

812 - PERMANENT SIGNING

SECTION 812

PERMANENT SIGNING

812.1 DESCRIPTION

Install highway signs, delineators and object markers as shown in the Contract Documents.

BID ITEMS

<u>BID ITEMS</u>	<u>UNITS</u>
Barricade (Type 3) (Fixed)	Each
Sign (*1) (High Performance)	Square Foot
Sign Post (4" x 6" Wood) (*2)	Linear Foot
Sign Post (*3 Steel Beam)	Linear Foot
Sign Post (*4 U Steel)	Linear Foot
Sign Post (*5 Perforated Square Steel Tube)	Linear Foot
Sign Post (4" x 6" Structural Steel)	Linear Foot
Sign Post (3 I 2.25 Aluminum)	Linear Foot
Sign Post Stub and Breakaway Base Plate (*3)	Each
Sign Post Breakaway Base Plate (*3)	Each
Sign Post Footing (*6 Concrete)	Linear Foot
Sign Post Footing (Sign Post Square Coupler) (*11)	Each
Sign Post Footing (*5 Perforated Square Steel Tube)	Each
Signing Object Marker (*7)	Each
Signing Delineator (*8) (*9 Rigid, "U" Post)	Each
Signing Delineator (*8) (*9 Flexible) (*10 Anchor)	Each
Signing Delineator (*8) (*9 Bracket)	Each
Sign (Remove and Reset)	Lump Sum

*1 Type of substrate: Flat Sheet, Reinforced Panel or Overlay

*2 Type of sign: Flat Sheet Sign or Reinforced Panel Sign

*3 Size and weight of post: W 6 x 9, W 10 x 12 or W 10 x 22

*4 Weight per foot: 2 lbs./ft. or 3 lbs./ft.

*5 Size of post: 1¼ inch, 2 inch, 2¼ inch or 2½ inch

*6 Diameter: 18- inch wood post, 24- inch steel beam post or 30- inch steel beam post

*7 Type: Type 2 or Type 3

*8 Type: Type A or Type B

*9 Color: Yellow or White

*10 Type: Type 1 or Type 3

*11 Size: 2 ¼ inches

812.2 MATERIALS

a. Materials for Permanent Signs.

(1) Provide Grade 3.0 concrete for sign post footings that complies with **SECTIONS 401, 402 and 1102**. If allowed, provide expanded foam foundations according to **DIVISION 1700**.

(2) Provide asphalt material for sealing gaps between the wood posts and the concrete footings approved by the Engineer.

(3) Provide steel reinforcement bars, structural steel tubes, anchor bolts, steel fasteners, steel sign posts, steel delineator posts, aluminum sign blanks, aluminum sign overlay panels, aluminum I-beams, aluminum Z-bars and aluminum post clips that comply with **DIVISION 1600**.

(4) Provide organic zinc-rich paint for repairing damaged spelter coatings that complies with **DIVISION 1800**.

(5) Provide retroreflective sheeting, process inks and flexible delineator posts and anchoring devices that comply with **DIVISION 2200**.

(6) Provide wood posts and preservative treatment of and drilled holes that comply with **DIVISION 2300**.

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b. Shop Fabrication of Signing Items.

(1) Flat Sheet Signs. Provide flat sheet sign blanks that comply with the Contract Documents. Remove warps, burrs and other defects.

(2) Reinforced Panels. Provide reinforced panels of either extrusheet or extruded fabrication that comply with the Contract Documents and these requirements:

- Cut the ends of all panels at 90° angles to within 1/8 inch of the length shown in the Contract Documents.
- If the panel is extrusheet fabrication, do not exceed a 1/32 inch mismatch between the edge of the sheet and the extrusion it is fastened to.
- Remove warps, burrs and other defects.

(3) Flat Sheet Sign Blank and Reinforced Panel Preparations. After fabrication, prepare the metal for sheeting application using a Class 2 conversion coating according to ASTM B 921, "Standard Specification for Non-hexavalent Chromium Conversion Coatings on Aluminum and Aluminum Alloys".

Handle the metal with a mechanical device or clean canvas gloves, between the etching operation and application of retroreflective sheeting. Prevent the metal from coming in contact with greases, oils or other contaminants before the application of sheeting, films or inks.

(4) Application of Retroreflective Sheeting. Use either heat activated or pressure sensitive retroreflective sheeting of the color shown in the Contract Documents.

Apply the sheeting to the treated blanks and panels according to the manufacturer's recommendation, or by a method that will produce an equivalent result.

During fabrication of sign faces comprised of 2 or more pieces of retroreflective sheeting on reinforced panels, carefully match adjacent pieces of sheeting for color to provide uniform appearance and brilliance under both day and night illumination. Any apparent contrast between adjacent pieces of applied sheeting or panels is cause for rejection of the sign.

Overlap pressure sensitive sheeting a minimum of 3/16 inch at splices. If heat activated sheeting is spliced, the minimum overlap is 3/16 inch. If adjacent sheets of heat activated sheeting are butted together, the gap between adjacent sheets may not exceed 1/32 inch.

On reinforced panel signs, vertical splices a minimum of 4 feet apart are permitted.

On flat sheet signs, 1 vertical or horizontal splice is permitted. Make horizontal lap splices with the uppermost piece overlapping the lower piece. Splicing is prohibited if the sign face is made using the reverse screen process.

(5) Sign Legend and Border Details. Provide sign legend and border that complies with the requirements specified in the Contract Documents.

Use capital letters and numbers that comply with the standard rounded capital letter alphabets in the latest edition of Standard Alphabets for Highway Signs. Use lower case letters that comply with the latest edition of Standard Lower Case Alphabet for Highway Signs. Use initial capital letters that are 1 1/2 times the loop height of the lower case letters, from a modified series "E" alphabet in which the stroke width is increased to approximately 1/5 of the height of the letter or number.

Make the sign face for flat sheet signs using one of these processes:

- Direct Screen: the legend and border color is applied to the face of the sign by the silkscreen process.
- Reverse Screen: a transparent color is applied to the face of the sign by the silkscreen process to form the legend and border.
- Direct Applied: the legend and border is retroreflective sheeting applied to the face of the sign by the appropriate methods.
- Digital Printing.

Use the Direct Applied process to make the sign face for reinforced panel signs.

(6) Application of Process Inks and Lettering Films. Use the color of film or ink to obtain the sign face, legend and border as shown in the Contract Documents.

Apply process inks to the sign faces according to the retroreflective sheeting manufacturer's recommendation, or by a method that will produce an equivalent result. Apply lettering films to the sign faces according to the lettering film manufacturer's recommendation, or by a method that will produce an equivalent result.

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(7) Sign Identification. Install a clear or light colored, pressure sensitive decal with a printed (not handwritten) black legend on the back of each sign, including the following information:

Sign Number (by sign fabricator)

Erection Date (by sign installer) (month-day-year)*

*A punch-out-the-date option may be used.

Locate the legend horizontally, vertically or diagonally along the bottom or right edge of the sign in a position that is not covered up when the sign is installed.

On a sign with an area of less than 16 square feet, the legend shall be a minimum of ½ inch in height. On a sign with an area of 16 square feet or more, the legend shall be a minimum of 1 inch in height.

(8) Sign Overlays. Provide sign overlays that comply with the Contract Documents. Fabricate the sign overlays from flat sheet blanks covered with retroreflective sheeting. Prepare the flat sheet blanks and apply the retroreflective sheeting as specified for flat sheet signs. Apply the legend and border to the retroreflective sheeting as specified for the flat sheet sign.

(9) Delineators. Provide the types of delineators specified in the Contract Documents.

Fabricate delineators for steel post mount or bracket mount from flat sheet blanks covered with retroreflective sheeting. Prepare the flat sheet blanks and apply the retroreflective sheeting as specified for flat sheet signs.

(10) Object Markers. Provide the type of object markers specified in the Contract Documents.

Fabricate Type 1 object markers from 18-inch by 18-inch flat sheet blanks covered with yellow high performance retroreflective sheeting.

Fabricate Type 2 object markers from 6-inch by 12-inch flat sheet sign blanks covered with yellow high performance retroreflective sheeting.

Fabricate Type 3 object markers from 12-inch by 36-inch flat sheet blanks covered with yellow high performance retroreflective sheeting with black non-reflective hash marks as shown in the Contract Documents.

Prepare the flat sheet blanks and apply the retroreflective sheeting as specified for flat sheet signs.

(11) Fabrication of Sign Posts. The total length of posts shown in the Contract Documents is estimated. The number, type and size of posts shown in the Contract Documents are determined from theoretical sections. Do not order sign posts until the Engineer provides the length of each post for the sign or the sign assembly based on actual field measurements (**see subsection 812.3c.**).

Wood posts, steel "U" posts and perforated square steel tube posts may be ordered in stock lengths and cut to the required length in the field. Do not torch-cut steel posts. Drill breakaway holes in the wood posts at the project site. Treat all field cuts and drilled holes in wood posts with preservative material. Paint all cut ends of steel posts with zinc-rich paint.

Fabricate steel beam posts, base plates and fuse plates to the specified dimensions. Drill the specified holes in the posts and plates. The preferred method of cutting plates is sawcuts; however, flame-cutting is permitted. Grind all edges smooth and remove all burrs projecting beyond the planes of the plate faces, cuts or drilled holes.

After the base plates are galvanized, remove all runs or beads in the areas where washers are placed.

812.3 CONSTRUCTION REQUIREMENTS

a. General. Erect the permanent signing as necessary to expedite the completion of the project and the opening of the highway. The Engineer may require that the Contractor mobilize permanent signing operations whenever it is feasible to complete a portion of the project. The Contractor may have to mobilize and, upon completion of all currently feasible work, suspend the permanent signing operations more than once before the project is completed.

It is the Contractor's responsible to verify the utility locations.

If a temporary sign interferes with the installation of a permanent sign, remove and reset the temporary sign to a location designated by the Engineer.

b. Sign Location and Orientation. Locate and stake each sign installation according to the Contract Documents. Orient the signs in relation to the highway alignment as shown in the Contract Documents.

If the Contract does not include the item of Contractor Construction Staking, the Engineer will stake the location of each sign.

c. Sign Post Lengths. The Engineer will provide the Contractor with the length of each sign post.

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If the contract includes Contractor Construction Staking, provide the Engineer with the information necessary to determine the length of each sign post. Provide the Engineer with the vertical and horizontal measurements from the top of the pavement edge to:

- the ground line (for posts with no footings)
- the top of the footing (for posts with footings)
- the top of the stub post base plate (for steel beam breakaway posts)

If the Contract does not include the item of Contractor Construction Staking, the Engineer will obtain the measurements necessary to determine the length of each sign post.

d. Sign Post Installation.

(1) Footings.

(a) Post Holes for Wood Posts. Excavate the post holes to the shape and dimensions shown in the Contract Documents. Prevent water from entering the excavated holes.

(b) Concrete Footings for Wood Posts and Steel Beam Stub Posts. Excavate the footings to the shape and dimensions shown in the Contract Documents. Remove all non-compacted material from the excavation. Form the top 12 inches of the footings. Place the reinforcing steel and post sleeves or stub posts in the footings as shown in the Contract Documents. Vibrate the concrete placed in the footings and finish the footings as detailed in the Contract Documents. Backfill the footings as detailed in the Contract Documents, placing the backfill soil in uniform layers (maximum layer of 8 inches, loose measurement), and compact each layer until no further consolidation is observed.

(c) Perforated Square Steel Tube Post Footings. Install the perforated square steel tube post footings plumb as shown in the Contract Documents. Do not damage the galvanized coating during installation or alter the cross-sectional dimensions of the perforated square steel tubes. Remove and replace any footing damaged during the perforated square steel tube installation.

(d) Expanded Foam Foundations. When a concrete footing is not specified, expanded foam foundations may be used on Sign Post (4" x 6"), Sign Post (4" x 6" Wood) (*²), and Sign Post (*⁵ Perforated Square Steel Tube). The post hole must be dry or damp with no standing water. Install the foam foundation and post according to the manufacturer's instructions. Do not substitute a concrete footing with expanded foam.

(2) Post Installation. Install the posts as shown in the Contract Documents. Plumb the sign posts as they are installed. The maximum allowable tolerance from vertical is 1 inch (from the top of the post to the ground line).

(a) Wood Posts in Soil. Place the posts in the post holes, plumb the posts and backfill with the soil from the post hole excavation in uniform layers (maximum layer of 8 inches, loose measurement) around the posts, and compact each layer to the original ground line until no further consolidation is observed. After backfilling, drill breakaway holes in the posts as shown in the Contract Documents. Treat the breakaway holes with preservative materials.

(b) Wood Posts in Concrete Footings. After curing, place the posts into the post sleeves, plumb the posts, secure the posts with wedges and seal the gaps between the posts and the post sleeves with asphalt material. Drill breakaway holes in the posts as shown in the Contract Documents after the posts are secured. Treat all field cuts and drilled holes in wood posts with materials for preservative treatment.

(c) Steel Beam Breakaway Posts. After curing, place the steel beam post with base plate onto the stub post base plate, plumb the post and tighten the base plate bolt assemblies as detailed in the Contract Documents. Attach the structural tubing to the steel posts.

(d) Perforated Square Steel Tube Posts. Install and attach the perforated square steel posts in the footings as detailed in the Contract Documents.

(e) Steel "U" Posts. Install the posts by driving. Do not alter the cross-sectional dimensions of the posts or damage the coating during installation. Remove and replace damaged posts.

(f) Assemble the sign post square couplers according to the manufacturer's instructions.

e. Sign Installation. Mount the signs as shown in the Contract Documents. Position the signs so the sign face is vertical. If required for installation, drill the holes in the fabricated signs from the sign face sheeting side.

After the sign is installed, the post shall be plumb and secure in the ground.

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Repair damaged retroreflective sheeting on the sign faces. Use pressure sensitive retroreflective sheeting to patch the damaged areas, overlapping the damages area a minimum of ¼ inch. Match the retroreflective sheeting patch to the adjacent pieces of sheeting for color and uniform appearance and brilliance under both day and night illumination. Repair damaged galvanized areas on posts and structural members by cleaning and painting with zinc-rich paint.

f. Delineators and Object Markers. Install delineators and object markers as shown in the Contract Documents.

g. Remove and Reset Existing Signs. Remove, transport, store and reset existing signs according to the details in the Contract Documents. Provide new bolts, nuts, washers, post clips and other attachments as necessary to reset the existing signs. When directed by the Engineer, repair or replace all existing signs damaged during the removal and resetting operations at own expense.

812.4 MEASUREMENT AND PAYMENT

The Engineer will measure the finished face of flat sheet signs, reinforced panel signs and sign overlays by the square foot.

The Engineer will measure wood posts, steel beam posts, "U" steel posts, perforated square steel tube posts, structural steel posts, aluminum posts and concrete footings by the linear foot. If the alternate grade of steel beam posts is provided, the measurement is based on the primary grade steel size and weight posts.

The Engineer will measure various sizes and types of each sign stub post with breakaway base plate, sign post breakaway base plate, perforated square steel tube sign post footing, object marker and delineator.

The Engineer will measure removal and resetting of existing sign by the lump sum.

The Engineer will measure each barricade, sign post square coupler and sign post coupler footing.

Payment for the various permanent signing bid items at the contract unit prices is full compensation for the specified work.