

SECTION 417 -- HIGHWAY SIGNS

417.01 -- Description

This work shall consist of all materials and labor necessary to provide, fabricate, and install highway signs at the locations shown in the plans.

417.02 -- Material Requirements

1. Materials for highway signs shall conform to the requirements of Section 1070 and the *Manual on Uniform Traffic Control Devices for Streets and Highways*.

a. "Type A Signs" are regulatory, warning, guide, and information signs composed of a flat aluminum sheet background surfaced with reflective sheeting and the message either directly applied or reverse screened on the sign face, all in the colors specified in the plans. Bridge and hazard markers shall be classified as a Type A sign.

b. "Type B Signs" are large guide and information signs mounted along the roadside or on overhead structures and constructed of molded extruded panels or reinforced aluminum, horizontally joined panels having a reflectorized background and direct applied letters, numerals, symbols, and border.

2. a. "Type A Signs" shall be mounted on break-away posts made from aluminum, steel, or wood as indicated in the plans.

b. Type B ground mounted signs are to be mounted along the roadside as shown in the plans and supported by structural steel beam breakaway posts with the post stub extending into round, reinforced concrete footings.

c. Type B overhead signs are to be mounted over the roadway on sign structures, including cantilever structures, with vertical supports installed on reinforced concrete foundations or on sign brackets attached to existing roadway bridges.

3. Letters, numerals, symbols, and the border for "Type B Signs" shall be reflective materials meeting the requirements of Type III direct applied or detachable copy in AASHTO M 268.

4. Reflective background sheeting for all signs shall meet the requirements of AASHTO M 268 Type III.

5. All concrete shall be Class 47B-20 conforming to the requirements of Section 1002.

417.03 -- Construction Methods

1. The Contractor shall prepare the sheet aluminum for reflective sheeting on both Type A and B signs as follows:

a. Paint shall be removed with lacquer thinner or a controlled alkaline cleaning system.

b. The aluminum sheet and extrusheet panels shall be degreased by one of the following methods:

(1) Vapor Degreasing--Total immersion of the sign in a saturated vapor of trichlorethylene or perchlorethylene.

(2) Alkaline Degreasing--Signs shall be immersed in a tank containing alkaline solutions, controlled and titrated to the solution manufacturer's specifications. Immersion time shall depend upon the amount of soil present. Metal shall be rinsed thoroughly with running water.

c. (1) The aluminum sheet and extrusheet panels shall be acid etched in a 6 to 8 percent proprietary, phosphoric acid etching solution at 38°C.

(2) After etching, the metal shall be thoroughly rinsed with running cold water.

(3) The cold rinse shall be followed by a hot water rinse. A forced hot air drier shall be used to dry the panels.

(4) Metal shall not be handled directly, but shall be moved with a mechanical device or clean canvas gloves between all cleaning and etching operations and the application of reflective sheeting.

(5) There shall be no opportunity for metal to contact greases, oils, or other contaminants before the application of reflective sheeting.

2. a. (1) The Contractor shall apply the reflective sheeting without visible seams or joints.

(2) If seams are required, they must be carefully matched for color at the time of sign fabrication to provide uniform appearance and brilliance, both day and night.

(3) Signs on which the background color of adjacent sheets or panels is not properly matched will be rejected.

b. Reflective sheeting shall be mechanically applied to properly treated base panels using the sheeting manufacturer's recommended procedures and equipment.

c. After aging 48 hours at 24°C, adhesion of reflective sheeting to the sign surface shall be strong enough to resist stripping from the panel when tested with a stiff putty knife.

3. The message, legend, and border of Type A signs shall be applied by one of two processes, depending on the kind of sign:

a. (1) Direct screened processing shall consist of processing the message, legend, and border color on the face of the sign by the silk screen process.

(2) The color material to be used and the dry film thickness to be obtained shall be as recommended by the manufacturer of the reflective sheeting.

(3) The color of the sign face, message, legend, and border shall be as shown in the plans.

b. (1) Reverse screen processing shall consist of processing an opaque or transparent color over the sign face to form the legend and border.

(2) The opaque or transparent process color material to be used and the dry film thickness to be obtained shall be as recommended by the manufacturer of the reflective sheeting.

(3) The color of the sign face, legend, and border shall be as shown in the plans.

4. a. The extrusheet panels for each sign shall be of the length and width specified in the plans.

b. The width of the top, intermediate, and bottom panels shall be in the sequence shown in the plans for each sign.

c. There shall be no longitudinal gap between panel joints on the sign face, and the face of the panels shall be in the same plane on the sign face.

d. The ends of all panels in any one sign shall be perpendicular and in line. The ends shall be free from burrs.

e. The surface of all sign panels shall be flat and free of flaws.

f. The sign shall be attached to 100 mm aluminum H-beam vertical supports as shown in the plans.

g. The vertical supports shall be flush with the top of the sign.

5. a. (1) Letters, numerals, symbols, and border for Type B signs shall be directly applied.

(2) Large letters, numerals, and symbols may be fastened to the panel face with self-plugging type rivets, 3 mm in diameter and of all aluminum construction, when they cannot be directly applied.

b. Rivet length shall be as recommended by the manufacturer for the combined thickness of each legend material and the structural panels to which they are applied.

c. After a rivet is set, the stem, if remaining, shall be trimmed flush with the rivet head in a manner recommended by the rivet manufacturer.

6. Height of all signs shall be as shown in the plans.

7. a. The Engineer will establish by stake (or mark on the pavement) the location of each sign and will also establish the elevation of the edge of the roadway if it does not exist.

b. (1) All roadside signs on the freeway roadway, including gore signs, shall be mounted so that any edge of the sign which is adjacent to a roadway will be 600 mm outside of the curb where there is a barrier type curb.

(2) On rural freeways (interstate), the edge of any sign shall be at least 11 m from the edge of the roadway.

(3) On rural expressways, the edge of any sign shall be at least 9.2 m from the edge of the roadway.

(4) On urban freeways or expressways, the edge of any sign shall be at least 9.2 m from the edge of the roadway.

8. a. Type B signs shall be erected so that the sign face is vertical and positioned as shown in the plans. On curved alignments, the angle of placement should be determined by the course of approaching traffic rather than by the roadway edge at the point where the sign is located.

b. Type B signs shall be fastened to the supports in accordance with the recommendations of the extrusheet panel manufacturer. All supports shall be cut off flush with the top of the sign.

c. Type A signs shall be fastened to sign posts with threaded bolts as prescribed in Section 1071.

9. a. The Contractor shall drill wood posts as shown in the plans to provide a break-away feature.

b. (1) The Contractor shall fabricate steel beam break-away posts in accordance with Section 708.

(2) Mill test reports shall be submitted to the Engineer before fabrication.

(3) The saw cut for the breakaway hinge should be made on the job site to avoid deformation of the pre-cut post in shipping.

(4) The saw cut shall be free of galvanizing material.

(5) The saw cut and any damage to galvanizing shall be repaired in accordance with Method 2 of Section 1061.

(6) Any deformation of the post shall be cause for rejecting the post.

10. The fuse plate bolt shall be tightened by the turn-of-the-nut method prescribed in Subsection 708.03. The base connection assembly shall follow the procedure outlined in the plans which shall include rechecking the torques until all bolts in the base have the prescribed torque. This procedure shall be repeated immediately preceding the final inspection of the project.

11. a. Footings for roadside mounted signs on steel beam breakaway posts shall be concrete.

b. The footing shall be circular in shape and of the diameter and depth shown in the plans.

c. Before placing concrete footings, stub posts shall be placed so the posts are plumb and correctly spaced.

d. Footings shall be no higher than 100 mm above the ground to prevent snagging.

e. Footing construction shall be in accordance with the applicable requirements of Sections 702, 704, and 707.

12. When 2 or more signs are required on an overhead sign support, the bottom of all signs shall have the same elevation so they will be horizontally aligned with each other. All signs shall be hung at a minimum of 600 mm above the walkway. Sign posts and vertical supports used as sign stiffeners shall be cut off flush with the top of the sign.

417.04 -- Method of Measurement

1. Providing, fabricating, and installing Types A and B signs shall be measured by the square meter.

2. Providing and installing break-away steel supports for Type A and Type B signs shall be measured by the kilogram of unplated, unwelded, and undrilled steel. The kilograms of steel shall be the mass per meter multiplied by the length of sign support above the stub post required at each location. Connections shall be subsidiary to this item.

3. Providing, fabricating, and installing wood supports for Type A and Type B signs shall be measured for payment by the meter. The quantity to be paid for shall be the actual support length used or as ordered by the Engineer.

4. Providing and constructing concrete footings for a steel beam breakaway post for Type A and B signs will be measured by the each for each post.

417.05 -- Basis of Payment

- | 1. | <u>Pay Item</u> | <u>Pay Unit</u> |
|----|------------------------------------|---------------------------------|
| | Type A Sign | Square Meters (m ²) |
| | Type B Sign | Square Meters (m ²) |
| | Install Type A Sign | Square Meters (m ²) |
| | Install Type B Sign | Square Meters (m ²) |
| | Structural Steel for Sign Supports | Kilogram (kg) |
| | 100 mm x 100 mm Wood Sign Support | Meter (m) |
| | 100 mm x 150 mm Wood Sign Support | Meter (m) |
| | _____ Sign Support Footing | Each (ea) |
2. Furnishing and installing 1.0 m long stub posts and the required reinforcing steel shall be subsidiary to the "_____ Sign Support Footing".
3. Connecting and mounting hardware is subsidiary to the relevant pay item.
4. Payment is full compensation for all work prescribed in this Section.