

CONCRETE FOUNDATIONS**INTRODUCTION**

There are four basic types of concrete foundations used in traffic signal construction:

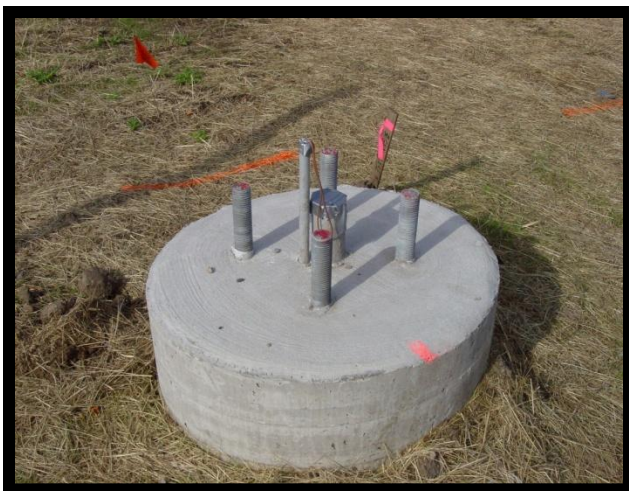
Pedestal Foundation
(Std. Plate 8112)





Pedestrian Push Button Stations (Standard Plate 8115).

Cabinet/Equipment Pads (Standard Plate 8119). See Appendix for Typical Signal Plan Equipment Pad detail.



Mast Arm Pole Foundations:
PA85 Standard Plate 8120

PA 90 and PA100 Standard Plate 8126

There are five basic types of foundations used in roadway lighting construction:



Lighting Unit concrete base

..... Lighting cabinet concrete foundation



.....Pre-cast concrete light base



..... High Mast (Tower) light foundation

Steel Screw-in Bases

Lighting - If approved by the Engineer, an alternate screw-in light base may be used as specified in the Contract documents.

Signals – The Contract documents will specify if a screw-in base is to be used for pedestal installations on a signal project.



GENERAL REQUIREMENTS

If rocks or other obstructions that prevent construction of the base are encountered, the dimensions of the foundation may be adjusted, as determined by the Engineer, to provide a stable base.

If soil conditions permit, the Contractor may use a partial form in the upper portion of the foundation. In sandy soil, which does not have enough binder, partial forms should not be used because the hole may cave in during the pouring operation and the foundation could be lost. If there are any doubts about the soil condition, a full-length form should be used.



Conduits, anchor rods and rebar cages must be placed in the proper position and held in place until the concrete is cured. Forms must not be removed until the concrete is cured. A tremie must be used when pouring concrete to ensure that the concrete is not dropped from a height of more than four (4) feet (1.2 m).



Rebar cages for signal pole foundations are to be wire tied together, welded together, or a combination of each. Rebar material must be as specified on the Mn/DOT Pole (PA85, PA90, and PA100) Foundation Standard Plates.

Anchor rod cages must be designed without welding or tack welding on the anchor rods. Anchor rods that show evidence of welding or tack welding will be rejected.

An accurate template must be provided for the anchor bolts, it must remain in place until the concrete is cured. The foundation will be rejected if the anchor bolts are improperly aligned after the foundation has cured. The bolt holes in the transformer base must not be enlarged to allow for anchor bolts shifting.



There is additional finishing instructions for concrete foundations located in the Contract documents. The specifications state that the top of the foundation must be floated smooth and the edges must be beveled to present a neat appearance.

STANDARD PLATES

The Standard Plates contain essential details about the construction of concrete foundations.

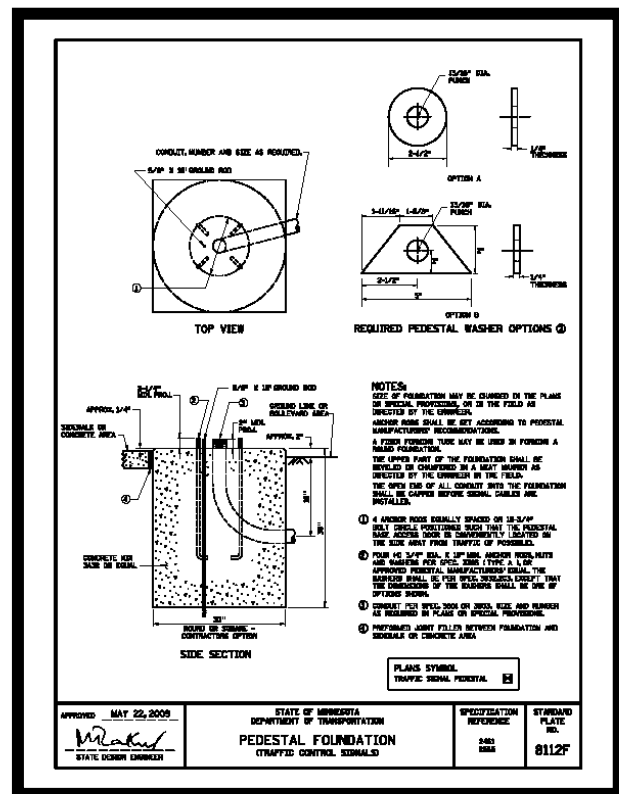
The Standard Plates that apply to a specific project are listed on the Detail Sheet of the plan.

Information found on Standard Plates include:

- Concrete mix required.
- The diameter of the line of the anchor bolt circle.
- Bolt spacing.
- Minimum conduit size and type .
- Number of conduits required in the base.
- Reinforcement bar size and placement.
- Minimum projection of the conduit above the base.
- Size and projection of the anchor bolts.
- Overall dimensions of the base.
- The grade of the top of the foundation relative to the adjacent ground or sidewalk.

Other required items:

- The contractor has the option, if the Engineer approves, of using a stronger mix such as 3y43.
- The same applies to increasing the size and shape of the base.



Most Standard Plates contain an area dedicated to NOTES. It is essential that these notes be carefully read and understood. Because the Standard Plates and the Spec. Book may be outdated, the contractor and the inspector must check the Contract Documents before work begins on any structure.

Refer to the specific Standard Plate that applies to the foundation that is to be constructed. It should be noted, that Standard Plates can change and the current Standard Plates, that apply to a specific project, will listed in the contract documents.

STANDARD SPECIFICATIONS REQUIREMENTS2401.3 - Concrete Bridge Construction

This specification covers a wide spectrum of items, some of which do not apply to signal foundations. One item that does apply is 2401.3B6 (Form Construction) which addresses form integrity, strength and construction. Another is 2401.3C which covers Placement of Concrete items such as inspection of forms, reinforcement bars, materials and



equipment. Reinforcement bars must be carefully situated in the form so that they are centered within the form and there is a minimum of 3 inches of concrete (ACI Spec 5.7.1) covering the rebar when the structure is cast. Concrete must not be placed unless all items have been approved and adequate lighting exists to do the work.

Compaction of Concrete

Concrete foundations must be thoroughly compacted by mechanical vibration applied internally. Vibrators must be operated at a frequency of not less than 4500 impulses per minute. Compaction of concrete must be as specified in Mn/DOT 2401.

Finishing Concrete

All exposed surfaces of concrete foundations must receive an “ordinary surface finish” as specified in Mn/DOT 2401.3F.

2401.3G - Concrete Curing and Protection

Concrete curing is important to the strength and life of the structure. The choice of curing method depends on the air temperature, surface temperature of the structure and surface moisture of the structure. If the surface temperature of the structure drops below 40 degrees Fahrenheit (4.5 degrees Celsius), no curing time will be counted. The surface of the structure must remain moist. This is accomplished by tightly covering the structure with plastic sheeting. Sheeting is described in Std. Spec. 3756 (White Opaque Polyethylene). No other color is allowed.



The Standard Plate states: “Mast Arm Pole standards must not be installed on foundations until at least seven days of curing period has elapsed.” This is based on 60% strength. If different conditions prevail, refer to Specification 2401.3G (Concrete Curing and Protection), Table 2401-1 in the Mn/DOT Standard Specifications for Construction book to find out the number of curing days required and for additional details on this subject.



Anti-Seize Lubricant

Threaded portions of all anchor rods, above concrete foundations and steel bases, etc., must be coated with a brush-on anti-seize lubricant before installation of signal service cabinets, signal cabinets, mast arm pole standards, pedestals, lighting units, lighting service cabinets, or other type cabinets/structures on anchor rods. All threaded items require brush-on anti seize lubricant.

