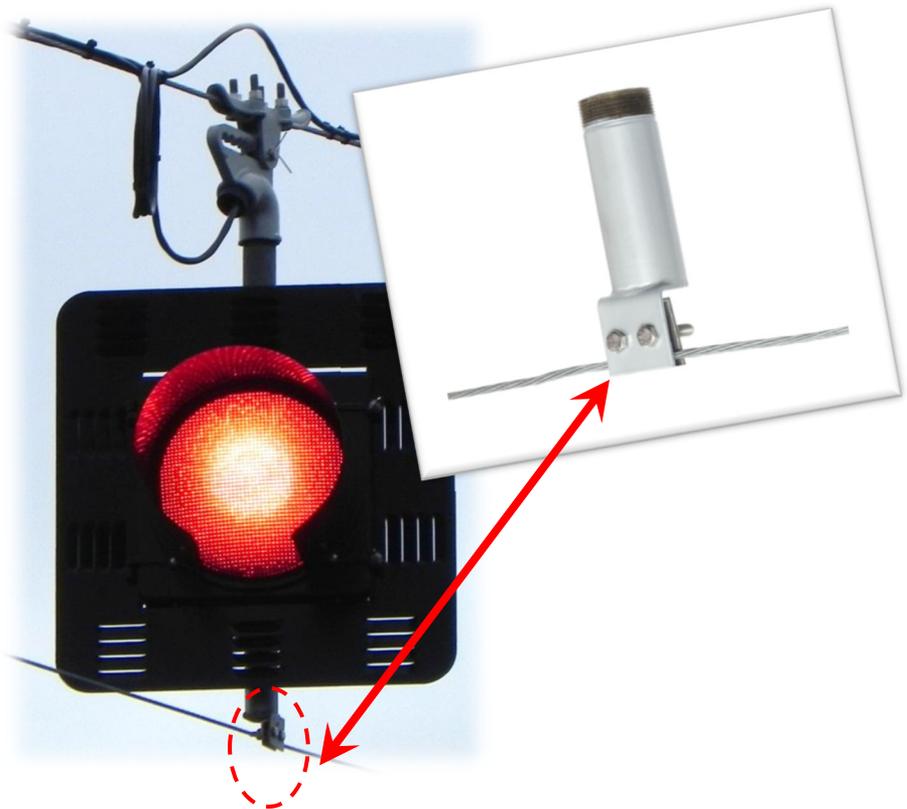
Typical Sources of Info:

Specs: NO

Std. Dwg: TM463

Plan Sheets: NO

Additional Installation Info: Pg. 148



DESCRIPTION: Fitting of cast aluminum with steel insert, powder coated. Three bolts, split washers, and nylon insert lock-nuts, with 2 stainless steel backing washers.

USE: To attach vehicle signals and signs to a 1 ½ inch conduit riser which is supported by a spanwire hanger.

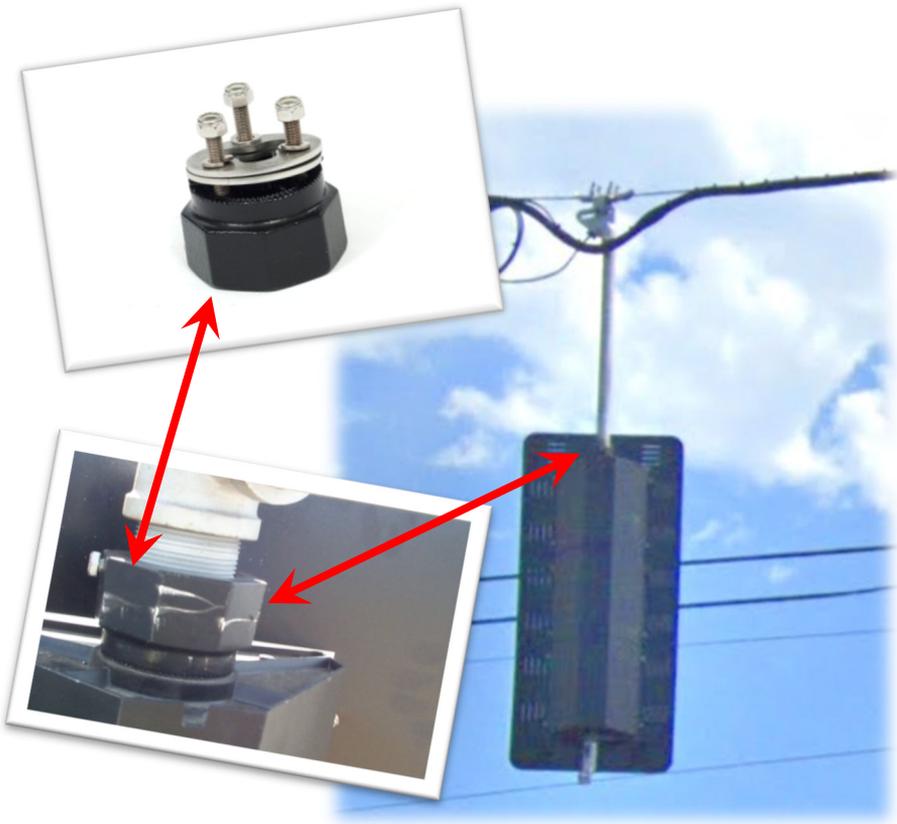
Typical Sources of Info:

Specs: NO

Std. Dwg: TM463

Plan Sheets: NO

Additional Installation Info: Pg. 150



Bond Wire

DESCRIPTION: THWN No. 6 AWG, 7 Stranded copper wire (in conduit) or bare No.4 AWG, 7 Stranded copper wire (outside of conduit).

USE: Bond/grounding wire for 120V AC circuits.

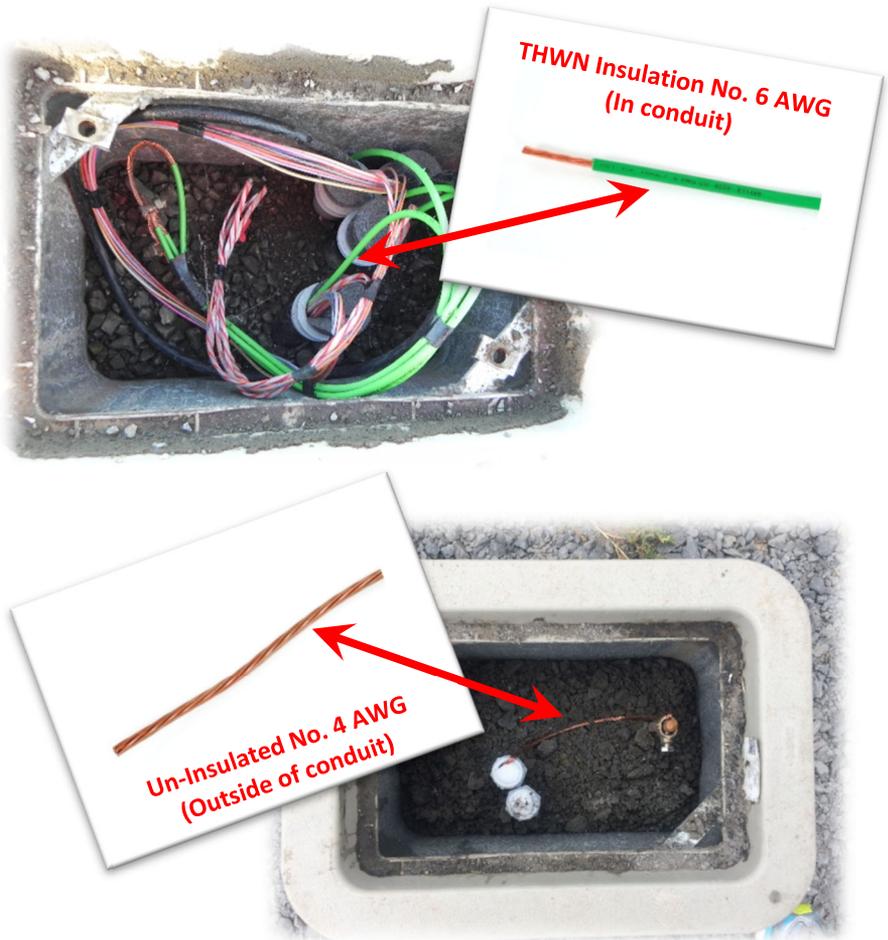
Typical Sources of Info:

Specs: 00960.50(b)

Std. Dwg: TM450, TM452, & TM482

Plan Sheets: NO

Additional Installation Info: Pg. 154



Ground Rod & Clamp

DESCRIPTION: Copper coated 5/8 inch metal rod, 8 feet to 10 feet long with clamp.

USE: To ground electrical installation. All poles, conduit runs with 120V AC, and controller cabinet must be bonded to ground rod using full-contact clamps.

Typical Sources of Info:

Specs: 00960.50(c)

Std. Dwg: TM450, TM452, TM455, TM457, TM482, & TM492

Plan Sheets: NO

Additional Installation Info: Pgs. 126 & 154



Control Cable

DESCRIPTION: Multi-conductor bundled cable with assorted stranded copper wires (typically 14 AWG, but may be other sizes). Must meet color code on standard drawings.

USE: Used to provide electrical energy. Strapped to messenger cable on spans or used in mast arms. May also be used in conduit runs.

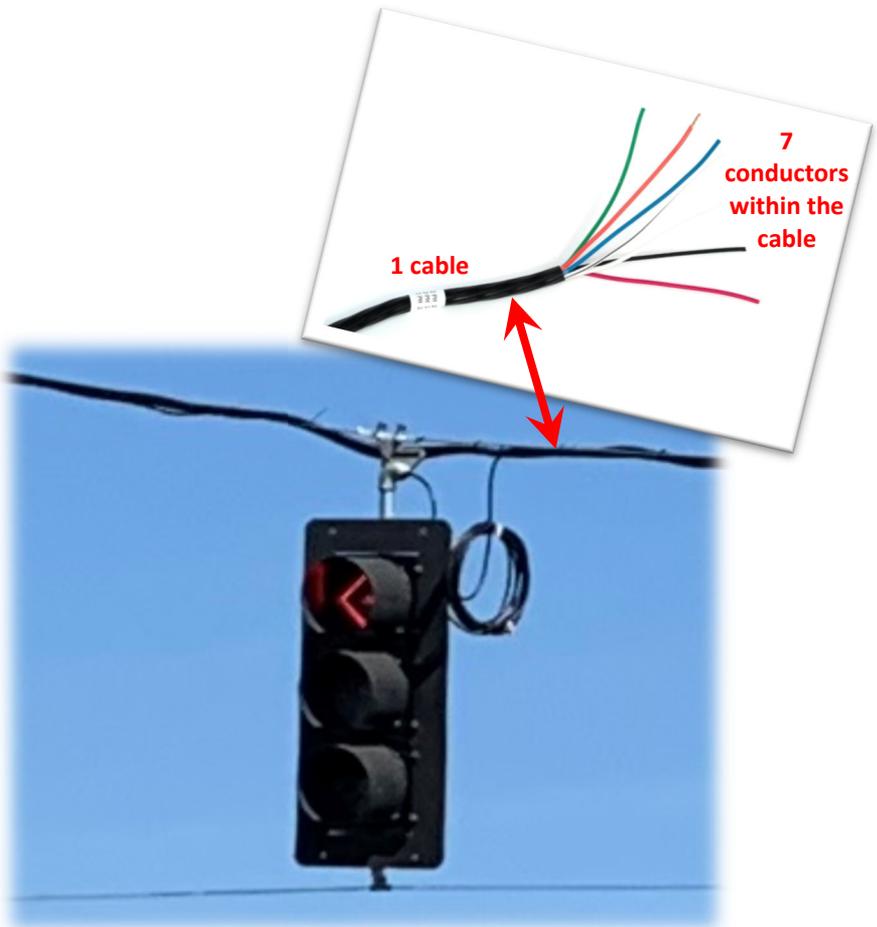
Typical Sources of Info:

Specs: NO

Std. Dwg: TM470

Plan Sheets: YES

Additional Installation Info: Pgs. 156 & 158



Industrial Ethernet Cable

DESCRIPTION: Waterblock/direct burial rated, shielded enhanced category 6 cable. No. 24 AWG solid bare copper conductors with PE inner jacket.

USE: For communication between devices.

Typical Sources of Info:

Specs: NO

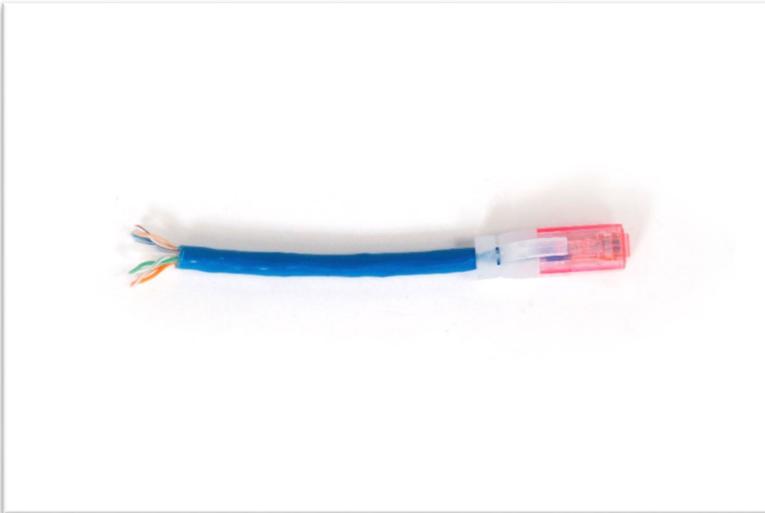
Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: Pg. 156

NET

CAT6



Interconnect Cable

DESCRIPTION: Shielded cable containing 6+ twisted pairs of No. 19 AWG wires. REA spec. PE-22 (air-core, for overhead) or PE-39 (gel-fill, for underground), polyethylene jacket.

USE: For communication between traffic signal controllers. Installed with no splices between separate signal controllers.

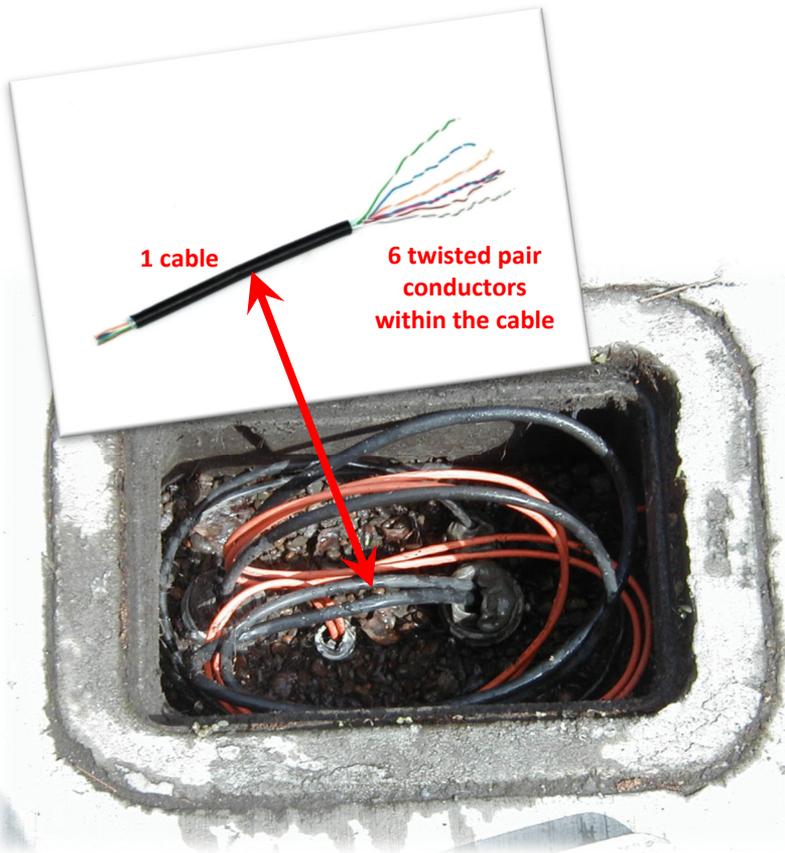
Typical Sources of Info:

Specs: 00990.70(i)

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: Pg. 156



TFFN, THWN & XHHW Wire

DESCRIPTION: Stranded copper conductor, color coded wire.

- **TFFN wire** has PVC insulation and nylon jacket. Very similar to THWN.
- **THWN wire** has PVC insulation and nylon jacket. Visually, this insulation is “shinier” than XHHW.
- **XHHW wire** has cross-linked polyethylene insulation. This insulation is more durable than THWN.

USE: THWN and XHHW is used provide electricity to equipment for all single conductor applications. TFFN wire is used exclusively as a tracer/locate wire.

Typical Sources of Info:

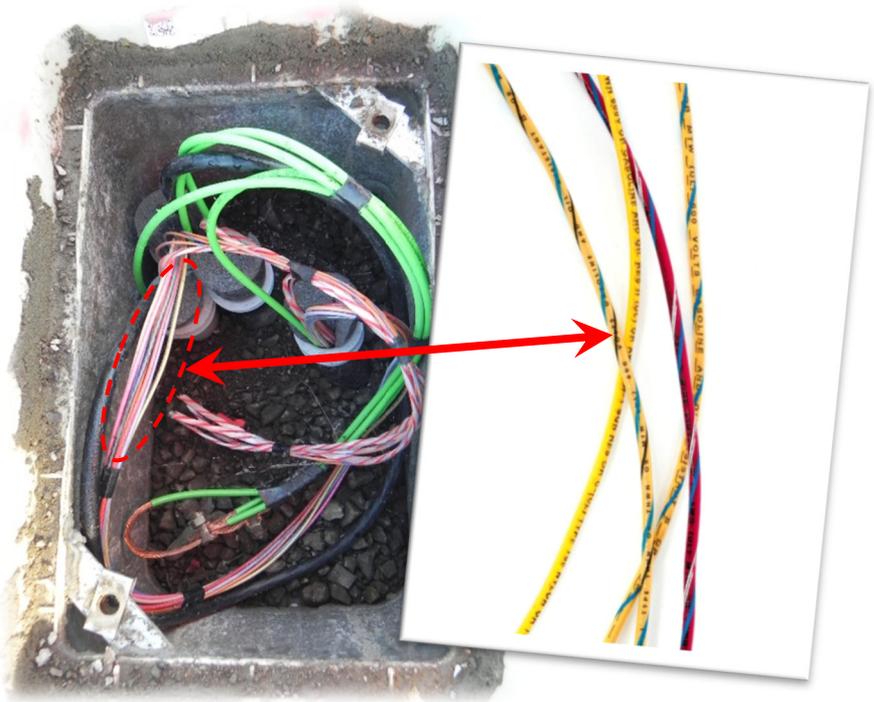
Specs: NO

Std. Dwg: TM470

Plan Sheets: YES (TFFN: NO)

Additional Installation Info: Pgs. 156 & 158

N-C	N-12C
N/G	N G



Strain Relief

DESCRIPTION: Single eye, tin coated bronze wire with a mesh grip.

USE: To provide slack and hold wires/cables at certain locations, protecting them from strain and damage. Typically used inside the signal pole at the point where the mast arm and luminaire arm connects to the pole.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM450

Plan Sheets: NO

Additional Installation Info: Pg. 158



DESCRIPTION: Pole mounted signals. Aluminum powder coated black or black polycarbonate with stainless steel hardware.

USE: To indicate pedestrian phases at marked crosswalks (WALK, Flashing DON'T WALK, and DON'T WALK).

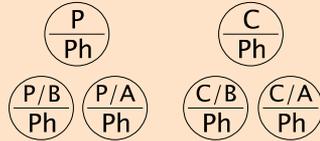
Typical Sources of Info:

Specs: NO

Std. Dwg: TM467

Plan Sheets: YES

Additional Installation Info: Pg. 160



Pedestrian Signal Mount

DESCRIPTION: Swing open clam shell compartment.

USE: To connect pedestrian signal to pole, with wire terminals.

Typical Sources of Info:

Specs: NO

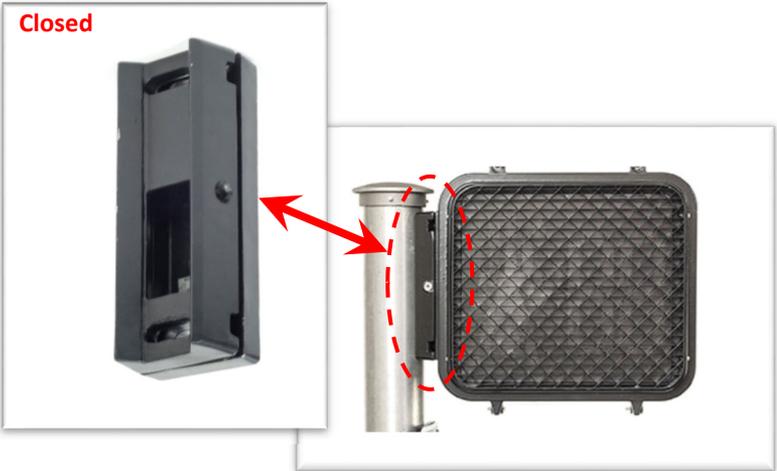
Std. Dwg: TM467

Plan Sheets: YES

Additional Installation Info: Pg. 160



Blue Sheet
Materials



LED Modules (Pedestrian Signal)

DESCRIPTION: Light Emitting Diode (LED) unit for pedestrian heads. Flange mount type, clear. Countdown Combo or Hand/Man Combo

USE: To illuminate pedestrian signals.

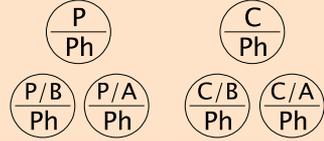
Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: Pg. 160



Pushbutton & Mount

DESCRIPTION: Pushbutton with mounts. Note the new standard mount, which has replaced the type “H” mount used in the past.

USE: For pedestrians to request the walk phase.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM467

Plan Sheets: YES

Additional Installation Info: Pgs. 162 & 164



Blue Sheet
Materials



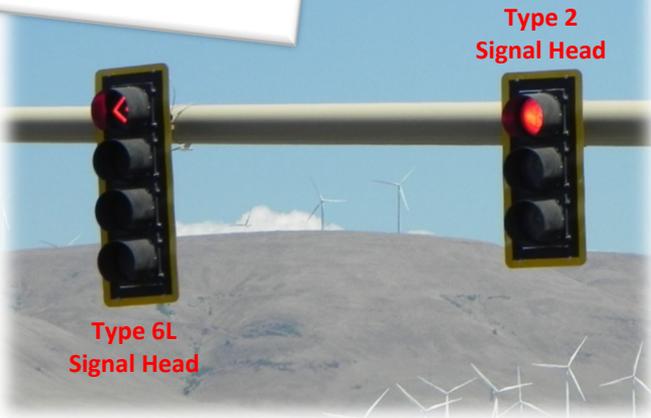
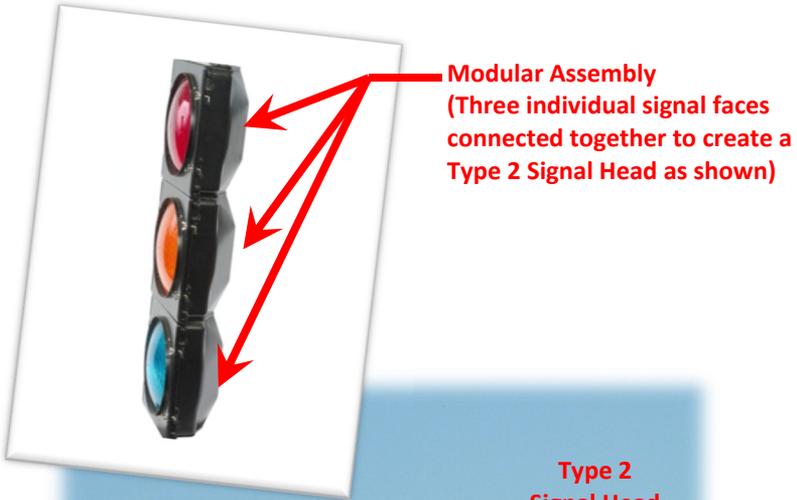
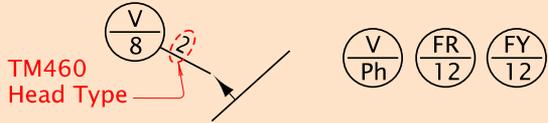
**New Standard
(9"x12" mount)**

DESCRIPTION: Aluminum powder coated black or black polycarbonate. May have 1,2,3,4, or 5 signal faces, defined on plan sheets and TM460 by Signal Head Type. All fasteners shall be type 304/316 stainless steel except for brass terminal screws.

USE: To direct vehicles at intersections.

Typical Sources of Info:

Specs: NO
 Std. Dwg: TM460
 Plan Sheets: YES
 Additional Installation Info: Pg. 166



Vehicle Signal (Backboard)

DESCRIPTION: Aluminum sheet powder-coated flat black louvered or black polycarbonate attached with stainless steel screws and washers with reflective sheeting installed along the edge.

USE: Shield around vehicle signal to provide a contrast to the background.

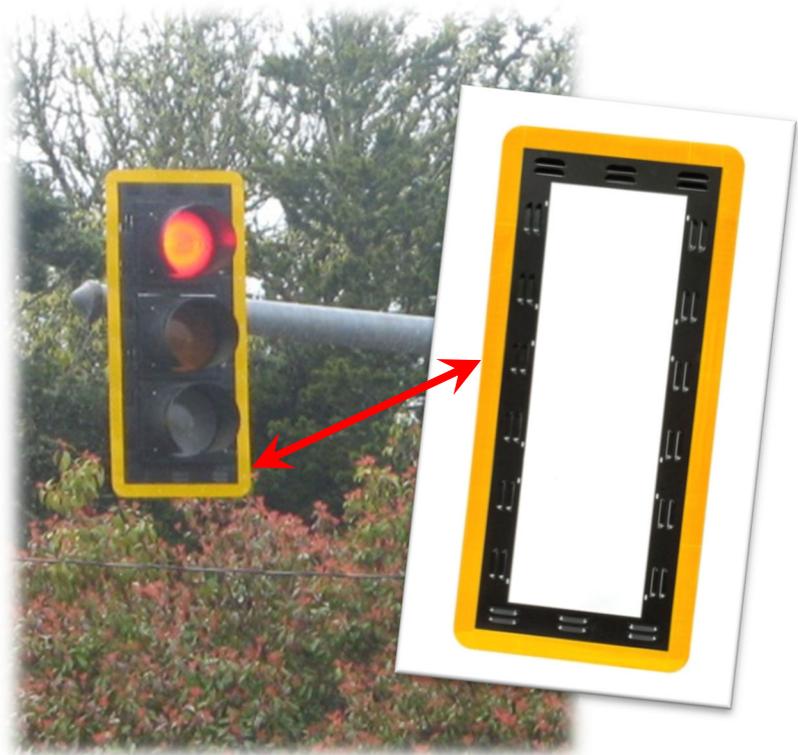
Typical Sources of Info:

Specs: NO

Std. Dwg: TM460

Plan Sheets: YES

Additional Installation Info: Pg. 166



DESCRIPTION: Aluminum powder coated black or black polycarbonate. Visor must attach to signal heads with stainless steel screws.

- **Standard:** open at bottom standard (tunnel)
- **Cut-off:** longer, not open at bottom (used for special cases to limit visibility of the indication)

USE: On all signal heads to direct the illumination to the motorist.

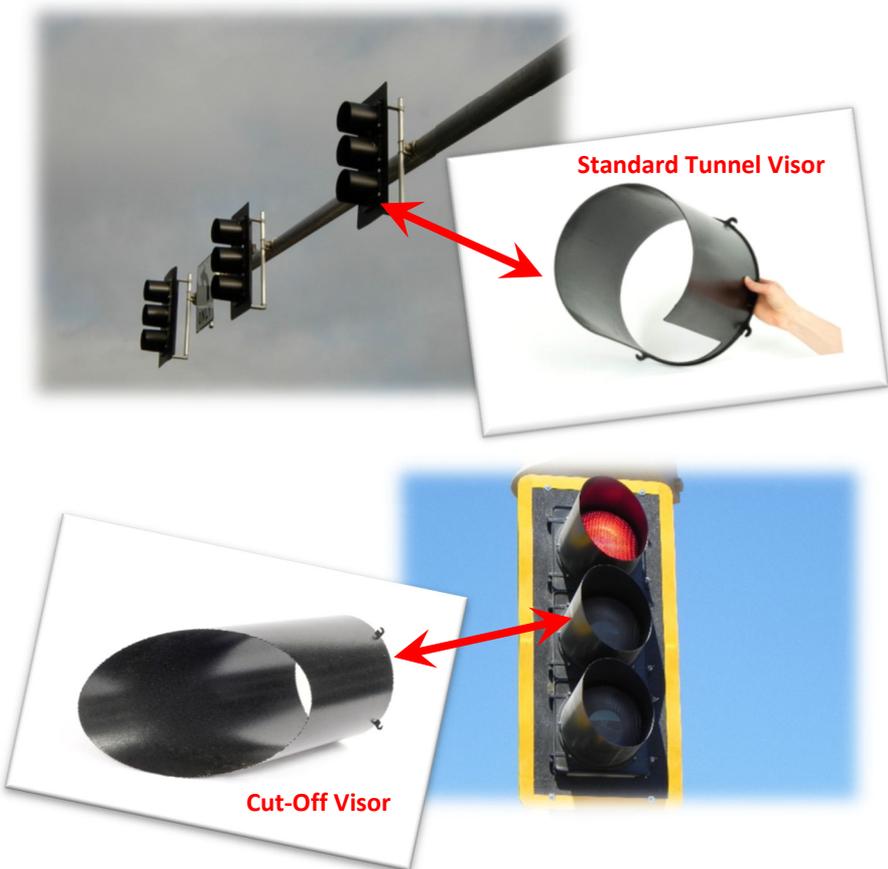
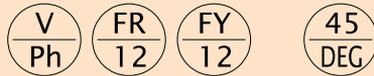
Typical Sources of Info:

Specs: NO

Std. Dwg: TM460

Plan Sheets: YES

Additional Installation Info: Pgs. 166 & 194



LED Modules (Vehicle Signal)

DESCRIPTION: Light Emitting Diode (LED) unit for vehicle signal heads. Flange mount type, clear. 12 inch Ball or Arrow in Red, Yellow or Green.

USE: To illuminate vehicle signals.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM460

Plan Sheets: YES

Additional Installation Info: Pgs. 166

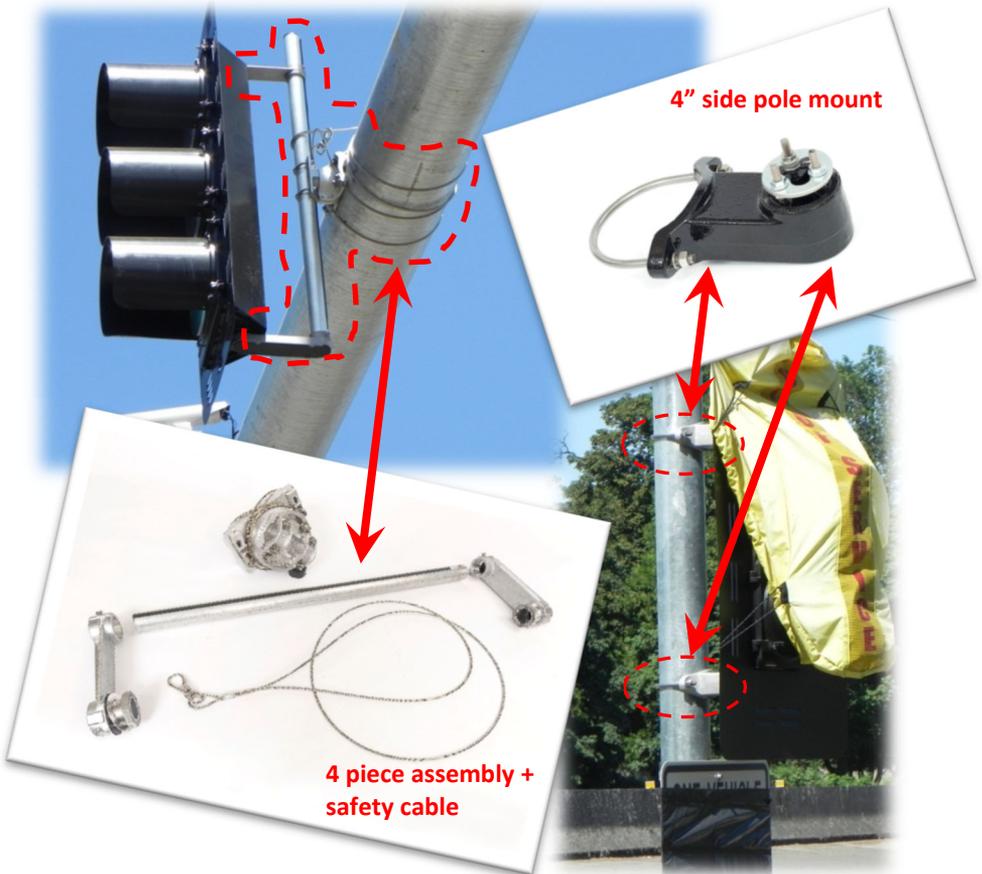


DESCRIPTION: An extruded aluminum assembly that is adjustable. Its full length supports a vehicle signal on a mast arm and attaches to the arm by means of stainless steel cables.

USE: To mount vehicle signals and signs on a mast arm. Allows for adjustment of signal for height and full support of signal sections. 4 inch side pole mount used to mount vehicle signals on vehicle pedestals.

Typical Sources of Info:

- Specs: NO
- Std. Dwg: TM462
- Plan Sheets: YES (pole entrance chart)
- Additional Installation Info: Pg. 168



Louver

DESCRIPTION: Geometrically programmed louvers installed inside the visor.

USE: To limit visibility of the signal indication in certain circumstances.

Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: Pgs. 166 & 194

GPL



DESCRIPTION: Powder coated aluminum or polymer, 2 inch diameter, white LED indication.

USE: Mounted on the vehicle signal, hard-wired to the red indication, aids police in enforcement of red light running.

Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: Pg. 195



Tattletale light is visible when looking at the back of the signal head – indicating the RED indication is ON

Loop Feeder Cable

DESCRIPTION: Polyethylene jacketed, shielded cable with two twisted No. 14 AWG wires and bare tinned copper drain wire or No. 14 AWG wires wrapped with mylar tape. IMSA Spec. No. 50-2. May also be No. 18 AWG wires if shown in the plans.

USE: Connects pairs of loop wires to controller, splice only at the junction box nearest the loop wires.

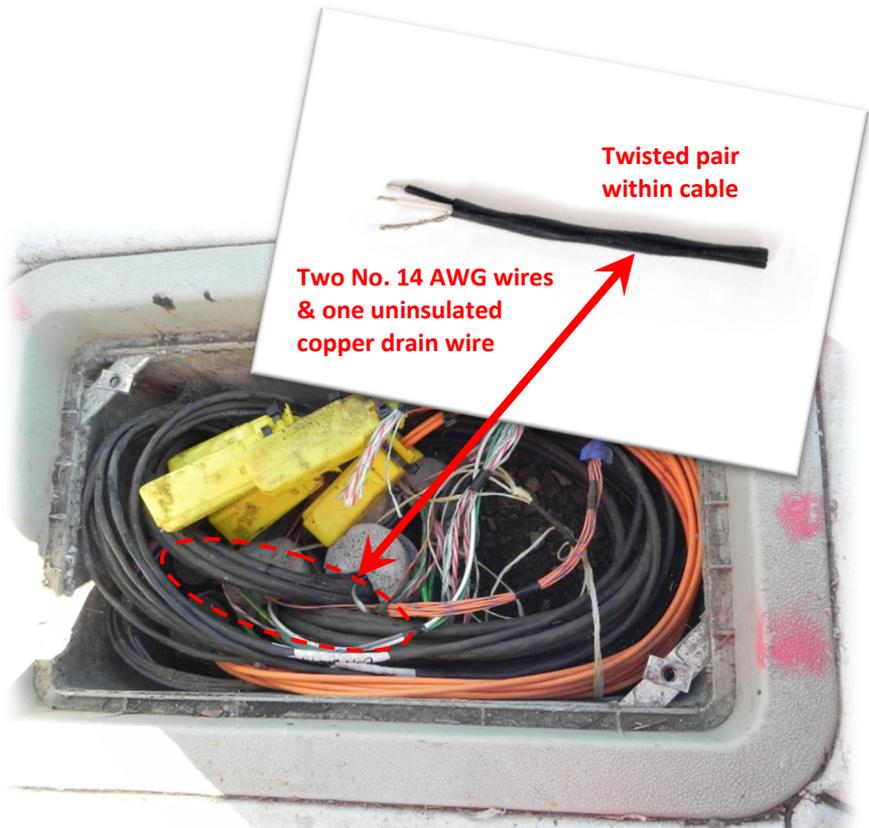
Typical Sources of Info:

Specs: 00990.42(b)

Std. Dwg: TM475

Plan Sheets: YES

Additional Installation Info: Pg. 156 & 178



Blue Sheet
Materials

DESCRIPTION: Stranded copper conductor, with cross-linked polyethylene insulation, No. 14 AWG wire. Encased in a polyethylene tube (sleeve). Wire and tube must be stamped with proper IMSA 51.7.

USE: Used to detect vehicles. Loop wire is installed in the pavement in a circle or diamond pattern. The pair of loop wires, from the pavement to the junction box, is manually twisted 4 to 6 turns per foot.

Typical Sources of Info:

Specs: 00990.41

Std. Dwg: TM475

Plan Sheets: YES

Additional Installation Info: Pgs. 172, 174, & 178



Loop Splice

DESCRIPTION: Two-piece plastic enclosure flooded with silicon grease. Includes screw on silicon grease filled wire connectors.

USE: Used to connect loop feeder and loop wire (splice point).

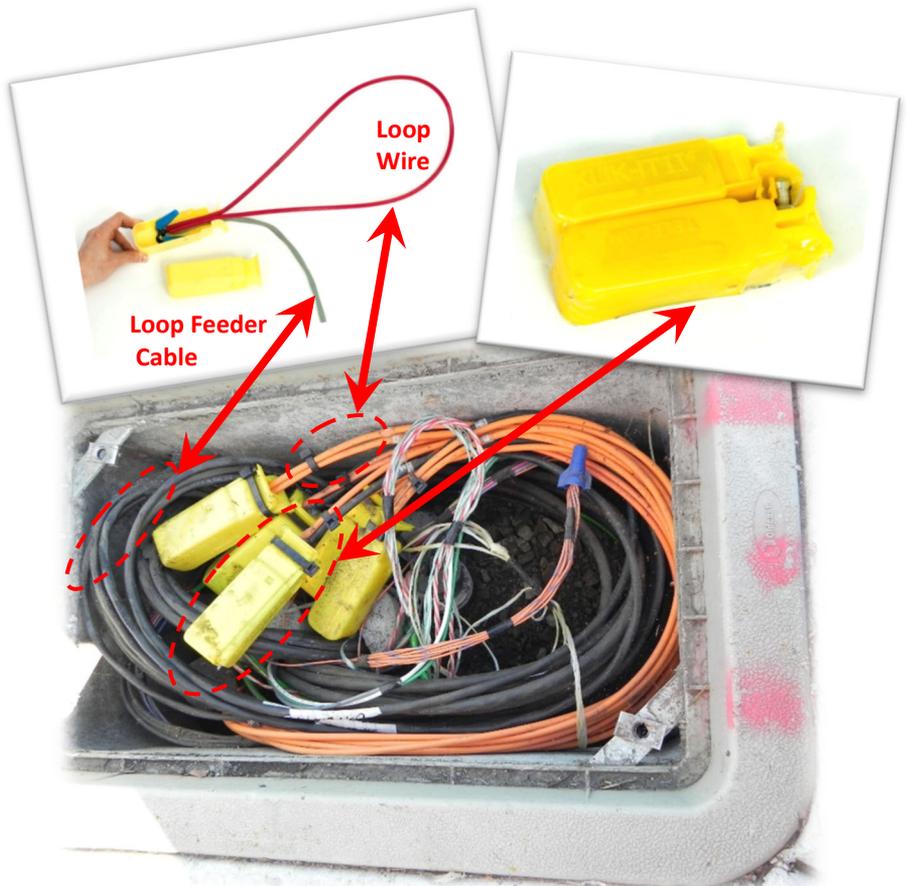
Typical Sources of Info:

Specs: 00990.41(d)

Std. Dwg: TM475

Plan Sheets: NO

Additional Installation Info: Pg. 178



DESCRIPTION: 30A 600V single pole or double pole in-line fuse holder with KTK fuse, insulating boots, and set-screw terminations.

USE: To splice illumination wires and provide a fused disconnect in the luminaire/signal pole base.

Typical Sources of Info:

Specs: 00970.42

Std. Dwg: NO

Plan Sheets: NO

Additional Installation Info: Pg. 184



TC Cable

DESCRIPTION: Typically a three conductor No. 10 AWG cable with XHHW conductors and overall PVC jacket.

USE: Illumination cable between the luminaire fixture and the in-line fuse holder in the pole base.

Typical Sources of Info:

Specs: 00970.42

Std. Dwg: NO

Plan Sheets: NO

Additional Installation Info: Pg. 184



DESCRIPTION: A photoelectronic device used for turning on illuminated signs or luminaires meeting specifications under 00970.

USE: To activate illumination systems, luminaires at traffic signals and interior illuminated signs.

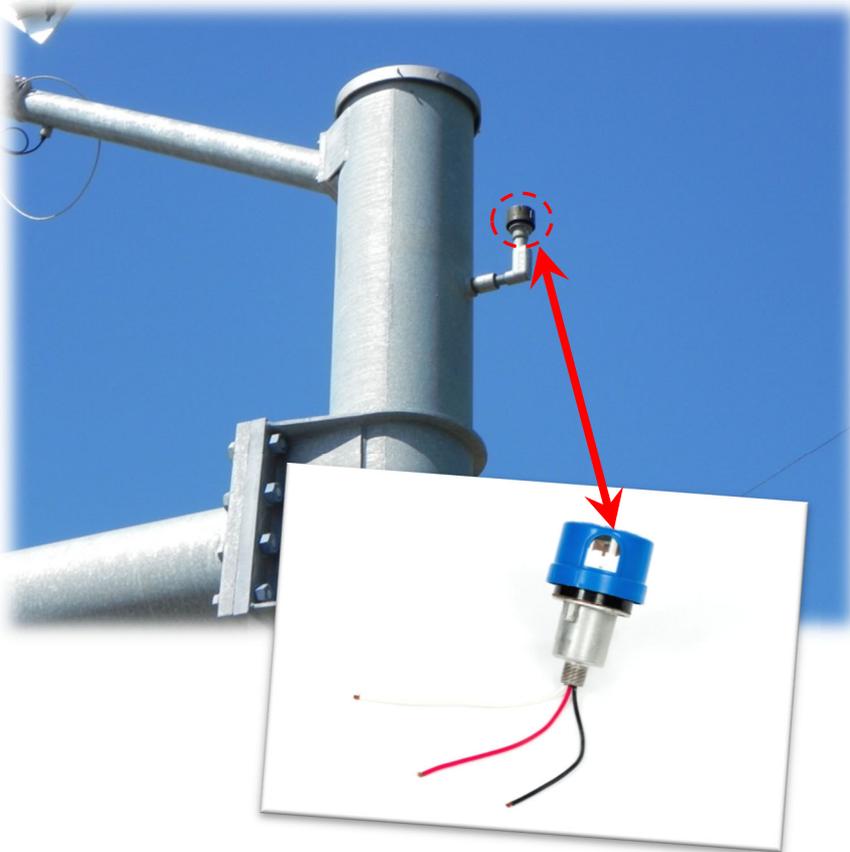
Typical Sources of Info:

Specs: 00970.43 & 02926.41(e)

Std. Dwg: TM465

Plan Sheets: YES

Additional Installation Info: Pg. 184



Riser Frames

DESCRIPTION: Aluminum framework of ¼ inch channel or 1/8 inch sheet stock. One piece welded construction for newer installations, two-piece bolt together for retro-fit. Both styles anodized after fabrication.

USE: To raise the controller cabinet from the foundation 8 inches, providing additional work space under the cabinet. Use building paper gasket and non-hardening water tight seal between riser and cabinet and between foundation and riser.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM482

Plan Sheets: YES

Additional Installation Info: Pg. 186

332S

334

RF



Base Mounted Service Cabinet

DESCRIPTION: Base mounted service cabinet with integral meter base. Includes circuit breakers, contactors, test switches, neutral and ground bars. Stainless, powder coated aluminum, or galvanized steel cabinet.

Note: Temporary installations use a pole mounted, stand-alone service cabinet and stand-alone meter base. See Pages 11 & 12.

USE: Used to provide fused electrical service for permanent installations.

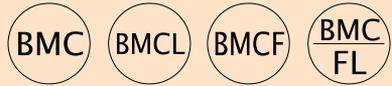
Typical Sources of Info:

Specs: NO

Std. Dwg: TM482 & TM485

Plan Sheets: YES

Additional Installation Info: Pg.152



Base Mounted Service Cabinet Types (Housing stays the same, circuitry inside changes as per TM485):

- **BMC: Signal Only**
- **BMCL: Signal & Illumination**
- **BMCF: Signal & Flashing Beacon**
- **BMCFL: Signal, Flashing Beacon, & Illumination**

Terminal Cabinet

DESCRIPTION: Constructed of 1/8 inch stainless, galvanized steel, or powder coated aluminum. Weatherproof fittings at the bottom for span wire installations. Typically only used with span wire and temporary wood pole installations. Mast arm poles typically specify a recessed terminal cabinet (RTC), which is part of the signal pole shop drawings, not a blue sheet item.

USE: To house terminal blocks on poles for all signal circuits.

Typical Sources of Info:

Specs: NO

Std. Dwg: TM488

Plan Sheets: YES

Additional Installation Info: Pg. 144

TC

RTC



DESCRIPTION: Sectional wire termination points, 600 Volt rated, solder-less connections, tubular clamp, sized for wire being terminated, channel mount assembly.

USE: For terminating wires/cables in the terminal cabinet on a signal pole and in the 332S signal controller cabinet.

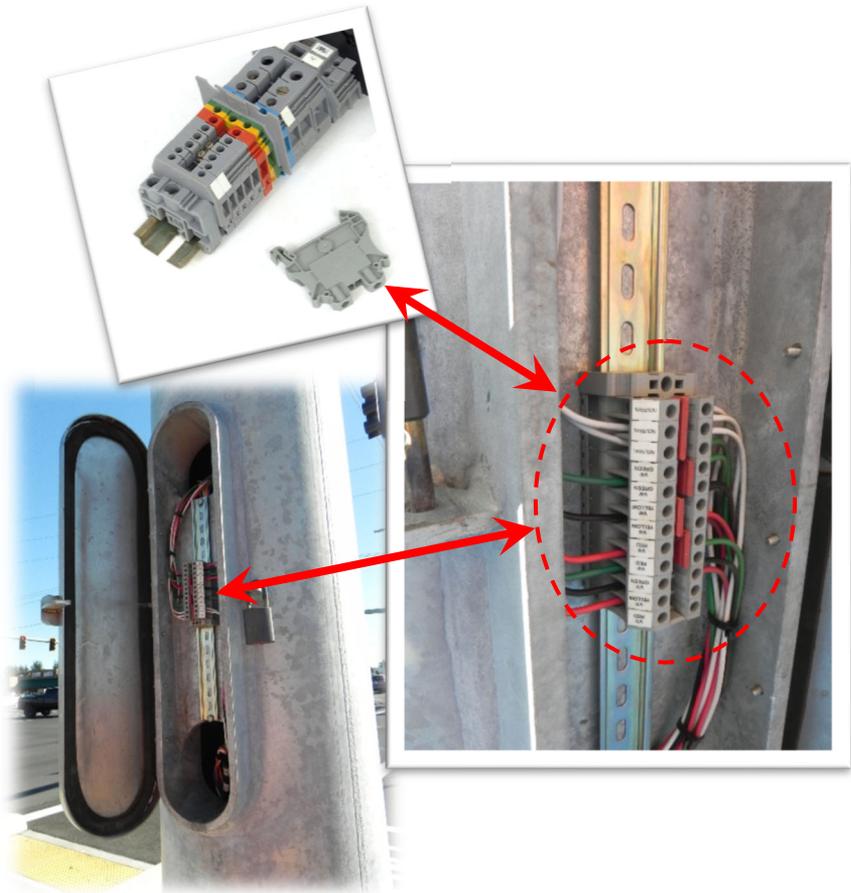
Typical Sources of Info:

Specs: NO

Std. Dwg: TM488

Plan Sheets: NO (external terminal cabinet), YES (recessed terminal cabinet)

Additional Installation Info: Pgs. 144 & 186



PTR (Part Time Restriction) Signs

DESCRIPTION: Flat black, painted, aluminum alloy case with legend when lit. LED illuminated legend. Also referred to as a “blank-out sign”.

USE: To indicate part time restrictions when applicable. Typically used for restricted turn moves when signals have railroad preemption.

Typical Sources of Info:

Specs: NO

Std. Dwg: NO

Plan Sheets: YES

Additional Installation Info: NO



PTR sign OFF
(Message not visible)



PTR sign ON
(LED message visible)

DESCRIPTION: An aluminum assembly for mounting signs on a mast arm, pole and spanwire installations.

- Type A mount is used on spanwire installations
- Type B mount is used on mast arm and pole installations

USE: To attach signs to a mast arm or span wire

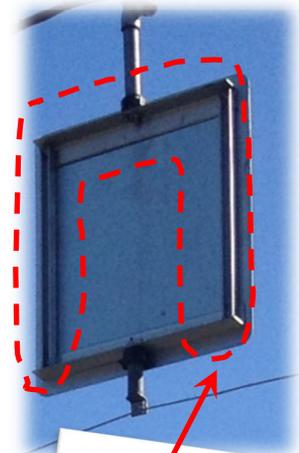
Typical Sources of Info:

Specs: NO

Std. Dwg: TM465

Plan Sheets: YES (pole entrance chart)

Additional Installation Info: NO



**Type A
(Spanwire Mount)**



**Type B
(Mast arm mount)**

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