

“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

*This “sample” set of Signal System Special Provisions will require editing (add, delete, modify, update, etc.) prior to use on a specific project.*

**DIVISION SS**

*The following paragraph is required for all Mn/DOT or State Aid project contracts. All RED text must be removed from the special provisions prior to the Special Provisions being submitted for project letting.*

**SS-1 (1802) QUALIFICATION OF WORKERS**

The provisions of Mn/DOT Specification 1802 are hereby supplemented with the following:

Signal and Lighting Certification will be required for all Contractors, Supervisors or Foremen involved in the field installation of the Traffic Signal and/or Lighting portion of this Project. Signal and Lighting Certification, Level II, is available through the Mn/DOT Office of Traffic, Safety, and Technology (OTST). Questions regarding certification or past certification may be directed to the Mn/DOT Office of Traffic, Safety, and Technology (OTST) at Telephone No. (651) 234-7055.

**Certified Contractor personnel shall be on the Project work site at all times to perform or directly supervise the installation of a Traffic Signal System or a Lighting system.**

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**SS-2 (2565) TRAFFIC CONTROL SIGNALS**

This work shall consist of removing and salvaging, or disposing of the existing traffic control signal system; furnishing and installing materials and electrical equipment; and installing Department furnished materials as specified herein, all to provide a complete operating new hardware interconnected coordinated full-traffic-actuated traffic control signal system at the intersection of \_\_\_\_\_ (\_\_\_\_\_) and \_\_\_\_\_ in \_\_\_\_\_ County, in accordance with the applicable provisions of Mn/DOT 2565; with the current edition of the National Electrical Code; with the Plans; and as follows:

**--- OR ---**

This work shall consist of removing, salvaging, or disposing of two existing traffic control signal systems; furnishing and installing materials and electrical equipment; and installing Department furnished materials as specified herein, all to provide two complete operating new hardware interconnected coordinated full-traffic-actuated traffic control signal systems ---

1. **SYSTEM "A"** - at the intersection of \_\_\_\_\_ (\_\_\_\_\_) and \_\_\_\_\_ in \_\_\_\_\_, \_\_\_\_\_ County, and
2. **SYSTEM "B"** - at the intersection of \_\_\_\_\_ (\_\_\_\_\_) and \_\_\_\_\_ in \_\_\_\_\_, \_\_\_\_\_ County,

--- in accordance with the applicable provisions of Mn/DOT 2565; with the current edition of the National Electrical Code; with the Plans; and as follows:

**SS-2.1 GENERAL**

**A. Department Furnished Materials**

The Department will furnish to the Contractor (at no expense to the Contractor) the following materials and electrical equipment for the Contractor to install:

1. One (1) traffic signal cabinets each complete with actuated controller unit and all required signal control equipment.
2. Four (4) sets of anchor rods, nuts, and washers to mount the Department furnished traffic signal cabinet (one set = 1 anchor rod, nut, and washer).
3. One (1) 4-section rubber gaskets to be installed by the Contractor between the bottom of each traffic signal cabinet and the concrete foundation.

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**B. Installation of Department Furnished Materials**

The Contractor shall install the Department furnished traffic signal cabinets each complete with actuated controller unit and all required signal control equipment described in (A) above; shall furnish and install all additional materials and electrical equipment to provide a complete operating traffic signal cabinet installation (which includes, but is not limited to: a cabinet concrete foundation as part of the equipment pad concrete foundation using Department furnished anchor rods, nuts, and washers; bonding and grounding materials and connections; etc.); and shall make all field lead connections in each traffic signal cabinet as directed by the Engineer to make each traffic control signal system operational.

*The following paragraph needs to be modified to give contractor specific location to deliver the pallet back to Mn/DOT.  
All RED text must be removed from the special provisions being submitted for project letting.*

THE CONTRACTOR SHALL PROTECT THE DEPARTMENT FURNISHED CABINET PALLET FROM DAMAGE AND RETURN THE PALLET TO Mn/DOT CENTRAL ELECTRICAL INVENTORY CENTER AT THE ADDRESS SPECIFIED HEREIN, OR TO THE DISTRICT HEADQUARTERS.

**C. Department Furnished Materials Pick Up**

The materials and electrical equipment described in (A) above will be furnished to the Contractor at the Mn/DOT Central Electrical Services Unit, 6000 Minnehaha Avenue, St. Paul, MN., 55111. The Contractor shall request from the Central Electrical Services Unit the materials and electrical equipment listed in (A) above. The Contractor shall direct the Central Electrical Services Unit to refer to T.E. Request No. \_\_\_\_\_. The Contractor shall request these Department furnished materials at least thirty (30) normal working days in advance of the time the Contractor needs them on the project. The Contractor shall further notify Mr. Jim Deans of the Mn/DOT Central Electrical Services Unit (Telephone 651-366-5753) at least three (3) normal working days in advance of each time the Contractor intends to pick up materials and electrical equipment. The Contractor shall pick up the Department furnished materials and electrical equipment at the above specified location and haul them to the job site. **THE ENGINEER SHALL BE NOTIFIED IN ADVANCE OF NOTIFICATION TO MR. DEANS.**

Each cabinet shall be secured in an upright position when transporting to the job site to insure that the cabinets will not tip and be damaged.

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**D. Signal Agreements**

A Minnesota Transportation Department Traffic Control Signal Agreement will be executed for the work under this Contract. Mn/DOT approval of any and all changes, supplements to the Contract, and/or change orders to this Contract which will affect cost participation in the signal construction shall be contingent upon the execution of appropriate procedures necessary to satisfy the terms and conditions of said agreement.

**E. Placed Orders For Materials**

**WITHIN 15 DAYS AFTER THE CONTRACT APPROVAL NOTICE MAILING DATE, THE CONTRACTOR SHALL FURNISH EVIDENCE TO THE ENGINEER, IN WRITING, THAT ORDERS HAVE BEEN PLACED FOR ALL SIGNAL SYSTEM COMPONENTS REQUIRED ON THE PROJECT.**

**F. Shop Drawings**

**THE CONTRACTOR SHALL PROVIDE SHOP DETAIL DRAWINGS FOR MATERIALS AND ELECTRICAL EQUIPMENT AS SPECIFIED IN THE CONTRACT DOCUMENTS.**

**G. Gopher State One Call**

**The Contractor must adhere to all requirements of Gopher State One Call including the following:**

The Contractor is responsible for marking the proposed excavation area by utilizing white markings. The white markings must delineate the actual excavation area where the locating of underground facilities is required.

*The following text should be used when the district wants GPS coordinates provided on all newly installed infrastructure:  
All Red text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

**H. System Component and Utility Location Data**

The Contractor will collect location coordinates for each lighting unit, lighting cabinets, source of power and underground cable installed using a GPS receiver capable of sub-meter accuracy. Location data shall meet the following criteria:

- The collected coordinates should be accurate to less than one meter.
- A minimum of 5 satellites will be used by the receiver to collect location data.

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- UTM15N or WGS84 are preferred coordinate systems.

Above ground components will be measured from the street side of the asset collected.

Underground cable location shall be collected no more than 2 weeks after it has been installed. Underground cable will be collected as line geometry. The vertex points captured shall be every 100 feet and at every junction or change in cable direction. Depth does not need to be collected unless underground cable is installed outside the depth specified by 2545.3G2. If depth change has to occur, it must be approved by the Traffic Office Personnel and the vertex point before and after the depth change captured.

Data that does not meet the above criteria and guidelines may be rejected and the contractor would be responsible to repeat the data collection.

The Contractor will provide the system component and utility location data in an electronic, standard geospatial vector data format. The format must be accepted by Mn/DOT prior to commencement of field work.

Completing and submitting the system component and utility location data shall be considered incidental work.

**SS-2.2 MATERIALS**

**A. Conduit**

The Contractor shall furnish and install either rigid steel conduit (R.S.C.), non-metallic rigid conduit (N.M.C.), or Continuous Length Conduit (HDPE) at the locations indicated in the Plans. The size of the conduit shall be as indicated in the Plan. All conduit shall be in accordance with the following:

1. Rigid Steel Conduit:
  - Shall be in accordance with Mn/DOT 3801.
2. Rigid Non-Metallic Conduit (NMC) and Continuous Length Conduit (HDPE):
  - Shall be in accordance with Mn/DOT 3803, except as follows:
    - a. Shall be NRTL listed as being compliant with UL 651B.
    - b. All references to ASTM F 2160 shall be deleted.
    - c. Shall be Schedule 80 conduit and fittings for all installations.

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- d. Conduit fittings shall be appropriate for use with HDPE continuous length conduit.
- e. Shall be capable of being installed by stitching, plowing, trenching, or directional boring methods.
- f. Shall be either “GREY” or “RED” in color.
- g. Shall be marked on the outside of conduit indicating the following:
  - Manufacturer’s name
  - Size of conduit
  - Type of conduit (HDPE, etc.)
  - NRTL Certification Mark
  - Any other markings required by the N.E.C.

- h. Before the cables and conductors are installed, non-metallic conduit bell ends (appropriately sized for the HDPE type conduit) shall be installed to prevent damage to the cables and conductors

All conduit from concrete foundations to the nearest handhole shall be either rigid steel conduit (R.S.C.) or rigid non-metallic conduit (N.M.C.). **HDPE continuous length conduit is not allowed for use between concrete foundations and the nearest handhole.**

**B. Handholes**

New Handholes shall be Mn/DOT approved Handholes and Handhole Covers listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

**C. Mast Arms, Pole Standards and Luminaire Davits ( Steel Requirements )**

1. All steel used in construction of mast arm pole standards, mast arm extensions and luminaire davits shall be in accordance with the provisions of Mn/DOT 3310, and as follows:
  - a. The plate steel used shall be ASTM A709 Gr. 50 (A572 Gr. 50)
  - b. The sheet steel used shall be ASTM A1011 Gr. 50
  - c. The structural coil used shall be ASTM A1018 Gr. 50

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2. All steel used on mast arm pole standards, mast arms (including access covers), and luminaire davits shall be galvanized in accordance with the provisions of Mn/DOT 3394.

**D. Mast Arm Pole Standards and Luminaires**

All mast arm pole standards and luminaires shall be in accordance with the provisions of Mn/DOT 3831, except as follows:

1. Seal Mast Arm Standard Access Covers

The Contractor shall seal all 76 mm x 127 mm (3 inch by 5 inch) vertical pole shaft and mast arm handholes with a clear 100% silicone sealant to ensure a moisture free seal between the access cover and the handhole opening.

2. Luminaire Wiring

The 14-3 Signal control cable shall be run as one continuous piece from the signal service cabinet to the Luminaire. This cable shall not be spliced in the pole base.

The Contractor shall furnish and install a wire holder that supports the luminaire cable/conductors within the end of the luminaire slipfitter near the connection point of the luminaire. The Mn/DOT approved Wire Holders are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

3. Luminaires

All luminaires shall be cobrahead, 250 watt, High Pressure Sodium (HPS) (without photocell receptacle) for 120 Volt. Mn/DOT approved Luminaires are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

<http://www.dot.state.mn.us/products/index.html>

4. Transformer Bases

Transformer bases shall be in accordance with 3831.2B and as follows:

The Contractor shall not attach any appurtenances (such as pedestrian push buttons, signs, etc.) to the transformer base that requires the drilling of holes in the base.

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5. Stainless Steel Woven Wire Cloth

The Contractor shall furnish and install a **stainless steel** woven wire cloth around the opening at the bottom of the transformer base to the satisfaction of the Engineer. The woven wire cloth shall have a mesh of 5 x 5 per inch, a wire diameter of .041 inch, an opening width of .159 inch, with an open area of 63.2%.

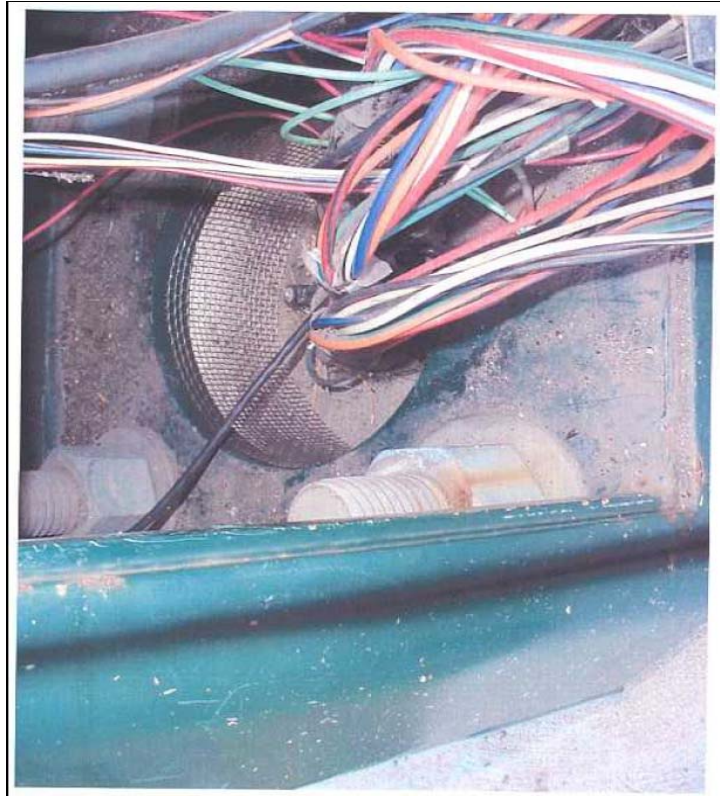
The stainless steel woven cloth shall be inserted and wound around the transformer base opening (see pictures elsewhere in these Special Provisions) to prevent rodent entry. The woven cloth top edge shall be cut even and smooth and secured flush with self tapping screws to the upper edge of the transformer base opening. The woven cloth shall be connected at the overlap with either a small stainless steel or brass bolt and nut assembly. The Contractor shall ensure that the woven wire cloth bottom edge is smooth, flush with the transformer base concrete foundation, ends shall overlap at least two (2) inches, and secured, in a manner, that does not allow movement.

The entire woven mesh assembly shall be grounded in accordance with the National Electrical Code (NEC) requirements.

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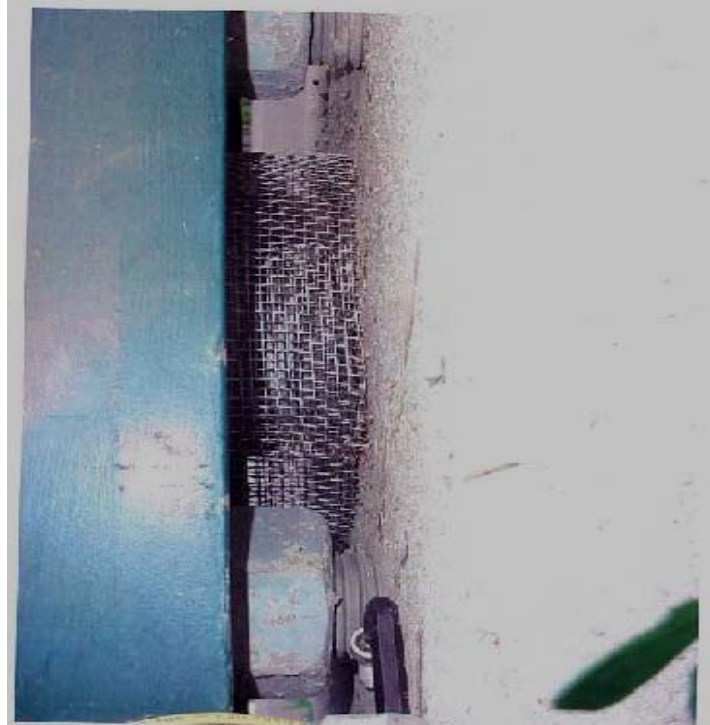
INSIDE TRANSFORMER BASE VIEW:



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OUTSIDE VIEW FROM TOP OF CONCRETE FOUNDATION TO OPENING IN THE BOTTOM OF THE TRANSFORMER BASE:



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**E. Traffic Signal Pedestals**

The Contractor shall furnish and install traffic signal pedestal shafts and pedestal bases at the locations indicated in the Plans. Each traffic signal pedestal shaft and pedestal base shall be in accordance with the applicable provisions of Mn/DOT Standard Plate No. 8122, Mn/DOT 3832, and as follows:

1. Pedestal Shaft:
 

Shall be in accordance with the applicable provisions of Mn/DOT 3832 and Mn/DOT Standard Plate No. 8122 and as follows:

  - a. Shall be aluminum.
  - b. Shall be spun finished.
  - c. Shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.
2. Pedestal Base:
  - a. Shall be aluminum.
  - b. Shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.
  - c. Shall meet or exceed current American Association of State Highway and Transportation Officials (AASHTO) breakaway requirements. Test reports from a Federal Highway Administration (FHWA) approved independent laboratory shall be provided certifying that the pedestal base has been tested and meets all requirements. A statement of certification from the FHWA stating such tests have been accepted and approved shall be supplied by the manufacturer.
3. Pedestal Base Access Door:
  - a. Shall be aluminum.
  - b. Shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.
  - c. The access door shall lock on the inside top, and shall have a fixed catch (es) on the inside bottom of the access door. The locking method shall be as specified on Mn/DOT Standard Plate 8122.

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4. Anchor Rods:

Anchor rods, nuts, and washers shall conform to the requirements of Mn/DOT Standard Plate No. 8112 and shall be galvanized full length in accordance with the provisions of Mn/DOT 3392.

5. Pedestal Washers:

Each pedestal washer shall be in accordance with Mn/DOT Standard Plate No. 8112.

6. Pedestal Reinforcing Collars (Wind Collars):

The Contractor shall furnish and install pedestal reinforcing collars on each pedestal shaft. The pedestal reinforcing collars shall be Mn/DOT approved Pedestal Reinforcing Collars as listed on the Mn/DOT Approved/Qualified Products List WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

*The following language needs to be included if you are using pedestal shafts for mounting signal heads*  
*All RED text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

7. Pedestal Cap:

A pedestal cap shall be furnished and installed atop each pedestal shaft when straight mount plumbers are used for signal and pedestrian head mounting. The caps shall be fabricated from aluminum.  
 The Pedestal Caps shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.

The pedestal caps shall be Mn/DOT approved pedestal caps as listed on the Mn/DOT Approved/Qualified Products List WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

*The following language needs to be included if you are using pedestal shafts for mounting the pedestal head type 4A and APS button on a corner or if you are using signal head bracketing on the pedestal shaft.*  
*All RED text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

8. Pedestal Slipfitter Collars:

A pedestal slipfitter collar as detailed in Mn/DOT Standard Plate No. 8111 shall be

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furnished and installed atop each pedestal shaft when a pedestrian signal indication is installed on the top of the pedestal shaft or when signal head bracketing is used--  
- the Contractor shall check with the Engineer before procurement for the number of 1½ inch inside threaded hubs (side openings) in the pedestal slipfitter collar to be ordered from the signal supplier. The ornamental caps shall be fabricated from aluminum.

The Pedestal Slipfitter Collars shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.

**F. Straight and Angle Mount Plumbizers**

The Contractor shall furnish and install straight or angle mount plumbizers at locations as indicated in the plan.

The straight and angle mount plumbizers shall be Mn/DOT approved, straight or angle mount plumbizers as listed on the Mn/DOT Approved/Qualified Products List WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

**G. Angle and Straight Mount Caps**

The Contractor shall furnish and install angle and straight mount caps at locations as indicated in the plan.

The angle and straight mount caps shall be Mn/DOT approved angle and straight mount caps as listed on the Mn/DOT Approved/Qualified Products List WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

**H. Threaded Hub and Flange Pole Adaptor**

The Contractor shall furnish and install threaded hub and flange pole adaptors at locations as indicated in the plan.

The threaded hub and flange pole adaptors shall be Mn/DOT approved threaded hub and flange pole adaptors as listed on the Mn/DOT Approved/Qualified Products List WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

*The following language needs to be included if “pole base connectors” are being used as conductor termination devices. You must use either Pole Base Connectors or Terminal Blocks but not both.*

*All RED text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

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**I. Blank**

**J. Pole Base Connectors**

14 AWG pole base connectors shall be installed in each pole base for terminating signal conductors to vehicle signal indications, pedestrian signal indications, and EYP confirmatory lights. **Pole base connectors shall be installed in accordance with the detail in the Plan.**

Mn/DOT approved 14 AWG Pole Base Connectors (including Pins, Sockets, Wedges, Sealing Plug, and Hand Crimp Tool) are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

*The following language needs to be included if “terminal blocks” are being used as Conductor termination devices. You must use either Pole Base Connectors or Terminal Blocks but not both.*

*All RED text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

**K. Terminal Blocks**

Terminal blocks shall be in accordance with the provisions of Mn/DOT 2565.3J5.

All terminal blocks shall be coated with a pole base terminal block coating. Mn/DOT approved Pole Base Terminal Block Coatings are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

The coating of the terminal block shall include spraying the terminal connections and the exposed wire ends where crimped to the spade connector.

**L. Electrical Cables and Conductors for Traffic Signal Systems**

All electrical cables and conductors for traffic signal systems shall be in accordance with the applicable provisions of Mn/DOT 3815, and as specified herein.

**1. Cable Markings:**

All electrical cables, except Loop Detector Lead-in Cable - IMSA 50-2 and the 3/C #20 Emergency Vehicle Preemption (EVP) Detector Cable used in signal system construction

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shall have the jacket surface ink printed with the following information:

- a. Manufacturer Name
- b. Year of Manufacture ( Date Code)
- c. Type of Wire or Cable ( i.e. TC, XHHW-2, THWN)
- d. Size and Number of Conductors
- e. Voltage Rating
- f. Conductor Insulation Rating
- g. Nationally Recognized Testing Laboratory (NRTL) Certification Mark indicating the cable is listed. [i.e. UL, ITSNA (ETL), CSA]
- h. Labeled as sunlight resistant (Sun Res), direct burial (Dir Bur), Oil Resistant 1 (Oil Res 1)

Signal Control Cable shall have additional markings as follows.

- a. Traffic Signal Cable
- b. Foot Markers
- c. -35° C Cold Bend

Loop Detector Lead-in Cable - IMSA 50-2 shall meet the marking requirements set forth in the International Municipal Signal Association (IMSA) specification.

Emergency Vehicle Preemption (EVP) Detector Cable ( 3C # 20) shall be surface marked in accordance with the National Electrical Code (NEC) and shall have additional markings as follows:

- a. Labeled as sunlight resistant, direct burial
- b. Year of Manufacture ( Date Code)
- c. Conductor Insulation Rating
- d. Foot Markers

All cable markings shall be repeated at intervals not exceeding 24 inches on the jacket surface.

2. Signal Control Cable:

- a. All signal control cable shall be listed by a National Recognized Testing Laboratory (NRTL) as defined by the U.S. Department of Labor. The testing laboratory must be listed by OSHA in its scope of recognition for the applicable tests being conducted as required by this specification. A list of recognized testing labs for products sold in the United States may be found on the U.S. Department of Labor’s web site: <http://www.osha.gov/>
- b. The cables shall be tested by an NRTL and shall meet all of the following listed

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specifications and general requirements:

- UL 44
- UL 1277
- UL 1685

c. All signal control cable shall conform to the following :

- ICEA T-29-520
- ICEA T-30-520
- ICEA S-73-532 (NEMA WC 57)

d. Shall be suitable for use at 90°C in wet or dry locations

Note: This cable will be submerged in water for long periods of time

- e. Shall be suitable for direct burial
- f. Shall be sunlight resistant
- g. Shall be rated for 600 Volts
- h. Shall be rated as a Tray Cable
- i. Shall have a cable designation of XHHW-2
- j. Shall be #14 AWG
- k. Each conductor shall be a Class B (7 strand) soft drawn, bare or tinned copper per ASTM B3, ASTM B8 and ASTM B33

l. Shall be constructed with circuit identification in accordance with method 1 of ICEA S-73-532 (NEMA WC-57) Table E-1 except as modified below.

**3 Conductor:**

- 1. Black
- 2. White
- 3. Green

**4 Conductor:**

- 1. Black
- 2. White
- 3. Red
- 4. Black/Red stripe

**6 Conductor:**

- 1. Black
- 2. White
- 3. Red
- 4. Black/Red stripe
- 5. Orange
- 6. Blue

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**12 Conductor:**

- 1. Black
- 2. White
- 3. Red
- 4. Black/Red stripe
- 5. Orange
- 6. Blue
- 7. White/Black Stripe
- 8. Red/Black Stripe
- 9. White/Red Stripe
- 10. Orange/Black Stripe
- 11. Blue/Black Stripe
- 12. Black/White Stripe

- m. Shall have a minimum average insulation thickness of 30mils
- n. Shall be constructed using a tape binder
- o. Shall have a cable jacket that has a substantially circular cross-section. The outer cable jacket shall not be convoluted and shall not have a ropy appearance.
- p. Shall have non-hygroscopic fillers used in the interstices of the cables where necessary to give the completed cable assembly a circular cross-section.
- q. Fillers made of Jute or Paper are not acceptable.
- r. Shall have a rip cord between the outer jacket and the tape binder
- s. Bare copper or tinned wires are acceptable
- t. Outer jacket of the 4 conductor cable shall have **maximum** diameter of 0.480 inches.
- u. Outer jacket of the 6 conductor cable shall have **maximum** diameter of 0.560 inches.
- v. Shall carry an oil resistance level 1
- w. Shall meet a -35° C (-31° F) cold bend test
- x. For cables employing a PVC jacket a low migration grade of PVC is required
- y. The cable jacket shall pass the 7 day (168 hr) oven age test @ 121° C (249.8° F) per UL 1581
- z. This cable carries multiple ratings. Where the requirements of different ratings are in conflict the more stringent specification shall be the parameter the cable is required to meet.
- aa. The manufacturer shall provide to Minnesota Department of Transportation (Mn/DOT) the test qualification report from the NRTL stating that the submitted cable meets all the requirements of this specification.
- bb. Once a cable has been accepted by MN/DOT as meeting the requirements of this specification no substitution of materials will be allowed unless the manufacturer has received written permission from Mn/DOT allowing the substitution.

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All field wiring terminations shall be as indicated on the field wiring diagram included in the Plan set.

- 3. The following cables are not required to be listed by a Nationally Recognized Testing Laboratory (NRTL):
  - 2/c #14 (Loop Detector Lead-in Cable)
  - 3/C #20 (EVP cable)
- 4. Loop Detector Lead In Cable
  - Shall be in accordance with 3815.2C4(b)

**M. Vehicle Signal Faces (Poly-Carbonate)**

All new vehicle signal faces shall be in accordance with the applicable provisions of Mn/DOT 3834, except as follows:

All vehicle signal faces, visors, and background shields shall be fabricated with ultraviolet and heat stabilized black poly-carbonate materials, conforming to I.T.E. requirements.

Mn/DOT approved Poly-Carbonate Signal Heads are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:  
<http://www.dot.state.mn.us/products/index.html>

The Contractor shall furnish and install a metal support plate (supplied by the signal head Manufacturer) on the inside of the signal indication at the attachment point of the straight or angle mount plumbizer (one plate each for inside the upper and lower signal housing at the attachment point).

Vehicle signal faces shall utilize either straight or angled mounts. The mounts shall be in accordance with these special provisions and as detailed in the Plan.

The Contractor shall furnish and install signal head mounting spacers when mounting a four or five section signal face. See attached diagram located elsewhere in these Special Provisions.

Mn/DOT approved mounting spacers are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

*This “sample” set of Signal System Special Provisions will require editing (add, delete, modify, update, etc.) prior to use on a specific project.*

The Contractor shall also furnish and install the required through-bolts for connecting the individual sections. See attached diagram located elsewhere in these Special Provisions.

In all cases, two sections of the vehicle signal head shall be mounted below the straight or angled mount with the remaining sections mounted above the straight or angled mount. The indications above or below the straight or angled mount shall be fastened together by means of a noncorrosive 3-bolt mounting assembly. The 3-bolt mounting assembly shall utilize locknuts to prevent the assembly from loosening.

The installation of the vehicle signal faces shall be to the satisfaction of the Engineer. All "Red", "Yellow", and "Green" signal indications shall utilize light-emitting diode (LED) units. Mn/DOT approved LED Signal Indications are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals.

<http://www.dot.state.mn.us/products/index.html>

For each LED signal indication, the Contractor shall submit to the Engineer, for approval, four copies of all warranty information indicating the required 5-year warranty period (**from date of installation**), product invoice, and documentation indicating name of manufacturer, model number, and serial number. The four copies shall be distributed by the Engineer as follows:

1. Mn/DOT Central Electrical Services Unit (Non-Metro Projects Only), or Mn/DOT Metro Electrical Services Unit (Metro Projects Only).
2. Mn/DOT Traffic Electrical Systems Engineer.
3. Mn/DOT District Traffic Engineer.
4. City of \_\_\_\_\_ or County of \_\_\_\_\_.

The Contractor shall, to the satisfaction of the Engineer, affix to the back of each "LED" signal indication a permanent label, or permanently marked (utilizing a "oil based paint marker") with the actual date of installation. The oil based paint marker shall be a contrasting color to ensure that the date can be easily read.

N. Pedestrian Signal Faces with Countdown Timers

The Contractor shall furnish and install poly-carbonate pedestrian signal faces with countdown timers. Mn/DOT approved Pedestrian Signal Faces with countdown timers are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals.

<http://www.dot.state.mn.us/products/index.html>

The pedestrian indications with countdown timer shall utilize Light-emitting Diode (LED) Units listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

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<http://www.dot.state.mn.us/products/index.html>

The Contractor shall provide, to the Engineer, four (4) copies of product documentation as required by Mn/DOT 3835 and the copies shall be distributed, by the Engineer, as follows:

1. Mn/DOT Central Electrical Services Unit (Non-Metro Projects Only), or Mn/DOT Metro Electrical Services Unit (Metro Projects Only).
2. Mn/DOT Traffic Electrical Systems Engineer.
3. Mn/DOT District Traffic Engineer.
4. City of \_\_\_\_\_ or County of \_\_\_\_\_.

O. Blank

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

This “sample” set of Signal System Special Provisions will require editing (add, delete, modify, update, etc.) prior to use on a specific project.

The following language needs to be included if “Accessible Pedestrian Signals (APS)” are being designed in the signal system. When designing the signal plan the two (2) Accessible Buttons on a given corner must not be placed on the same pole. Use of the replaceable pedestrian station detail for mounting the second Button is required. You may also use standard plate 8115D. You must use either Pedestrian Push Buttons or Accessible Pedestrian Signal (APS) Push Button Stations when the signal system is providing Pedestrian access. You may use one or the other type buttons but not both in any combination.

All RED text must be removed from the special provisions prior to the special provisions being submitted for project letting.

P. Accessible Pedestrian Signals (APS) – ( Audible Pedestrian Push Button Units and Associated Traffic Signal Cabinet Equipment )

The Contractor shall furnish and install “Accessible Pedestrian Signals (APS)”. Mn/DOT approved “Accessible Pedestrian Signals (APS)” are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

All Accessible Pedestrian Signals (APS) components with the exception of the push button units shall be delivered to the Mn/DOT Central Electrical Services Unit for installation into the department furnished traffic signal cabinet. The components being installed in the traffic signal cabinet must be delivered to the above location at least thirty (30) normal working days in advance of when the department furnished traffic signal cabinet is required on the job site.

The contractor shall insure the order form below is presented to the Accessible Pedestrian Signal (APS) manufacturer so the appropriate Braille message will be added to the pedestrian information sign and the correct voice messages will be programmed in the pedestrian push button stations.

“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

This “sample” set of Signal System Special Provisions will require editing (add, delete, modify, update, etc.) prior to use on a specific project.

The following order form must be filled out by the special provisions writer before inclusion in the final set of special provisions. The order form should be left as separate pages so they can be removed.

All RED text must be removed from the special provisions prior to the Special Provisions being submitted for project letting.

Accessible Pedestrian Signal (APS)

ORDER FORM

(Fill out one form per intersection)

Intersection:

Total Qty of Pedestrian Push Buttons \_\_\_\_\_

Control Board: One needed for each intersection Qty \_\_\_\_\_ 1

CCU: (Central Control Unit) One needed for each intersection Qty \_\_\_\_\_ 1

CONFIG: (Configurator) One needed for each intersection Qty \_\_\_\_\_ 1

Push Button and Sign Braille Information

Button	Arrow Direction R/L	Street Name (Street Being Crossed)
PB2-1		PB2-1
PB2-2		PB2-2
PB4-1		PB4-1
PB4-2		PB4-2
PB6-1		PB6-1
PB6-2		PB6-2
PB8-1		PB8-1
PB8-2		PB8-2

Custom Voice Message Details

Voice on Location and Walk Message(s). Please give phonetic pronunciation on difficult street names so that the message will be recorded correctly.

\*Note that unless Street, Drive, Avenue etc...are absolutely necessary for intersection identification, it is recommended to not include them in the verbal message.

“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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**PB2-1**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

**PB2-2**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

**PB4-1**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

**PB4-2**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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**PB6-1**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

**PB6-2**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

**PB8-1**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

**PB8-2**

Wait Message:  
**Wait to Cross**  at   
 (Street Being Crossed) (Intersecting Street)

Walk Message:  
 **Walk sign is on to cross**   
 (Street Being Crossed) (Street Being Crossed)

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

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**Recommended Guidelines for Speech Messages**

With the advent of Accessible Pedestrian Signals (APS) incorporating voice messages as required by the Minnesota MUTCD, the issue of what wording should be used has received much debate. Recent research conducted by Accessible Design for the Blind produced a report titled “**Determining Recommended Language for Speech Messages Used By Accessible Pedestrian Signals**”. You can view or print the complete 25 page report by going to [www.ite.org](http://www.ite.org), click on technical information, click on Accessible Intersections, then click on the report title as stated above. A summary of the report recommendations for the most common type crossings are as follows:

**Walk Interval Messages**

Model message for the walk interval, applicable to most intersections.  
➤ “Howard. Walk sign is on to cross Howard.”

**Pushbutton Information Messages**

Model message for pushbutton intersection identification information.  
➤ “Wait to cross Howard at Grand.”

*All RED text must be removed from the special provisions prior to the Special Provisions being submitted for project letting.*

**Q. Equipment Pad**

The Contractor shall furnish and install an equipment pad as detailed in the Plans and specified in these Special Provisions.

The equipment pad shall contain the following:

1. Traffic signal cabinet and control equipment.  
(CABINET AND CONTROL EQUIPMENT TO BE FURNISHED BY THE DEPARTMENT AND INSTALLED BY THE CONTRACTOR.)

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

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2. Signal Service Cabinet.

(SIGNAL SERVICE CABINET TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR)

**R. Signal Service Cabinet, Type SSB (with Battery Back-up Equipment)**

The language will need to be modified if battery back-up equipment is **not** required.

*All RED text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

The Contractor shall furnish and install a signal service cabinet. Type SSB with battery back-up equipment and external strobe. Mn/DOT approved Signal Service Cabinets and Battery Back-up Equipment are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

**S. Pavement Markings**

The Contractor shall furnish and apply new durable reflectorized pavement markings for control and guidance of traffic in accordance with the Plans and attached specifications - "Specification No. 3 High Durability Performed Pavement Markings" included elsewhere in this Contract Proposal.

The furnishing and applying of new pavement markings shall be considered incidental work and no direct compensation will be made therefore.

**T. Loop Detector Sealant Material**

For saw cut loop detectors, the Contractor shall furnish and install Mn/DOT approved loop detector sealant material. Mn/DOT approved Loop Detector Sealant is listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

**THE CONTRACTOR SHALL INSTALL SEALANT MATERIAL ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.**

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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**U. Loop Detector Splices**

The Contractor shall furnish and install qualified loop detector splice encapsulation kits.

Mn/DOT approved Splice Encapsulation Kits are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

**THE CONTRACTOR SHALL INSTALL LOOP DETECTOR SPLICES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS AND AS SPECIFIED ELSE WHERE IN THESE SPECIAL PROVISIONS.**

**V. Advance Warning Flashers (AWF)**

The Contractor shall furnish and install all materials and electrical equipment to provide four (4) complete operating advance warning flashers (Signal Base No.'s    ,    ,    , and    ) at the locations indicated in the Plans in accordance with the "ADVANCE WARNING FLASHER DETAILS" in the Plans and with the following:

1. Pedestal Shaft:

Shall be in accordance with the applicable provisions of Mn/DOT 3832, Mn/DOT Standard Plate No. 8122, and as follows:

- a. Shall be aluminum
- b. The shaft shall be spun finished.
- c. Shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.

2. Pedestal Base:

- a. Shall be aluminum
- b. Shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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- c. Shall meet or exceed current American Association of State Highway and Transportation Officials (AASHTO) breakaway requirements. Test reports from a Federal Highway Administration (FHWA) approved independent laboratory shall be provided certifying that the pedestal base has been tested and meets all requirements. A statement of certification from the FHWA stating such tests have been accepted and approved shall be supplied by the manufacturer.

3. Pedestal Base Access Door:

- a. Shall be aluminum
- b. Shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.
- c. The access door shall lock on the inside top, and shall have a fixed catch (es) on the inside bottom of the access door. The locking method shall be as specified on Mn/DOT Standard Plate 8122.

4. Anchor Rods:

Anchor rods, nuts, and washers shall conform to the requirements of Mn/DOT Standard Plate No. 8112 and shall be galvanized full length in accordance with the provisions of Mn/DOT 3392.

5. Pedestal Washers:

Each pedestal washer shall be in accordance with Mn/DOT Standard Plate No. 8112.

6. Pedestal Reinforcing Collars (Wind Collars):

The Contractor shall furnish and install pedestal reinforcing collars on each pedestal shaft. The pedestal reinforcing collars shall be Mn/DOT approved Pedestal Reinforcing Collars as listed on the Mn/DOT Approved/Qualified Products List WEB site for Signals:

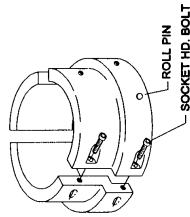
<http://www.dot.state.mn.us/products/index.html>

Pedestal Reinforcing Collar (wind collar) Installation:

The Contractor shall clamp each reinforcing collar around the top of the pedestal base by using two (2) 5/16" Socket Head Bolts per section (see figure below). Each section shall have a 5/16" pilot hole for drilling into base. A 5/16" x 3/4" Roll Pin shall be driven through the collar into the base to prevent the collar from "walking" up the base.

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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7. Pedestal Slipfitter Collars:

A pedestal slipfitter collar as detailed in Mn/DOT Standard Plate No. 8111 shall be furnished and installed atop each flasher pedestal shaft --- the Contractor shall check with the Engineer before procurement for the number of 1 1/2 inch inside threaded hubs (side openings) in the pedestal slipfitter collar to be ordered from the signal supplier.

The Pedestal Slipfitter Collars shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.

8. Flashing Beacon Assemblies:

All 8 inch vehicle signal faces utilized in flashing beacon assemblies shall be polycarbonate. Vehicle signal faces, visors, and background shields shall be fabricated with ultraviolet and heat stabilized black polycarbonate materials, conforming to I.T.E. requirements. Mn/DOT approved Poly Carbonate Vehicle Signal Faces are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for [Signals](http://www.dot.state.mn.us/products/index.html):

<http://www.dot.state.mn.us/products/index.html>

The Contractor shall furnish and install a metal support plate (supplied by the signal head Manufacturer) on the inside of the signal indication at the attachment point of the mount (one plate inside the head at the attachment point).

The 8 inch "Yellow" signal indications shall utilize light-emitting diode (LED) units. Mn/DOT approved LED Signal Indications are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for [Signals](http://www.dot.state.mn.us/products/index.html):

<http://www.dot.state.mn.us/products/index.html>

The Contractor shall, to the satisfaction of the Engineer, affix to the back of each "yellow" flasher indication a permanent label indicating the date of installation.

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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Each flashing beacon assembly shall include a cut away visor and background shield as indicated on the detail in the Plan. The cut away visor and background shield shall be in accordance with the applicable provisions of Mn/DOT 3834.

Each flasher beacon shall be attached to the advance warning flasher assembly as detailed in the Plans to the satisfaction of the Engineer.

9. Flashing Beacon Assembly Bracketing

- a. Shall be aluminum
- b. Shall have an anodic coating as per MIL-A-8625C for Type II, Class I Coating.

10. Wiring at Each Advance Warning Flasher:

The Contractor shall furnish and install for each flasher indication a 4/c #14 signal control cable in accordance with the provisions included elsewhere in these Special Provisions between the terminal block or pole base connector in the pedestal base and each flashing beacon atop the advance warning flasher assembly.

11. Advance Warning Flasher Signs:

The Contractor shall furnish and install W3-X4 (PREPARE TO STOP WHEN FLASHING) with each advance warning flasher installation. The Contractor shall fabricate the W3-X4 signs in accordance with Mn/DOT 2564, and as detailed in the Plans, and as follows:

The sign base material, sign legend material, and fabrication stickers shall be in accordance with the applicable provisions of Mn/DOT 2564. Sign face material shall be as follows:

Signs shall be fabricated with either Sign Sheeting for Rigid Permanent Signs, Delineators and Markers (Type IX) or High Performance Sign Sheeting for Rigid Permanent Signs, Delineators and Markers (Type HP), except as specified below:

Sign face material shall be fluorescent yellow reflective sheeting

The retro reflective sheeting types and qualified products used for rigid permanent signs, markers and delineators can be found on the Mn/DOT Approved/Qualified Products Lists WEB site for Signing under Sheeting Materials.

<http://www.dot.state.mn.us/products/index.html>

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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The Contractor shall mount each sign as detailed in the Plan to the satisfaction of the Engineer.

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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**SS-2.3 CONSTRUCTION REQUIREMENTS**

**A. Conduit Installation**

Conduit shall be installed in accordance with Mn/DOT 2565.3D, except as follows:

1. Continuous Type HDPE Non-Metallic Conduit:  
 Except for under existing pavements, underground Continuous Type HDPE Conduit shall be placed by trenching, stitching, plowing, or other method approved by the engineer. Under existing pavements, Continuous Type HDPE Non-Metallic Conduit shall be placed as specified in 2565.3D2b.
2. Rigid Non-Metallic Conduit Joints:  
 The Contractor shall install appropriate sized long line couplings when installed under existing roadway surfaces  
 The applied PVC joint cement shall be allowed to set-up for six (6 hours) before pulling the conduit through a directional bored channel.

**B. Handhole Installation**

The Contractor shall install handholes in accordance with the provisions of Mn/DOT 2565.3E and as follows:

The required aggregate drain bed below the handhole shall be **compacted** before installation of the handhole.

Conduit holes located in handhole barrel section shall be sized no more than 1 inch larger than the size of the conduit being used.

All handholes shall be backfilled **after** the frame casting and cover have been installed onto the handhole.

**C. Anti-Seize Lubricant**

The contractor must apply Brush on Anti-Seize lubricant to all threaded portions of the signal system prior to assembly. The following is list of assemblies that require anti-seize lubricant:

- Mast arm pole standard anchor rods above concrete foundations
- Mast arm pole to transformer base bolts

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

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- Traffic signal cabinet anchor rods above concrete foundations
- Signal Service cabinet anchor rods above concrete foundations
- Traffic signal pedestals anchor rods above concrete foundations
- Traffic signal pedestal base and shaft
- Pedestal base shaft set screws
- Pedestal shaft caps
- Pedestal base access door locking screw
- Blind threaded inserts (rivet nuts)
- Threaded hub and flange pole adaptor
- Bolt on hub and flange
- Straight and angle mount plumbizers
- Pedestal reinforcing collars
- Signal bracketing (where used)
- APS mounting hardware and sign mounting hardware

Application of the brush-on anti-seize lubricant to all threaded portions of the signal system shall be to the satisfaction of the Engineer.

**D. Equipment Pad Concrete Foundation**

The equipment pad concrete foundation shall be installed at the location staked by the Engineer and shall be constructed as detailed in the Plans.

The cabinet concrete foundation for the Department furnished traffic signal cabinet and control equipment shall be installed as part of the equipment pad concrete foundation using Department furnished anchor rods, nuts, and washers to mount the cabinet. The anchor rods shall project above the concrete foundation to accommodate the 13 mm (1/2 inch) thick gasket. The Contractor shall install the Department furnished rubber gasket sections between the bottom of each cabinet base and the concrete foundation. The Contractor shall leave one 13 mm (1/2 inch) gap in the gasket to ensure proper water drainage.

The cabinet concrete foundation for the signal service cabinet type SSB shall be installed as part of the equipment pad concrete foundation using anchor rods, nuts, and washers supplied by the SSB cabinet manufacturer. The anchor rods shall project above the concrete foundation to accommodate the 13 mm (1/2 inch) thick gasket. The Contractor shall install the cabinet manufacturer supplied rubber gasket sections between the bottom of each cabinet base and the concrete foundation. The Contractor shall leave one 13 mm (1/2 inch) gap in the gasket to ensure proper water drainage.

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)

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**E. Signal Service Cabinet**

The Contractor shall install the signal service cabinet type SSB on the equipment pad concrete foundation as detailed in the Plan and to the satisfaction of the Engineer.

The contractor shall fill out the following electric service information form for traffic signal systems.

The Contractor shall provide, to the Engineer prior to final acceptance of the project, four (4) copies of the electric service information form for traffic signal systems and the copies shall be distributed, by the Engineer, as follows:

1. Mn/DOT Central Electrical Services Unit (Non-Metro Projects Only), or
2. Mn/DOT Metro Electrical Services Unit (Metro Projects Only).
3. Mn/DOT Traffic Electrical Systems Engineer.
4. City of \_\_\_\_\_ or County of \_\_\_\_\_.

The Contractor furnished "electrical service information form for traffic signal systems" shall be considered incidental work.

**(The following form should be left on its own page so it can be removed from the special provisions and used by the contractor) See the next page of this document**  
*All Red text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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**Electric Service Information Form For Traffic Signal Systems**

Project Number: \_\_\_\_\_

Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

MN/DOT Signal System ID	Intersection	Meter Address	Electric Utility Transformer Size In KVA	Length of conductors in feet from transformer connection to meter socket connection.	
				L1 =	L2 =
				L1 =	L2 = Neutral =
				L1 =	L2 = Neutral =
				L1 =	L2 = Neutral =
				L1 =	L2 = Neutral =
				L1 =	L2 = Neutral =
				L1 =	L2 = Neutral =

“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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**F. Preformed Rigid PVC Conduit Loop Detector Installation**

1. Preformed Rigid PVC Conduit Loop Detectors

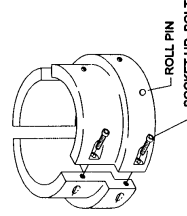
The Contractor shall install loop detectors in rigid PVC conduit in accordance with Standard Plate 8132; as marked by the Engineer; and with the applicable provisions of Mn/DOT 2565.3G.

2. Saw Cut Loop Detectors

Saw cut loop detectors shall be saw cut in the roadway in accordance with Standard Plate 8130; as marked by the Engineer, and with the applicable provisions of Mn/DOT 2565.3G.

**G. Pedestal Reinforcing Collar (Wind Collar) Installation**

The Contractor shall clamp each reinforcing collar around the top of the pedestal base by using two (2) 5/16" Socket Head Bolts per section (see figure below). Each section shall have a 5/16" pilot hole for drilling into base. A 5/16" x 3/4" Roll Pin shall be driven through the collar into the base (flush to allow 1/4" penetration into the base) to prevent the pedestal shaft from turning in the pedestal base.



**H. Concrete Walks**

Concrete walks (4") around signal bases shall be in accordance with the applicable provisions of Mn/DOT 2521; with the Plans; and as directed by the Engineer. The concrete walks may include pedestrian curb ramp(s) if in a curb section. All construction of the concrete walks shall be considered incidental work.

**I. Blank**

**J. Pedestrian Curb Ramps**

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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Pedestrian Curb Ramps shall be constructed at the locations indicated in the Plans in accordance with Mn/DOT Standard Plate No. 7036F and to the satisfaction of the Engineer.

**K. “As Built Plans”**

The Contractor shall furnish “as built Plans” that contain any changes in the following:

- types of foundations
- pole locations
- length of mast arms
- signal bracketing or signal mounts
- conduit sizes
- conduit runs
- number of handholes
- handhole locations
- wiring
- size of detection
- type of detection
- cable path
- other items as required by the Engineer

Any discrepancy or additions between the final plan and how the signal was actually built **must be indicated** on the “as built plan”.

The “as built Plans” shall be in a form that is satisfactory to the Engineer.

**L. Wiring**

All wiring shall be in accordance with the Plan and Mn/DOT 2565.3J, except as follows:

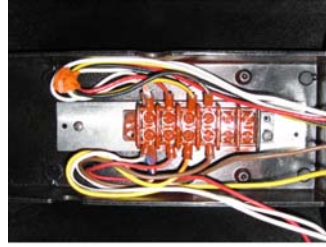
1. Vehicle and Pedestrian Signal Faces  
 For horizontally mounted terminal blocks termination of the signal control cable running from the pole base into signal face shall be terminated with the forks of the spade lug pointing down.

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“SAMPLE” SIGNAL SYSTEM SPECIAL PROVISIONS (December 16, 2010)  
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For vertically mounted terminal blocks termination of the signal control cable running from the pole base into signal face shall be terminated with the spade lug mounted horizontally and a loop of wire extending up from the terminal block at least 3 inches above the block and then a loop back down to exit the head for termination in the pole base.



After the conductors have been properly terminated the entire terminal block and the spade lugs shall be sprayed with pole base terminal block coating.

Mn/DOT approved Pole Base Terminal Block Coatings are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

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The coating of the terminal block shall include spraying the terminal connections and the exposed wire ends where crimped to the spade connector.

2. Labeling

Labels to identify cables and conductors, except the individual conductors terminated at the cabinet fuse panels, shall consist of white vinyl adhesive tape wrapped around the cable. The labeling shall be hand written on the vinyl adhesive tape or produced with a label maker. If label marking is handwritten, the labeling shall be accomplished by utilizing a black permanent marker, in such a manner, that the markings are legible to the satisfaction of the Engineer. Labels produced with a label maker shall be suitable for use in wet locations, and this label must wrap around the cable one complete revolution with some overlap.

Labels to identify the individual conductors terminated at the cabinet fuse panels, shall utilize either machine printed labels, embossed plastic labels, vinyl adhesive pre-printed labels, or sleeve type labels placed around each conductor.

**M. Bonding and Grounding**

All bonding and grounding shall be in accordance with the provisions of Mn/DOT2565.3H, except as follows:

1. All ground rod electrodes shall be UL Listed.
2. All ground rod electrodes shall be a single piece non threaded 5/8 inch diameter by 1.5 foot long copper clad ground rod.
3. The ground rod electrode in a pedestal foundation shall be placed slightly off center in the pedestal foundation as specified in the plans.
4. The ground rod electrode for signal poles (PA85, PA90, PA100) shall be placed in the nearest hand hole adjacent to the signal pole foundation as shown on the field wiring diagram of the plan. Grounding of the signal poles shall be accomplished by bonding together the #6 AWG, stranded, insulated green grounding conductor that runs from the traffic signal cabinet to the ground rod electrode and thru to the pole base. The ground rod electrode shall be placed in the hand hole with the top of the ground rod being installed approximately 3 inches below the bottom of the hand hole cover as specified in the plans.
5. Connection of the daisy chain #6 AWG stranded insulated green grounding conductor that runs from the adjacent signal poles ground rod electrode to the next signal pole's ground rod electrode shall be welded to the ground rod electrode with a T type connector utilizing

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a 3 wire tap connection. A 2 wire tap connection shall be utilized at the end of the daisy chain run.

6. Bonding of all ground rod electrodes to the #6 AWG stranded, insulated green conductor coming from the traffic signal cabinet and running to the signal pole base shall be accomplished by exothermic welding.

7. The exothermic welding is achieved by:

- a) Stripping off enough insulating material from the #6 AWG stranded green insulated grounding wire to ensure the insulation does not burn or melt during the welding process.
- b) Using a manufacturer's specific sized mold for exothermic welding of a #6 AWG stranded copper wire being welded to a non threaded 5/8 inch copper clad ground rod electrode. This mold must be a T type configuration with a 3 wire tap or 2 wire tap as specified in the plans.
- c) All exothermic welds shall be made in strict adherence to the weld manufactures instructions for material preparation, welding and testing of the exothermic weld.

8. Bonding of the #6 AWG stranded, insulated green grounding conductor to the signal pole base 5/16” grounding stud shall be accomplished by use of a UL listed Re-usable screw type active clamping ground lug with a tang that connects to the 5/16” signal pole base grounding stud.

9. The last paragraph on Page 650 shall read as follows:

Metal poles, pedestals, cabinets, and other structures requiring a ground rod electrode shall be bonded to the ground rod electrode by a No. 6 stranded copper grounding electrode conductor. One end of the bonding jumper shall be attached to the lower part of the pole, pedestal, cabinet, or structure shaft or base and the other end attached to the ground rod electrode by an exothermic weld.

10. The first full paragraph on Page 651 shall read as follows:

For bonding and grounding in all conduit systems, a No. 6 stranded insulated green equipment grounding conductor shall be installed with all electrical circuits. Where non-metallic conduit is to be installed for future use, the equipment grounding conductor may be omitted.

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**N. Oxide Inhibitor**

The Contractor shall apply an oxide inhibiting agent to all No. 6 grounding connections after assembly and final connection.

**O. Blank**

*The following language needs to be included if “Accessible Pedestrian Systems” are being designed in the signal system.  
 All RED text must be removed from the special provisions prior to the special provisions being submitted for project letting.*

**P. Accessible Pedestrian Push Button Units**

Accessible pedestrian push button units shall be installed at the locations as indicated on the plans. Each push button unit contains three (3) custom components; sign with Braille, push button arrow direction and a custom voice message. When installing the push button units careful attention to must be paid so the correct button is placed in the proper location. The button must be mounted facing the pedestrian landing.

The contractor shall also follow the manufactures installation requirements.

The Contractor shall apply to the APS wire termination blocks, after wire installation, an electrical insulating coating. Mn/DOT approved Electrical Insulating Coatings are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

The Contractor shall apply a bead of 100% clear silicone sealant around the top of the push button station housing where the push button comes in contact with the pole shaft.

**Q. Pole Sealant**

The Contractor shall place an adequate amount of 100% clear silicone sealant between the pole base plate and where it meets the transformer base to ensure a moisture proof seal between the pole and the transformer base. This seal shall be to the satisfaction of the Engineer.

**R. Luminaires & Lamp Labeling**

Luminaires and Lamps shall be marked according to 3810.2A. The term permanent marker shall be modified as follows “black oil based paint marker”.

**S. Signal Pole Installation to Concrete Foundation Anchor Rods**

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The Contractor shall install mast arm pole standards to concrete foundations anchor rods in accordance with the following installation procedure:

1. Clean exposed part of anchor rods with a wire brush or equivalent.
2. Assure clean anchor rods and that nuts will spin freely along entire length of all anchor rods.
3. Lubricate anchor rod threads with brush on anti-seize compound.
4. Install heavy hex leveling nuts and set them to level.
5. Install 1st set of washers, place base/pole on anchor rod cluster, install 2nd set of washers.
6. Install heavy hex top nuts and hand tighten.
7. Using “full force” and a standard wrench, or a few impacts of an impact wrench, tighten all top nuts in any order.
8. **(Critical)** Using “full force” and a standard wrench, tighten all leveling nuts in any order.
9. Mark positions of all top nuts in relation to its adjacent bolt. Using appropriate equipment tighten all top nuts an additional 1/6 turn beyond tightening achieved in steps 6 and 7.
10. After 48 hours, with the entire mast arm pole standard [including mast arm(s), transformer base, and, if applicable, the luminaire extension] being completely assembled and installed, the nuts shall be checked to assure they have maintained tightness. If additional tightening is required, follow Steps 7 thru 9.

**T. Activating Signals**

Mn/DOT Specification 2565.3W is hereby deleted and replaced with the following:

When the traffic control signal system is to be placed in operation, all vehicle signal faces and pedestrian signal faces shall be aimed as directed by the Engineer. The Contractor shall notify the Engineer at least 48 hours in advance of the scheduled traffic signal turn-on.

The traffic control signal system will be turned on by Mn/DOT personnel, unless otherwise authorized by the Engineer. The Contractor shall be present at time of turn on to provide assistance to ensure the traffic control signal system is operating correctly and in a safe manner. The Contractor shall provide all necessary parts and labor to rectify any malfunctioning

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components of the traffic control signal system installed by the Contractor. This requirement would not include Department furnished material/components, except if the Department furnished material/components were malfunctioning, or damaged, due to Contractors operations. All components of the signal system, including the emergency vehicle preemption (EVP) and the traffic control interconnection, must be completely operational to the satisfaction of the Engineer before the actual signal system turn on is performed.

The Contractor shall not turn the signal system ON or OFF, or place in flashing mode of operation, without the specific approval of, and in the presence of the Engineer.

**U. Removals**

When directed by the Engineer, the Contractor shall remove and salvage, or dispose of all items of the existing traffic control signal system in accordance with the applicable provisions of Mn/DOT 2565.3U; the applicable provisions of Mn/DOT 2104; and the following:

1. Underground conduit may be abandoned in place, unless otherwise directed by the Engineer to be removed.

--- OR ---

All underground conduit, except under roadway surfaces, shall be removed and disposed of as specified herein. Conduit under roadway surfaces may be abandoned in place, unless otherwise directed by the Engineer to be removed.

2. After the cabinet and control equipment is de-energized and power conductors disconnected, the Contractor shall prevent damage to the cabinet and control equipment as follows:

- a) Unplug and remove all removable control equipment (i.e., controller unit, detector amplifier units, conflict monitor, load switches, etc.) from the cabinet. The control equipment removed from the cabinet shall be suitably packed to prevent damage to the equipment during transportation.
- b) Connecting harnesses for the equipment shall be coiled or grouped together and secured to a shelf in the cabinet. The harnesses can be taped, wired, or tie wrapped, but shall be done by a method that prevents the harnesses from being pinched in the door when the door is closed, or from dropping below the bottom of the cabinet when it is lifted off the foundation.

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- c) The cabinet shall be secured in an upright position at all times (removing from foundation, transporting, loading, and unloading) to insure that the cabinet will not tip and be damaged.

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3. The salvaged traffic signal cabinet and control equipment shall be disassembled as specified herein and shall be delivered to the Department at the Mn/DOT Central Electrical Inventory Center at the location specified elsewhere in these Special Provisions. The Contractor shall notify Mr. Mike Schroeder (612-366-5719) of Mn/DOT Central Electrical Inventory Center at least three (3) normal working days in advance of the time the Contractor intends to deliver the salvaged materials. **THE ENGINEER SHALL BE NOTIFIED IN ADVANCE OF NOTIFICATION TO MR. SCHROEDER.**

**The Contractor shall obtain a salvaged material receipt from the Mn/DOT Central Electrical Inventory Center indicating that Mn/DOT has received the salvaged material. The Contractor shall give the project Engineer a copy of this receipt for the permanent project records.**

4. All items, not salvaged, shall be removed entirely and disposed of outside the Right-of-Way in any manner that the Contractor may elect subject to the provisions of Mn/DOT 2104.3C3, and as follows:

Mn/DOT no longer salvages mast arm pole standards or traffic signal Pedestal shafts and bases. The Contractor shall remove and dispose of the mast arm pole standards and pedestal shafts as specified herein.

After removal, the mast arm pole standards (transformer base, pole shafts, mast arms, and luminaire extensions) shall be disassembled and cut-up (or other method that renders the mast arm pole standards unusable) to the satisfaction of Engineer. After the mast arm pole standards have been prepared for disposal, the Contractor shall dispose of the mast arm pole standards and traffic signal pedestals as follows:

The mast arm pole standards and the traffic signal pedestals (pedestal shafts and pedestal bases) may have been painted with lead-based paint. If this is the case, the Contractor shall be responsible for the proper handling, transportation, and disposal of the mast arm pole standards and traffic signal pedestals as hazardous waste and the handling, transportation, and disposal of these items shall be in accordance with Occupational Safety & Health Administration (OSHA) and the Minnesota Pollution Control Agency (MPCA) regulations.

The Contractor certifies that he or she is familiar with, and will comply with, the applicable requirements in OSHA 29 CFR 1926.62 and Minnesota Rules Chapter 5206, 7025, 7035, 7045 relating to disposal and/or the removal of these lead painted mast arm pole standards and traffic signal pedestals.

**The Contractor shall provide to the Engineer a completed “Contractor Certification of Disposal” form included elsewhere in these Special Provisions.**

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5. All resulting excavation shall be backfilled and the backfilling and compaction shall be like in kind to approximately the same density as the adjoining ground. Any roadway surfacing (concrete pavement, bituminous surface, or gravel surface, including underlying base courses), sidewalks, curb and gutters, sod, etc., removed by the construction operations shall be replaced in kind by the Contractor, all at his own expense.

All removals of materials of the existing signal system and salvaging as required, the disposal of non-salvage materials, and backfilling, all in accordance with the foregoing, shall be incidental work.

**SS-2.4 MEASUREMENTS AND PAYMENTS**

Removing and salvaging, or disposing of the existing traffic control signal system; furnishing and installing materials and electrical equipment; and installing Department furnished materials as specified herein, all to provide a complete operating new full-traffic-actuated traffic control signal system at the intersection of \_\_\_\_\_ and \_\_\_\_\_ in \_\_\_\_\_ County as contained in these Special Provisions and in the Plans will be measured as an integral unit and paid for as specified in Mn/DOT 2565.4 and Mn/DOT 2565.5 respectively for Item No. 2565.511 (TRAFFIC CONTROL SIGNAL SYSTEM).

All delivery of salvaged materials to the Department at the location specified herein shall be paid for under Item No. 2104.601 (HAUL SALVAGED MATERIAL) at the contract LUMP SUM price which shall be payment in full for all costs relative to hauling the materials to, and depositing the materials, at the location specified herein.

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### Contractor Certification of Disposal

Project No.: \_\_\_\_\_ Location: \_\_\_\_\_

We, \_\_\_\_\_, hereby certify that the mast arm pole standards

(Name of Contractor)

were rendered unusable, and the mast arm pole standards, and if applicable, pedestal shafts and bases were removed, transported, and disposed of in accordance with all requirements of the Minnesota Pollution Control Agency (MPCA) and the Occupational Safety & Health Administration (OSHA) for the removal, transporting, and disposal of hazardous waste.

\_\_\_\_\_  
 SIGNATURE

\_\_\_\_\_  
 DATE

After signed and dated, the Contractor shall submit this form to the Mn/DOT project Engineer. The Contractor shall also submit to the Engineer a copy of the “Tipping Receipt” that the Contractor receives from the scrap yard or recycler.

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SS-3 (2565) EMERGENCY VEHICLE PREEMPTION SYSTEM

This shall consist of furnishing and installing emergency vehicle preemption (EVP) system at the intersection of \_\_\_\_\_ and \_\_\_\_\_ in \_\_\_\_\_ County in accordance with the applicable provisions of Mn/DOT 2565; with the Plans; and as follows:

SS-3.1 GENERAL

- A. All applicable provisions of the current edition of the National Electrical Code shall apply.
- B. The Contractor shall furnish rack mounted EVP phase selectors (or other approved equal EVP equipment to be installed in the traffic signal cabinet) to be installed in the Department furnished cabinet by Mn/DOT personnel.

All EVP phase selectors (or other approved equal EVP equipment to be installed in the traffic signal cabinet) shall be delivered to the Department at the Mn/DOT Central Electrical Services Unit (for approval, and for installation into the Department furnished traffic signal cabinet) at least thirty (30) normal working days in advance of when the Department furnished traffic signal cabinet is required on the job site.

SS-3.2 MATERIALS

A. EVP Mounting Equipment

Emergency Vehicle Preemption mounting equipment shall be as follows:

1. EVP Round Outlet Box

The EVP round outlet box for wire splicing shall be as follows:

- a. Shall be sized nominal 4 inch diameter by nominal 1-1/2 inch deep
- b. Shall be cast aluminum.
- c. Shall be UL Listed.
- d. Suitable for wet locations.
- e. Shall have four (4) threaded openings to support 3/4 inch conduit: top, bottom, and the two sides, all with threaded caps.
- f. Shall have one (1) threaded opening to support a 3/4 inch conduit on back of outlet box with threaded cap.
- g. Shall have a galvanized or zinc plated screw-on cover with weather seal and suitable for wet locations.
- h. Shall have threaded nipples with locking washers sized to fit the round outlet box for the all attached appurtenance's.

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EVP Conduit Outlet Body

The EVP conduit outlet body for mounting the EVP detector unit to the EVP round outlet box shall be as follows:

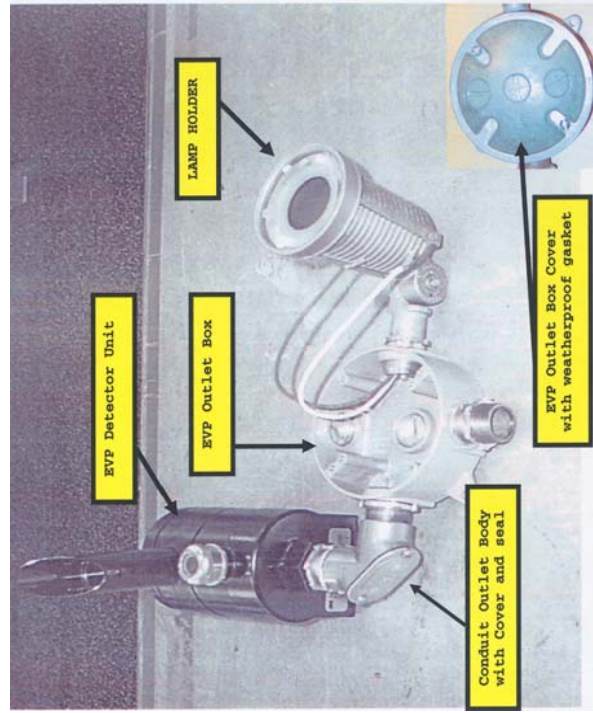
- a. Shall be 90 degrees.
- b. Shall have a screw-on cover with weather seal.
- c. Shall have male threaded end and a female threaded end.
- d. Shall be UL Listed.
- e. Suitable for wet locations.

2. EVP Verify Lamp Holder

Mn/DOT approved EVP Verify Lamp Holders for EVP confirmatory lights are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

The following is a picture of the individual EVP components:



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**B. EVP Detector Cable**

Emergency Vehicle Preemption (EVP) detector cable shall be in accordance with the provisions of Mn/DOT 3815.2C5, except that the shield shall be aluminum polyester with a minimum .170 inch overlap and shall be suitable for use in 75°C wet or dry locations.

**C. Emitter Activated Emergency Vehicle Preemption (EVP) Systems**

Mn/DOT approved Emergency Vehicle Preemption Systems – Emitter Activated Preemption Systems are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

<http://www.dot.state.mn.us/products/index.html>

**SS-3.3 CONSTRUCTION REQUIREMENTS**

**Emergency Vehicle Preemption (EVP) Installation**

The Contractor shall install EVP detectors and EVP indicator lamps at the locations indicated in the Plans in accordance with the provisions of Mn/DOT 2565.3S.

**SS-3.4 MEASUREMENT AND PAYMENT**

Furnishing and installing emergency vehicle preemption (EVP) system at the intersection of T.H. \_\_\_\_\_ and \_\_\_\_\_ in \_\_\_\_\_, \_\_\_\_\_ County as specified herein will be measured as \_\_\_\_\_ an integral unit complete in place and operating and will be paid for under Item No. 2565.601 [EMERGENCY VEHICLE PREEMPTION (EVP) SYSTEM] at the Contract price per LUMP SUM, which price shall be compensation in full for all costs incidental thereto.

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**SS-4 (2565) TRAFFIC CONTROL INTERCONNECTION**

This work shall consist of furnishing and installing conduit, handholes, interconnect cable, and system loop detectors, for traffic control interconnection on T.H. \_\_\_\_\_ at the locations indicated in the Plans, all in accordance with the applicable provisions of Mn/DOT 2565; with the current edition of the National Electrical Code; with the Plans; and as follows:

**SS-4.1 GENERAL**

1. As part of the traffic control interconnection, the Department will provide the master controller unit and all required master control equipment as part of the traffic signal cabinet at \_\_\_\_\_ to operate the hardware interconnected coordinated traffic control signal systems on T.H. \_\_\_\_\_ between \_\_\_\_\_ Street and \_\_\_\_\_ Street.

or

The master controller unit and all required master control equipment to operate the hardware interconnected coordinated traffic control signal systems on T.H. \_\_\_\_\_ is in place and located at the intersection of T.H. \_\_\_\_\_ and \_\_\_\_\_.

2. All interconnect cable connections in each intersection traffic signal cabinet will be made by Mn/DOT personnel to make the hardware interconnected coordinated traffic control signal system operational.

**SS-4.2 MATERIALS**

**Interconnect Cable**

Interconnect cable (\_\_\_\_ PAIR # 19 indicated in the Plans) shall be in accordance with Mn/DOT 3815.2C6c.

Mn/DOT 3815.2C6c paragraph 2 shall be modified to read as follows:

The cable shielding shall be one of the following:

- (1) 10-mil Copper
- (2) 5-mil or 6-mil Copper-Clad Stainless Steel
- (3) 5-mil Copper-Clad Alloy Steel
- (4) 6-mil or 7-mil Alloy 194

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**SS-4.3 CONSTRUCTION REQUIREMENTS**

**Interconnect Cable Installation**

Plowing direct buried cable shall be done by means of a “vibratory plow with a “feed blade” that breaks the ground, places the cable to a predetermined depth, and closes the break in the ground. The vibratory plow must guide the cable into the bottom of the break, in such a manner, that little or no stress is placed on the cable during installation, ensuring no damage to the cable assembly. The cable must be fed through the plow blade chute and NOT pulled by the plow blade. Installation of underground cable by means of a vibratory plow that “pulls” the cable in place, is not acceptable. The plowing method must be approved by the Engineer before installation of the cable.

All excavations shall be backfilled and the backfilling shall be like in kind to the adjacent materials and compacted to approximately the same density as the adjacent soils. Sod, curb and gutters, sidewalks, etc., removed by construction operations shall be restored to approximately its original condition by the Contractor at his own expense to the satisfaction of the Engineer.

The Contractor shall provide 1.8 m (6 feet) of interconnect cable in each cabinet. The Contractor shall prepare the interconnect cable by removing 610 mm (2 feet) of the cable sheath and completely removing any grease from a grease filled cable.

**SS-4.4 MEASUREMENT AND PAYMENT**

Furnishing and installing conduit, handholes, interconnect cable, and system loop detectors for traffic control interconnection on \_\_\_\_\_, at the locations indicated in the Plans, as contained in these Special Provisions and in the Plans will be measured as an integral unit complete in place and operating and will be paid for under Item No. 2565.601 (TRAFFIC CONTROL INTERCONNECTION) at the Contract price per LUMP SUM, which price shall be compensation in full for all costs incidental thereto.

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