Section 2524. Highway Signing

2524.01 DESCRIPTION.

Erect traffic signs and delineators according to the contract documents.

2524.02 MATERIALS.

A. Signing Materials: Apply Section 4186.

B. Wood Posts: Apply Section 4164.

C. Class A Crushed Stone: Apply Article 4120.04.

D. Concrete Footings: Apply the provisions of Section 2403.

2524.03 CONSTRUCTION.

Ensure all parts used in construction of traffic signs and delineators are able to withstand a wind load of 30 pounds per square foot (1.4 kPa) on the sign surface.

A. Fabrication of Signs.

1. Traffic Signs.

a. Except as modified by the contract documents, fabricate signs according to the standards established in the Standard Highway Signs, 2004 edition, as published by the U.S.D.O.T.

b. All traffic signs, except milepost markers and 6 inch by 6 inch (150 mm by 150 mm) route markers, are classified into two groups, Types A and B, as indicated in the contract documents.

1) Type A Signs.

a) Comply with the following:

- Aluminum, galvanized steel, or when specifically specified, plywood sheets mounted on wood or steel breakaway posts.
- Sign face material fabricated from reflective sheeting.
- Sign legends accomplished with either the direct or reverse silk screen process, or with black nonreflective sheeting that is direct applied.

b) Ensure the finished signs comply with the details specified in the contract documents.

2) Type B Signs.

a) Comply with the following:

- Extruded aluminum highway sign panels mounted on either wood or steel breakaway posts as specified in the contract documents.
- Sign face material fabricated from reflective sheeting.
- Sign legends accomplished through use of reflectorized or nonreflectorized letters, numerals, symbols, and borders that are direct applied.

b) Ensure the finished signs comply with the details specified in the contract documents.

c) Prior to fabrication, submit shop drawings for each Type B sign according to Article 1105.03. Each drawing is to be a scale drawing of the sign face, showing the size, arrangement, and spacing of all letters, numerals, symbols, and borders.

2. Milepost Markers.

a. Comply with the following:

- Green reflectorized sheeting on flat aluminum or galvanized steel sheets as for Type A signs.
- Reflectorized white message applied directly to the face material.
- Dimensions as specified in the contract documents.

b. Mount milepost markers on posts of the type specified for delineators.

3. Route Markers, 6 Inch by 6 Inch (150 mm by 150 mm).

Comply with the following:

- Reflectorized sheeting on flat aluminum or galvanized steel sheets as for Type A signs.
- Details as specified in the contract documents.

4. Delineators.

a. Install a hermetically sealed, acrylic plastic, prismatic, reflex reflector, appropriately housed and contained on Materials I.M. 486.07.

b. Mount above milepost markers on the same delineator post.

B. Erection of Signs, Milepost Markers, and 6 Inch by 6 Inch (150 mm by 150 mm) Route Markers.

1. Type A and B Signs.

a. Accurately erect all Type A and B signs to comply with the dimensions and details shown in the contract documents. Obtain the Engineer's approval for all deviations from the contract documents before starting the work.

b. After installation, modify each 4 inch by 6 inch (100 mm by 150 mm) wood sign post by field drilling holes as shown in the contract documents. All labor and equipment necessary for this modification is included in the price bid for the post and no separate payment will be made.

c. Set wood posts in 12 inch (300 mm) diameter holes of the proper depth with a minimum embedment of 5.0 feet (1.5 m).

d. Set posts to full depth at the required spacing. Align posts accurately both vertically and horizontally. Place backfill consisting of Class A crushed stone meeting the requirements of Article 4120.04 into the post holes. Place material in layers no more than 6 inches (150 mm) in depth. Thoroughly compact each layer taking care to preserve the alignment of the posts.

e. Where steel breakaway posts are specified in the contract documents, carefully drill or dig footing holes to the required size at

the proper location. Spread the excavated earth within the right-of-way to blend uniformly with the existing surface to the Engineer's approval.

f. Immediately before placing concrete, remove all loose and uncompacted material from the bottom of the hole. Some of the holes will be located in the bottoms of drainage ditches. In these cases conduct construction operations so that water will not enter excavated holes.

g. For the breakaway base, tighten all bolts to maximum using a 12 inch to 15 inch (305 mm to 308 mm) wrench to bed washers and shims, and to clean bolt threads. Loosen each bolt in turn and retighten in systematic order to the torque specified in the contract documents. For the fuse plate assembly, tighten fuse bolts to the torque specified in the contract documents.

h. Preposition stub posts and reinforcing to the proper depth as shown in the contract documents. Ensure stub posts and reinforcing are properly aligned and secured, complying with Article 2405.03, H, 3. Cast the footing to the elevation shown in the contract documents. Rod the concrete in place to fill all the voids. Form the exposed portion of the footing as shown in the contract documents. Shape the cap of the footing so that drainage is away from the base plate of the post. Apply the provisions of Section 2403.

i. After the concrete has developed the strength required by Article 2403.03, N, 2, attach the post and adjust for correct alignment and elevation. Remove all excess concrete from around the holes.

j. Erect extruded panels according to the details in the contract documents. Take necessary measures to prevent damage to sign faces. Repair (at no additional cost to the Contracting Authority) any mars, scratches, dents, or other damage to sign faces visible at a distance of 5 feet (1.5 m). Tighten locknuts on the post clip bolts by means of a torque wrench to 225 inch-pounds (25 Nm) when using dry, clean, unlubricated threads. Draw the nuts on panel bolts tight.

2. Delineators, Milepost Markers, and 6 Inch by 6 Inch (150 mm by 150 mm) Route Markers.

a. Drive the posts for delineators, milepost markers, and 6 inch by 6 inch (150 mm by 150 mm) route markers. Provide a suitable driving cap. Attach signs and delineators after driving.

b. Erect markers and delineators so that the signs and delineator reflectors will be at elevations called for in the contract documents. Ensure they are true to line and grade and are truly vertical. Where a milepost marker is designated, attach the marker in place of a delineator. Where a 6 inch by 6 inch (150 mm by 150 mm) route marker is designated, attach it above the milepost marker on the same post.

c. Ensure delineator posts for these signs are plumb and firm in the ground, spaced as shown in the contract documents, and driven to the required lines and grades. Ensure that after driving, the top of the post has substantially the same cross section dimensions as the body of the post. Battered heads will not be permitted. Remove from the site and replace (at no additional cost to the Contracting

Authority) all posts which are bent or otherwise damaged to the extent that they are, in the Engineer's opinion, unfit in the finished work.

3. Perforated Square Steel Tube (PSST) Posts and Anchors.

a. Position posts within anchor at furthest corner from likely point of impact from an errant vehicle.
b. Embed post within anchor without any play.
c. Provide minimum insertion length as required by manufacturer.
d. Ensure inside of break-away and slip base anchors installed in concrete are free of concrete to allow drainage.
e. Install triangular slip base assembly as required by manufacturer.

C. Sign Positioning.

The glossy surface on sign faces may produce specular reflection. Position signs to eliminate or minimize specular reflection in the following manner:

1. Overhead Signs.

a. Adjust the sign face in the following manner, where the road grade approaching the sign is plus 2.0% or greater:
- Vertical axis to be parallel to a plumb line.
- Horizontal axis to be at right angles to the road.

b. Adjust the sign face in the following manner, where the road grade approaching the sign is less than plus 2.0%:
- Vertical axis inclined to face upward at the rate of 1/8 inch per foot (10 mm/m) of vertical sign surface for each 1% the road grade differs from plus 2.0%.
- Horizontal axis to be at right angles with the road.

2. Ground Installations.

a. Ground installations will be shown in the contract documents.
b. After installation of signs is complete, the signs will be inspected at night by the Engineer. If specular reflection is apparent on any sign, adjust its positioning to eliminate or minimize this condition.

D. Sign Identification.

Identify the signs as specified in Section 4186, with the following additions:

Sign No..... (Filled in by Sign Fabricator)
Erection Date..... (Filled in by Sign Contractor)

2524.04 METHOD OF MEASUREMENT.

Measurement for signing, satisfactorily erected according to the contract documents, will be as follows:

A. Type A Signs.

1. Calculated in square feet (square meters) of sign area completed in place based on the nominal dimensions of the signs.

2. The area of all regular, rectangular, triangular, octagonal, and circular shaped Type A signs will be measured from the nominal given dimensions. Cutouts for rounded corners, and so forth, will not be deducted. The area of all irregularly shaped Type A signs, such as U.S. and Interstate route markers, will be measured from the dimensions of a circumscribed rectangle around the route marker.

B. Type B Signs.
Calculated in square feet (square meters) on the basis of area of the vertical, front face of the signs specified in the contract documents. Measurement will not be made for area in excess of this area.

C. Wood Posts for Type A or B Signs.
Each to the nearest foot (0.3 m) for the various post sizes installed. When posts are placed to depths greater than the minimum depth specified, the measured length does not include any parts placed to depths greater than 1 foot (0.3 m) more than the specified minimum.

D. Steel Breakaway Posts for Type A or B Signs.

1. Each to the nearest 0.1 foot (30 mm) for the various post sizes installed.

2. Unless specified otherwise in the contract documents, the measured length of steel breakaway posts includes no more than 1 foot (0.3 m) over the length necessary to meet specified minimums.

E. Concrete Footings for Breakaway Posts for Type A or B Signs.
Each will be counted by the various sizes installed.

F. Delineators, Milepost Markers, and 6 Inch by 6 Inch (150 mm by 150 mm) Route Markers.
Each will be counted by the various types installed.

G. Perforated Square Steel Tube Posts.
Linear feet (meters), to nearest foot (0.3 m), measured from top of anchor to top of post. Embedded length will not be measured separately, but included in price bid for Perforated Square Steel Tube Posts.

H. Perforated Square Steel Tube Post Anchors.
By count of each type installed.

2524.05 BASIS OF PAYMENT.
Payment for signing, satisfactorily erected according to the contract documents, will be at the contract unit price as follows:

A. Type A Signs.

1. Per square foot (square meter) of sign area.

2. Payment is full compensation for furnishing, fabricating, and erecting the signs complete, including furnishing of the blank, application of reflective

sheeting, application of the screened message, and all mounting hardware.

B. Type B Signs.

1. Per square foot (meter) of sign area.

2. Payment is full compensation for:

- Furnishing, fabricating, and erecting the complete signs, including furnishing aluminum extrusions or formed steel panel,
- Applying reflective sheeting,
- Furnishing and applying all letters, numerals, symbols, and border to the sign
- Applying the sign to the post,
- Furnishing all labor, and
- Furnishing all other details necessary to provide signs complete and erected in place, except for the required footings and posts.

C. Wood Posts for Type A or B Signs.

1. Per linear foot (meter).

2. Payment is full compensation for furnishing and erecting the posts, including treatment and other details necessary to provide the sign posts complete and erected in place.

D. Steel Breakaway Posts for Type A or B Signs.

1. Per linear foot (meter) for the various post sizes.

2. Payment is full compensation for furnishing, fabricating, and erecting the posts, including galvanizing and other details necessary to provide the sign posts complete and erected in place.

E. Concrete Footings for Breakaway Posts for Type A or B Signs.

1. Each for the various sizes.

2. Payment is full compensation for:

- Excavating the hole,
- Furnishing and placing concrete, stub post, reinforcing bars, and so forth,
- Finishing, and
- All other details necessary to provide a complete concrete footing.

F. Delineators, Milepost Markers, and 6 Inch by 6 Inch (150 mm by 150 mm) Route Markers.

1. Delineators and Milepost Markers:

a. Each for the various types.

b. Payment is full compensation for:

- Furnishing, fabricating, and erecting the delineators or milepost markers complete, including posts, reflector units, and frames for delineators, posts and milepost marker signs,
- Furnishing all necessary fittings and attachments, and
- All labor necessary to complete the work.

2. 6 inch by 6 inch (150 mm by 150 mm) Route Markers:
a. Each.
b. Payment is full payment for furnishing, fabricating, and erecting the route marker to a milepost marker post previously measured for payment, including all necessary fittings and attachments and all labor necessary to complete the work.

G. Perforated Square Steel Tube Posts.

1. Per linear foot (meter).

2. Payment is full compensation for furnishing, fabricating, and erecting posts.

H. Perforated Square Steel Tube Post Anchors.

1. Each, by type.

2. Payment is full compensation for providing and installing anchor, coring pavement, backfilling with concrete, slip base hardware, and other details necessary to provide anchor complete and erected in place.

~~G~~ I. Excavation in Unexpected Rock.
Excavation in unexpected rock for wood posts for Type A or B signs, steel posts for Type A or B signs, concrete footings for Type A or B signs, delineators, perforated square steel tube posts, and milepost marker posts will be paid for as extra work in Section 1109.03, B. Unexpected rock will be considered as rock encountered during post erection, but neither visible from the roadway nor indicated in the contract documents.