a. **Description.** This work consists of furnishing, fabricating, and erecting a traffic signal mast arm pole and mast arm as shown on the plans, in accordance with the standard specifications, and as specified herein. This special provision is for an anchor base type steel mast arm pole, including mast arms, and other associated hardware required to complete the work.

b. **Material.** Provide material in accordance with sections 906 and 908 of the Standard Specifications for Construction and this special provision.

Material specifications for the traffic signal mast arm pole and mast arm are included in Table 1.

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole Tube</td>
<td>ASTM A 595 GR A or ASTM A 572 GR 50</td>
</tr>
<tr>
<td>Mast Arm Tube</td>
<td>ASTM A 595 GR A or ASTM A 572 GR 50</td>
</tr>
<tr>
<td>Mast Arm Clamp</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>Gusset Plate</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>Hand Hole Frame</td>
<td>ASTM A 705 GR 50 or ASTM A 572 GR 50</td>
</tr>
<tr>
<td>Lifting Pipe</td>
<td>ASTM A 53 GR B or ASTM A 501</td>
</tr>
<tr>
<td>Handhole Cover</td>
<td>ASTM A 1011 GR 36</td>
</tr>
<tr>
<td>Pole Top</td>
<td>ASTM B 26 (356F or 43)</td>
</tr>
<tr>
<td>Stainless Steel Hardware</td>
<td>AISI 300 SERIES (18-8)</td>
</tr>
<tr>
<td>Luminaire Arm High Strength Bolts</td>
<td>ASTM F 3125 GR A325</td>
</tr>
<tr>
<td>Mast Arm Studs</td>
<td>ASTM A 449</td>
</tr>
<tr>
<td>“ANCO” Lock Nuts or Equivalent</td>
<td>ASTM A 563 GR DH</td>
</tr>
<tr>
<td>Flat Washers</td>
<td>ASTM F 436</td>
</tr>
<tr>
<td>Lock Washers</td>
<td>ANSI B18.21.1</td>
</tr>
<tr>
<td>Steel Plate and Shape Finish</td>
<td>ASTM A 123</td>
</tr>
<tr>
<td>Hardware Finish</td>
<td>ASTM A 153</td>
</tr>
<tr>
<td>Telescopic Field Splice Bolt</td>
<td>ASTM A 307</td>
</tr>
<tr>
<td>C-Hook</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>J-Hook</td>
<td>ASTM A 36</td>
</tr>
</tbody>
</table>

Use high strength bolts, nuts, and washers in accordance with subsection 906.07 of the Standard Specifications for Construction.
Structural steel material used to fabricate the traffic signal mast arm pole and mast arm is required to be accepted based on "Fabrication Inspection" per subsection 4.06 of the Materials Quality Assurance Procedures (MQAP) manual.

c. Fabrication. Fabricate and weld in accordance with section 707 of the Standard Specifications for Construction and the American Welding Society (AWS) D1.1:2010, Structural Welding Code – Steel (as modified by 12SP-707A - Structural Steel and Aluminum Construction), hereafter called AWS D1.1, except as modified herein. Fabricator must possess an active American Institute of Steel Construction (AISC) - Bridge Component QMS Certification (CPT) and Sophisticated Paint Endorsement (SPE) if painting steel surface areas greater than 500 square feet. The Engineer will accept Society of Protective Coatings (SSPC) QP3 - Standard Procedure for Evaluating the Qualifications of Shop Application Firms.

1. The pole and arm tubes must have a uniform taper.

2. Tolerance for overall length of pole tube and arm tube(s) is ±1/8 inch. Tolerance for sweep and camber of pole tube and arm tube(s) is 1/8 inch per 10 foot. Tolerance for twist of pole tube and arm tube(s) is ±10 degrees.

3. The pole tube and arm tube cannot have more than one longitudinal seam weld. Roll or grind flush the longitudinal seam weld. Transverse welds in the pole and arm tubes are prohibited.

4. Attach the arm tube to a connection plate by a full penetration weld. Bolt the arm tube to the pole tube as shown on the plans. Control distortion of flange plates for flatness to assure full contact between mating surfaces in an unbolted, relaxed condition.

5. Weld the longitudinal arm seam on the male and female sections of the telescopic (i.e. slip-type) field splice with a complete joint penetration (CJP) weld a minimum of 36 inches long. When the field splice is erected and in its final position the lap of the arm sections cannot extend beyond the longitudinal arm seam CJP weld.

6. All welds must be 100 percent visual test (VT) inspected by an AWS Certified Welding Inspector (CWI).

7. All fillet welds must be 25 percent magnetic particle test (MT) inspected by a technician qualified in accordance with American Society for Nondestructive Testing (ASNT) Level II. Perform MT inspection in accordance with ASTM E 709, using the yoke, or aluminum prod method with half-wave rectified alternating current (direct current).

8. All partial joint penetration (PJP) longitudinal seam welds must be 10 percent MT inspected by a technician qualified in accordance with ASNT Level II. Perform MT inspection in accordance with ASTM E 709, using the yoke, or aluminum prod method with half-wave rectified alternating current (direct current).

9. All complete joint penetration (CJP) welds must be 100 percent ultrasonic test (UT) inspected by a technician qualified in accordance with ASNT Level II per subsection 918.10 of the Standard Specifications for Construction, except the acceptance/rejection criteria for material thickness equal to or greater than 5/16 inch will be in accordance with AWS Section 6.13 and Table 6.3.
10. Evenly space the pole base plate holes so the pole may be bolted to a concrete foundation as shown on the plans. Finish the lower surface of the base plate flat and at 90 degrees to the pole axis.

11. Provide a hand hole opening and cover. Weld a reinforcing frame to the pole for the handhole opening. Ensure the placement of the handhole does not reduce the strength of the pole. Securely fasten the handhole cover using stainless steel hex head cap screws or by an approved locking device.

12. Provide a suitable pole top with means for securing it to the top of the pole.

13. Provide a hook or other suitable device for the support of cable on the inside of the pole near the top.

14. Weld square stock that has been drilled and tapped to the inside of the hand hole so that it is readily accessible from the hand hole for grounding purposes.

15. Fabricate the arm to pole upright connection to compensate for mast arm deflection. Show this detail on shop drawings for approval by the Engineer.

d. Erection. Snug tighten anchor bolts in accordance with subsection 810.03.N.2 of the Standard Specifications for Construction.

Tighten pole cap, mast arm cap, and luminaire arm high strength bolts to a snug tight condition. Snug tight is the tightness attained by the full effort of an iron worker using an ordinary spud wrench.

Ensure all installation procedures are witnessed by the Engineer.

e. Construction. Ensure all work complies with sections 819, 820, and subsection 810.03 of the Standard Specifications for Construction, the applicable signal construction plan sheets, and this special provision.

For repair coating, apply a coating 1½ times the thickness or thickness equivalent specified for galvanizing on the item, but not less than 5 mils. Use zinc-based solder, zinc-rich primer, or zinc metallizing in accordance with ASTM A 780. Obtain the Engineer’s approval before using zinc metallizing.

f. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mast Arm Pole, Cat __</td>
<td>Each</td>
</tr>
<tr>
<td>Mast Arm, __ foot, Cat __</td>
<td>Each</td>
</tr>
</tbody>
</table>

Mast Arm Pole, Cat __ and Mast Arm, __ foot, Cat __ includes furnishing all materials, fabrication, shop cleaning, galvanizing, shipping, and erection.

No extension of time or additional compensation will be granted due to obtaining the proper AISC certifications and/or endorsements required for this project.
Construction of the foundation will be included in other items.
a. **Description.** This work consists of providing all labor, equipment, and materials to install a mast arm pole foundation, including anchor bolts and other associated hardware required to complete the work.

b. **Material.**


2. Ensure steel reinforcement for all drilled shafts is as specified in section 905, and subsection 105.10 of the Standard Specifications for Construction.

3. Ensure the concrete mix is as specified in subsection 718.02 of the Standard Specifications for Construction.

4. Ensure slurry is as specified in subsection 718.03.E of the Standard Specifications for Construction. Use only polymer type slurries.

5. Use conduit material in accordance with section 819, and subsection 105.10 of the Standard Specifications for Construction.

c. **Construction.** Ensure all work is in accordance with sections 718, 819 and 820, and subsection 810.03 of the Standard Specifications for Construction, the applicable signal construction details, and this special provision.

1. The safety of the drilled shaft excavation, surrounding soil and material supported by the soil, and the stability of the sidewalls is the Contractor’s responsibility. The hydrovac type method is allowed for the first 4 feet below grade with the remaining excavation method as determined by the Contractor and approved by the Engineer.

2. Do not leave drilled shaft excavations unfilled overnight unless the following conditions are met. Dry drilled shafts are drilled shafts where the flow rate of water into the excavation does not exceed 12 inches within 1 hour.

   A. Ensure all open drilled shafts have appropriately sized and attached covers.

   B. Ensure all open drilled shafts in soil are cased overnight.

   (1) **Dry Drilled Shafts.** Temporary casing in dry drilled shafts is acceptable. However, the consequences and the associated costs are the responsibility of the
Contractor. Consequences may include, but are not limited to, hole collapse after the temporary casing is withdrawn or the need to leave temporary casing in place when it was not indicated in the contract. No additional payment will be made when temporary casing used to keep the hole open overnight must be left in place.

(2) Wet Drilled Shafts. Ensure wet drilled shafts have casing installed to the plan bottom of drilled shaft and the excavation within the casing is stopped a minimum distance of 5 feet above the plan bottom of drilled shaft during the nighttime shutdown period. Excavation to the plan bottom of drilled shaft elevation must be made the following day, prior to pouring the concrete.

3. Water within drilled shafts in excess of 3 inches may be pumped provided the flow rate of water into the excavation is less than 12 inches per hour.

4. Using the tremie method is acceptable whether placing the concrete in a wet or dry drilled shaft excavation. Use a watertight tremie, consisting of a tube of sufficient length, weight, and diameter (8 inch minimum inside diameter) to discharge concrete at the shaft base elevation. Ensure that the inside and outside surfaces of the tremie are clean and smooth. Pumped concrete must be placed in accordance with subsection 718.03.H.3 of the Standard Specifications for Construction.

5. Completely assemble a cage of reinforcing steel which consists of longitudinal and horizontal bars as indicated on the appropriate signal construction details. Provide a fully assembled steel reinforcement cage for inspection after inspection of the excavation and prior to placement of concrete. Support the cage to control vertical displacement during concrete placement. Steel reinforcement must have a clear cover of 3 inches, unless otherwise noted, and may be adjusted to ensure proper clear cover.

6. Ensure anchor bolt installation and tightening is in accordance with subsection 810.03.N of the Standard Specifications for Construction. Ensure all installation procedures are witnessed by the Engineer. Ensure anchor bolts and conduits are rigidly installed before the concrete is placed. Space anchor bolts by means of a template. The center of the template must coincide with the center of the foundation.

7. Continuously cast concrete once placement has commenced, until shaft concrete casting is completed. Exposed concrete surfaces must be cast in forms and exposed concrete edges must be beveled 3/4 inches.

do. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mast Arm Pole Fdn, 6 Bolt</td>
<td>Foot</td>
</tr>
</tbody>
</table>

Mast Arm Pole Fdn, 6 Bolt includes storage and disposal of removed material in the pay item. Disposal of removed material must comply with section 204 of the Standard Specifications for Construction or as directed by the Engineer. Steel casing is not included in this pay item and will be paid for separately.
a. Description. This work consists of providing all labor, equipment, and materials to install a steel casing when constructing a steel strain pole or mast arm pole foundation.

b. Material. Use casings that conform with subsections 105.10 and 919.10 of the Standard Specifications for Construction. Ensure the outside diameter of casing is not less than the specified size of the shaft.

c. Construction. Install the steel casing as indicated on the plans or as directed by the Engineer. Install the steel casing in a manner that produces either a positive seal at the bottom of the casing to prevent the entry of water and/or soil into the shaft excavation or install the steel casing to the bottom of the foundation, whichever is less in length. Leave the steel casing in place. The steel casing may stop at the conduit entrance into the foundations. The top of the foundation may be formed separately without steel casing. Ensure a suitable method of compaction is employed to ensure the soil immediately outside the casing is compacted properly and complies with section 206 of the Standard Specifications for Construction.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casing</td>
<td>Foot</td>
</tr>
</tbody>
</table>
a. Description. This special provision is for electrical construction and/or relocation of traffic signal facilities is to be used in addition to the applicable sections of the standard specifications. In case of conflict use whichever is most restrictive.

b. Materials. Furnish new material and equipment, unless specified otherwise, and comply with sections 918 and 921 of the Standard Specifications for Construction. Materials furnished by the Department to the Contractor will be picked up by the Contractor at such site as designated by either MDOT, or the Local Agency representing MDOT, with any associated costs included in pay items as indicated on the plans and will not be paid for separately.

1. General. Provide manufacturer’s certifications, in accordance with the specifications, for all wire and cable and other items or as directed by the Engineer. Do not install any wire or cable before it has been approved by the Engineer. Include statement “Materials are in accordance with the Specifications” on their material order, especially on wire and cable.

Reuse only the best of the existing material and equipment where the contract calls for reuse of existing material and equipment as directed by the Engineer. The Department will have the right to furnish the Contractor with a new part if any are found defective prior to dismantling. Any part or parts damaged by the Contractor subsequent to starting the removal are a liability of the Contractor.

Furnish the Engineer an as-built record of all underground or overhead work installed within 5 days after completion of each section of the underground conduit, cable or overhead line work. This record must include the size and length of cable and duct lines, location of the lines, handholes and manholes, and location and size of support poles. Tag and stamp all wires and cables using a brass tag indicating the source and use of the cable.

Connect the ground wire to the ground rod with a UL rated copper or bronze ground clamp.

c. Construction. All work must comply with sections 819 and 820 of the Standard Specifications for Construction, the applicable “typical” signal construction details, this special provision, and requirements of the NEC, National Electrical Safety Code (NESC), and the Michigan Department of Licensing and Regulatory Affairs (LARA). Contact the LARA for electric service inspection and be responsible for payment of all applicable fees.

1. Maintain all existing street lighting, traffic signal, primary, transmission, communication cables, etc. circuits in an operational condition, unless otherwise noted on the plans or as directed by the Engineer.
2. In addition to subsections 104.07 and 812.03 of the Standard Specifications for Construction, the following applies to Contractor maintenance of permanent or temporary traffic signal installations which are being worked on by the Contractor:

A. The Contractor is responsible for maintaining any portion of a traffic signal which has been worked on by the Contractor until final acceptance of that specific location.

B. If MDOT forces are required to work on an emergency traffic signal malfunction that is determined to have been caused by the work of a Contractor, the cost of the work will be the responsibility of the Contractor.

C. If vandalism occurs to equipment that is not energized, the Contractor is responsible for replacement.

3. Utility Coordination. Notify the System Operating Division of the local utility 72 hours in advance of any work on underground or overhead transmission or distribution circuits. If possible, the System Operating Division will shutdown and red tag the line by 8 a.m. for the day requested. Notify the System Operating Division when the work is complete.

Provide coordination and make arrangements, as described above, to work on traffic signal circuits.

Schedule, coordinate, install, and pay for work provided by the local utility company(s), as indicated on the plans or as directed by the Engineer. The Engineer will not authorize payment for delay caused by the Contractor’s failure to properly schedule and coordinate any utility work.

4. Agency Coordination. Secure all necessary permits covering the operations, including permits from the Public Authorities having jurisdiction over the streets, or other Public Properties in which the work is located, and the improvements therein. Obtain the amount of any charges for payment, including fees or inspection charges required by such authorities, and include the cost of these fees in the bid prices.

The local traffic authority may impose restrictions regarding particular times of certain days of the week wherein the Contractor cannot perform work and may, in fact, be required to clear the area of work obstacles or construction equipment. The Contractor must take note of this and there will be no extra payment to perform the work with possible restrictions imposed. The Engineer will not authorize extra payment if the Contractor chooses to perform work during overtime status.

5. Construction must be performed by persons who are experienced and qualified for the work required. On-site licensed (Journeyman electrician) supervision is required for the electrical system installation (including placement of traffic loops, conduits, and/or cables in dirt, foundations, and handholes) and must be present at all times when electrical construction is in progress. Ensure the ratio of electrical journeymen or master electricians to registered apprentice electricians is on the basis of one electrical journeyman or master electrician to one registered apprentice electrician in accordance with Michigan Law section 338.883e. This ratio is to be enforced on a jobsite basis. For traffic signal work a single jobsite is defined as a single intersection or single electronic traffic control device.