

## Memorandum

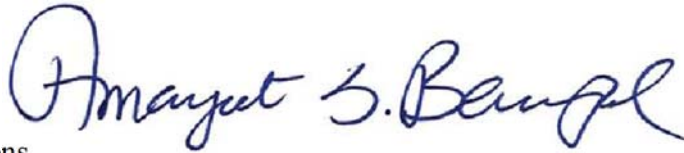
*Making Conservation  
a California Way of Life.*

**To:** DISTRICT DIRECTORS  
DIVISION CHIEFS  
Engineering Services, Construction, Design, Maintenance, and  
Procurement and Contracts  
DEPUTY DISTRICT DIRECTORS  
Traffic Operations, Maintenance, Construction, and Engineering  
Services

**Date:** April 13, 2017

**File:**

**From:** AMARJEET S. BENIPAL  
Acting Chief  
Division of Traffic Operations



**Subject: PROCUREMENT OF LAMINATED WOOD BOX POST (LWBP) SIGN SUPPORTS  
FOR CAPITAL OUTLAY PROJECTS**

Effective July 1, 2017, the California Department of Transportation (Caltrans) requires its contractors to procure and install laminated wood box posts (LWBP) for all capital outlay projects as contractor-furnished materials. LWBP Type L and Type M sign supports are specified supports for large roadside signs per Caltrans Standard Plan RS3 (2015), and the Standard Plans Users Guide and Appendix dated 3/24/2017 (attachment 2) published by the Division of Engineering Services. Historically, LBWPs have been Department-furnished materials for all projects.

The Division of Traffic Operations, Office of Traffic Engineering is the specification owner of Non-standard Special Provision (NSSP) 82-3 for contractor-furnished LBWPs (attachment 1). Project design staff shall utilize NSSP 82-3 for capital projects with ready-to-list (RTL) dates after July 1, 2017.

The Division of Engineering Services is evaluating alternatives for breakaway supports for large roadside signs for future use. For additional information, please contact Don Howe, Traffic Signs Branch Chief in the Division of Traffic Operations, Office of Traffic Engineering at (916) 654-2634, or by e-mail at <don.howe@dot.ca.gov>.

### Attachments

- (1) Nonstandard Special Provision 82-3, dated 4/13/2017
- (2) RS-Sheets Roadside Sign Standard Plans Users Guide, dated 03/24/2017  
RS-Sheets Roadside Sign Standard Plans Users Guide Appendix A, dated 3/24/2017

DISTRICT DIRECTORS, et al.

April 13, 2017

Page 2

- c: Robert W. Peterson, Acting Assistant Chief, Division of Traffic Operations
- Patti-Jo Dickinson, District Liaison, Division of Maintenance
- John Stayton, Deputy Division Chief, Division of Construction
- Shannon Post, Chief, Office of Design and Technical Services, Division of Engineering Services
- Theresa Garon-Ford, Branch Chief, Warehouse Support, Division of Procurement and Contracts
- Don Howe, Office of Traffic Engineering, Division of Traffic Operations

NSSP Approved by HQ Sponsor DE Howe on \_\_\_\_\_.

**Section 82-3. Use for a wide-flange metal post.**

**Replace the 2nd paragraph of section 82-3.01A with:**

Roadside signs include ground-mounted signs and Type N (CA), Type P (CA), and Type R (CA) marker panels.

**OSQM\_SSRD\_01\_N04-13-17**

**NSSP: Use in projects with laminated wood box posts that are not furnished by the Department; edit table to suit.**

**Add to section 82-3.01A:**

Furnished laminated wood box posts must comply with the following table:

| Box post type | Length (ft) | Quantity |
|---------------|-------------|----------|
| Type L        | 24          | --       |
| Type L        | 28          | --       |
| Type L        | 32          | --       |
| Type L        | 40          | --       |
| Type M        | 20          | --       |
| Type M        | 24          | --       |
| Type M        | 28          | --       |
| Type M        | 32          | --       |

**Add to section 82-3.01B:**

**ground-mounted sign:** Roadside sign or signs with a wide-flange metal post.

**OSQM\_SSRD\_02\_N04-13-17**

**NSSP: Use in projects with laminated wood box posts that are not furnished by the Department.**

**Replace *Reserved* in section 82-3.01C with:**

**82-3.01C(1) General**

Not Used

**82-3.01C(2) Laminated Wood Box Posts**

Submit a quart sample of the waterproofing material to METS 3 weeks before use.

Submit for each delivery of box posts to the job site:

1. Certificate of treatment including material type, size, and quantity
2. Assay report
3. Certified grading reports
4. Certificate of compliance
5. MSDS
6. Certified treatment and charge report. Include in the report:
  - 6.1 Treatment record
  - 6.2 Time versus pressure treatment chart
  - 6.3 Analysis results

- [6.4 Certificate of treatment](#)
- [6.5 Shipping number from bill of lading](#)
- [6.6 Quantity and size of box posts being delivered](#)

OSQM\_SSRD\_03\_N04-13-17

**NSSP: Use in projects with laminated wood box posts that are not furnished by the Department.**

Replace the 1st paragraph of section 82-3.01D with:

**82-3.01D(1) General**

Treated wood posts delivered to the job site must comply with the specified grading requirements and have a moisture content of not more than 25 percent when tested under ASTM D4444 with an authorized moisture meter.

**82-3.01D(2) Laminated Wood Box Posts**

**82-3.01D(2)(a) General**

Not Used

**82-3.01D(2)(b) Quality Control**

**82-3.01D(2)(b)(i) General**

Test the untreated laminated veneer lumber under the test methods shown in the following table:

| <u>Quality characteristic</u>                      | <u>Test method</u> | <u>Minimum sample size</u>             |
|--|--------------------|--|
| <u>Mean modulus of rupture</u>                     | <u>ASTM D198</u>   | <u>10 pieces</u>                       |
| <u>Moving average bending shear strength (psi)</u> | <u>ASTM D198</u>   | <u>Thirty 2.25-inch wide specimens</u> |

**82-3.01D(2)(b)(ii) Fabricated Box Posts**

Test fabricated box posts under the test method shown in the following table:

| <u>Quality characteristic</u>                     | <u>Test method</u> | <u>Sample size</u>  |
|---|--------------------|---|
| <u>Ultimate strength of completed box section</u> | <u>ASTM D198</u>   | <u>1 untreated post from each lot of 100 or fewer posts</u> |

Fabricated box post samples for testing must comply with the requirements shown in the following table:

| <u>Post type</u> | <u>Specimen length (min, feet)</u> | <u>Specimen length (max, feet)</u> | <u>Span (inches)</u> | <u>Half shear span (inches)</u> | <u>Load span (inches)</u> |
|------------------|------------------------------------|------------------------------------|----------------------|---------------------------------|---------------------------|
| <u>L</u>         | <u>14.5</u>                        | <u>15.0</u>                        | <u>168</u>           | <u>42</u>                       | <u>84</u>                 |
| <u>M</u>         | <u>10.5</u>                        | <u>11.0</u>                        | <u>120</u>           | <u>30</u>                       | <u>60</u>                 |

**82-3.01D(2)(b)(iii) Preservative Treatment Testing**

Prepare samples from preservative treated box posts as follows:

1. Take a minimum of 20 borings per retort charge for assay
2. Remove analysis cores from box posts located:
  - 2.1 In the upper and lower 10 percent of the retort charge
  - 2.2 From the end and the middle of the retort charge
3. Remove cores using a sharp instrument yielding a single core of wood with no shavings or chips
4. Take cores along the center line of post walls at least 2 feet from the ends
5. Take no more than 2 cores from any box post
6. Fill all holes from boring cores with treated plugs

### **82-3.01D(2)(c) Department Acceptance**

The Department inspects laminated wood box posts at the job site before installation. Allow 30 days for the Department's inspection after delivery to the job site.

Recoat or replace waterproofing if any of the following occurs:

1. Thickness is less than required.
2. Area is scuffed, blistered, peeled, cracked, checked, or damaged.

The Department inspects all repairs to waterproofing.

### **Add to section 82-3.02B:**

A mounting for a ground-mounted sign must be a wide-flange metal post fabricated from structural steel complying with ASTM A36/A36M. Nuts, bolts, and washers for the breakaway connections of a wide-flange steel post must comply with ASTM A325.

**OSQM\_SSRD\_04\_N04-13-17**

**NSSP: Use in projects with laminated wood box posts that are not furnished by the Department.**

**Replace the 1st paragraph of section 82-3.02D with:**

### **82-3.02D(1) General**

Not Used

### **82-3.02D(2) Delivery, Storage, and Handling**

Keep laminated veneer lumber dry.

Bundle Type L box posts oriented with the short sides horizontal.

Place 2-by-4-inch stickers between each layer of posts. Space stickers evenly at approximate quarter points along the length of the posts at a maximum of 4 feet on center.

Place 6-inch minimum blocking under each bundle of posts, evenly spaced at the approximate quarter points of the length of the posts at a maximum of 4 feet on center.

Bundles of box posts may be stacked.

Protect box posts and bundles that have not been weatherproofed from sunlight and dampness by (1) storing indoors or under a permanent roof or (2) covering with a waterproof tarp or heavy opaque plastic, draped loosely over the top to provide ventilation.

Bundle box posts with similar lengths and post type banded together in separate bundles. The Department rejects bundles containing mixed lengths or post types.

### **82-3.02D(3) Materials**

#### **82-3.02D(3)(a) General**

Fabricated box posts must comply with the requirements shown in the following table:

| <u>Quality characteristic</u>                           | <u>Test method</u> | <u>Requirement</u>   |
|---|--------------------|--|
| <u>Ultimate strength of completed box section (min)</u> | <u>ASTM D198</u>   | <u>39.9 kip load, Type L</u><br><u>21.1 kip load, Type M</u> |

Glue for box post corner joints must be a phenol resorcinol adhesive complying with ASTM D2559.

Bottom caps must be 23/32-inch thick exterior grade plywood, structural CD or better, sized to fit inside the bottom post opening.

Top caps must be 0.035-inch hot-dip galvanized metal, sized 1 inch larger than each side of the LWBP.

Post marking plates must be corrosion-resistant metal.

### **82-3.02D(3)(b) Laminated Veneer Lumber**

Untreated laminated veneer lumber must comply with the requirements shown in the following table:

| <u>Quality characteristic</u>                      | <u>Test method</u> | <u>Requirement</u>                        |
|--|--------------------|---|
| <u>Mean modulus of rupture (min, psi)</u>          | <u>ASTM D198</u>   | <u>8,000 for at least 80 % of samples</u> |
| <u>Moving average bending shear strength (psi)</u> | <u>ASTM D198</u>   | <u>9,900 ± 990</u>                        |

Veneers for laminated veneer lumber must be:

1. Minimum grade C or D.
2. Graded by ultrasonic or other authorized non-visual methods.
3. Dried to a moisture content of 6 percent or less.
4. End jointed with a lap splice or butt joint. Veneer end joints must be staggered.

Adhesive used to laminate veneers must be:

1. Phenol formaldehyde complying with ASTM D2559
2. Applied by a curtain coater or other authorized mechanical method

Laminated veneer lumber for laminated wood box posts must be:

1. Laminated and fabricated in a plant using a process approved by the National Research Board of the Council of American Building Officials
2. 1-1/4-inch-thick boards manufactured by gluing together 1/10-inch-thick or 1/8-inch-thick Douglas fir veneers in a continuous process with the grain parallel to the length of the boards

### **82-3.02D(3)(c) Preservative Treatment**

Preservative treatment for laminated wood box posts must be:

1. Pentachlorophenol complying with AWP A P8, Part 1
2. Oil-borne solvent complying with AWP A P9, Part 1 for Type C - Light Oil

Preservative treated box posts must comply with the following requirements:

| <u>Quality characteristic</u>             | <u>Test method</u>          | <u>Requirement</u>                                 |
|---|-----------------------------|--|
| <u>Penetration (min, percent)</u>         | <u>AWPA A3, procedure 4</u> | <u>90 at any depth for at least 80% of samples</u> |
| <u>Retention (min, lb/ft<sup>3</sup>)</u> | <u>AWPA A5, procedure 5</u> | <u>0.5</u>   |

### **82-3.02D(3)(d) Waterproofing Treatment**

Waterproofing treatment must be one of the following:

1. Water-repellant sealer Hydrepel, manufactured by Kryton International, matching color no. 20122 of FED-STD-595.
2. Exterior coating complying with MPI Standard 132.
3. Authorized waterproofing sealer approved for use by the wood preserver.

### **82-3.02D(4) Fabrication**

#### **82-3.02D(4)(a) General**

Construct laminated wood box posts using laminated veneer lumber.

Corner joints must be a 45-degree miter or other authorized joint of equal strength.

Laminated wood box posts must not have any joints except corner joints and veneer joints.

Center and attach a bottom cap to each box post using hot-dip galvanized nails.

Preservative treat box posts after assembling box walls and attaching the bottom cap.

Attach a top cap to each box post using hot-dip galvanized nails after waterproofing.

### **82-3.02D(4)(b) Preservative Treatment**

#### **82-3.02D(4)(b)(i) General**

Provide to the treatment plant with the request for each retort charge. Subject request must specify:

1. Wood volume per bundle
2. Desired retention
3. Drying specification
4. Project order number

#### **82-3.02D(4)(b)(ii) Preparation**

Pre-treatment steaming is not allowed.

Do not incise or seal the ends of box posts before treating.

Loosen banding sufficiently to place 2-by-4-inch spacer blocks with 2-by-4-inch stickers. Banding must be loose over the spacers. Place stickers between box posts evenly spaced a maximum of 4 feet on center including at banding.

On top and bottom of each bundle at locations of banding, place 2-by-4-inch blocks between banding and box posts to prevent banding from touching the wood.

#### **82-3.02D(4)(b)(iii) Treatment**

Treat box posts using the empty cell process. Process parameters must comply with the following:

1. No pre-treatment steaming is allowed.
2. Maximum treatment pressure of 100 psig.
3. Maximum solvent temperature of 195 degrees F.
4. Maximum pressure period of 5.5 hours.

The pressure release rate to zero must be uniform over a period of not less than 10 minutes.

Expansion bath with final steaming is allowed. Expansion bath must have a maximum temperature of 205 degrees F with a maximum duration of 2 hours. Final steaming must have a maximum temperature of 230 degrees F with a maximum duration of 2 hours.

Do not treat box posts more than once.

You may submit a proposal for an alternative treatment process if the proposed process is approved by the post manufacturer.

#### **82-3.02D(4)(c) Waterproofing**

After treating with wood preservative, waterproof all exterior surfaces of box posts. Do not waterproof the bottom 4 feet of posts or plywood end caps.

Allow treated box posts to air dry a minimum of 14 days before waterproofing. The moisture content must not be more than 20 percent before waterproofing.

Surfaces of box posts must be free from any type of residue or contamination.

Apply the waterproofing treatment full strength by spray or roller. The minimum dry film thickness of waterproofing must be 15 mils. Cure under the manufacturer's instructions.

Feather-sand and recoat any insufficient or damaged areas to the specified thickness.

**82-3.02D(4)(d) Identification Plates**

Permanently attach an identification plate 15 feet from the bottom of each post after waterproofing.  
Include the following information on the plate:

1. Name and address of the post manufacturer
2. Date of fabrication after waterproofing is cured
3. Contract number
4. Lot number



## User Guide to Standard Plans

### Section RS – ROADSIDE SIGNS

|                                 |  |
|---------------------------------|--|
| <b>Standard Plan Numbers</b>    | RS2, RS3, RS4  |
| <b>Description of Component</b> | <p>Used for single post and two post supports for the following types of Roadside Sign Panels</p> <ul style="list-style-type: none"> <li>• Single Sheet Aluminum</li> <li>• Framed Single Sheet Aluminum</li> <li>• Laminated Type B, 1" Thick (two post only)</li> <li>• Laminated Type B, 2½" Thick (two post only)</li> <li>• Laminated Type H, 2½" Thick (two post only)</li> </ul> <p>Use inside or outside of Special Wind Regions. Use inside or outside of Ice Regions. However, in locations where the designer knows that gravity loads due to freezing rain accumulations have caused damage to engineered structures, the Senior Technical Specialist for signs and overhead structures should be consulted.</p> |
| <b>Implementation</b>           | <p>Standard Plans for the 2015 Construction Contract Standards for the following sheets dated October 30<sup>th</sup> 2015</p> <p>RS2, RS3, RS4</p>  |
| <b>Standard Plan Features</b>   | <p>RS2: Single and two post installations using 4x4, 4x6, 6x6, and 6x8 wood posts. Includes spacing and embedment of posts, attachment and bracing of sign panels, post caps, and slots for breakaway feature.</p> <p>RS3: Two post installations using Laminated Wood Box Posts Type L and Type M. Includes spacing and embedment of posts, attachment of sign panels.</p> <p>RS4: Additional details for attachment of sign panels, including bracing and frame details. Also includes attachment of sign panels to the pole of an electrolier, signal standard, or the post of a sign structure.</p>  |

# User Guide to Standard Plans

## Section RS – ROADSIDE SIGNS

|                                       |   |
|---------------------------------------|---|
| <b>Project Development Procedures</b> | <ul style="list-style-type: none"><li>• Check for latest applicable version of Standard Plan(s) and SSP from <a href="http://www.dot.ca.gov/des/oe/construction-contract-standards.html">http://www.dot.ca.gov/des/oe/construction-contract-standards.html</a></li><li>• Get the applicable version of this User's Guide from <a href="http://des.onramp.dot.ca.gov/structure-policy-innovation/signs-overhead-structures">http://des.onramp.dot.ca.gov/structure-policy-innovation/signs-overhead-structures</a></li><li>• Check for other documents that might apply. Some examples are:<ul style="list-style-type: none"><li>○ <a href="#">Highway Design Manual (HDM)</a></li><li>○ <a href="#">California Manual on Traffic Control Devices (CA MUTCD)</a></li><li>○ <a href="#">Traffic Manual</a></li><li>○ <a href="#">Traffic Operations Policy Directives</a></li><li>○ <a href="#">MASH Implementation Memo</a></li></ul></li><li>• Verify that the project conforms to Standard Plans, this User's Guide, the specifications, and other requirements and determine which sheets are needed.<ul style="list-style-type: none"><li>○ For questions on interpretation of these Standard Plans or the User's Guide, contact the Senior Technical Specialist for Signs and Overhead Structures.</li><li>○ For questions on the interpretation of the construction specifications contact the head of the Traffic Signs Branch in Traffic Operations.</li><li>○ For detailed assistance in verification related to the Standard Plans, fill out a special designs work request form.<br/><a href="http://des.onramp.dot.ca.gov/office-design-and-technical-services/special-design-branch-b">http://des.onramp.dot.ca.gov/office-design-and-technical-services/special-design-branch-b</a></li></ul></li></ul> <p>If elements of the project do not conform, then the fill out a special designs form to request a custom design. In some cases special design is only needed for a certain portion, in which case the Standard Plans might still apply for the other portion.</p> <ul style="list-style-type: none"><li>• Determine if laminated wood box posts will be Department-furnished or contractor-furnished. Guidance is available from the Office of Traffic Engineering, in the Division of Traffic Operations.</li></ul> |
|---------------------------------------|---|

# User Guide to Standard Plans

## Section RS – ROADSIDE SIGNS

| <b>Design/General Notes</b>                            | <p>Structural Design Notes:</p> <ul style="list-style-type: none"><li>• AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 3<sup>rd</sup> Edition, 1994.</li><li>• Wind<ul style="list-style-type: none"><li>○ V = 60 mph (fastest mile)</li><li>○ 40% allowable stress increase for combinations involving wind</li></ul></li><li>• Materials (Solid-sawn wood posts):<ul style="list-style-type: none"><li>○ 4x4 allowable stress: 900 psi</li><li>○ 4x6 and larger allowable stress: 960 psi</li></ul></li><li>• Materials (Laminated wood box posts):<br/>Untreated laminated veneer lumber must comply with the following requirements:</li></ul> <table><tr><th>Quality characteristic</th><th>Test method</th><th>Requirement</th><th>Sample size</th></tr><tr><td>Mean modulus of rupture</td><td>ASTM D198</td><td>8,000 psi, min for at least 80% of samples</td><td>10 pieces, min</td></tr><tr><td>Moving average bending shear strength</td><td>ASTM D198</td><td>9,900 ± 990 psi</td><td>30 - 2.25" wide specimens, min</td></tr><tr><td>Ultimate shear strength of completed box section</td><td>ASTM D198</td><td>700 psi, min</td><td>1 untreated post from each lot of 100 or fewer posts</td></tr></table> <ul style="list-style-type: none"><li>• Exceptions:<ul style="list-style-type: none"><li>○ Ice Load NOT included, analysis indicated ice load combination not likely to control overall structure design.</li></ul></li></ul> | Quality characteristic                     | Test method  | Requirement | Sample size | Mean modulus of rupture | ASTM D198 | 8,000 psi, min for at least 80% of samples | 10 pieces, min | Moving average bending shear strength | ASTM D198 | 9,900 ± 990 psi | 30 - 2.25" wide specimens, min | Ultimate shear strength of completed box section | ASTM D198 | 700 psi, min | 1 untreated post from each lot of 100 or fewer posts |
|--|---|--|--|-------------|-------------|-------------------------|-----------|--|----------------|---------------------------------------|-----------|-----------------|--------------------------------|--|-----------|--------------|--|
| Quality characteristic                                 | Test method   | Requirement                                | Sample size  |             |             |                         |           |  |                |                                       |           |                 |                                |  |           |              |  |
| Mean modulus of rupture                                | ASTM D198   | 8,000 psi, min for at least 80% of samples | 10 pieces, min                                       |             |             |                         |           |  |                |                                       |           |                 |                                |  |           |              |  |
| Moving average bending shear strength                  | ASTM D198   | 9,900 ± 990 psi                            | 30 - 2.25" wide specimens, min                       |             |             |                         |           |  |                |                                       |           |                 |                                |  |           |              |  |
| Ultimate shear strength of completed box section       | ASTM D198   | 700 psi, min                               | 1 untreated post from each lot of 100 or fewer posts |             |             |                         |           |  |                |                                       |           |                 |                                |  |           |              |  |
| <b>Additional Drawings Needed to Complete PS&amp;E</b> | <p>Project plans showing</p> <ul style="list-style-type: none"><li>• Sign structure location</li><li>• Post spacing (two post)</li><li>• Sign panel type</li><li>• Sign panel sizes and locations on structure</li><li>• Post type</li><li>• Non-standard vertical clearance requirements</li></ul>   |  |  |             |             |                         |           |  |                |                                       |           |                 |                                |  |           |              |  |
| <b>Contract Specifications</b>                         | <ul style="list-style-type: none"><li>• Standard Specifications.</li><li>• Standard Special Provision (SSP) from <a href="http://www.dot.ca.gov/des/oe/construction-contract-standards.html">http://www.dot.ca.gov/des/oe/construction-contract-standards.html</a></li><li>• For laminated wood box posts that are to be contractor furnished, an NSSP (82-3) is available from the Office of Traffic Engineering, in the Division of Traffic Operations.</li></ul>   |  |  |             |             |                         |           |  |                |                                       |           |                 |                                |  |           |              |  |

## User Guide to Standard Plans

### Section RS – ROADSIDE SIGNS

|   |  |
|---|--|
| <b>Restrictions on Use of Standard Drawings</b> | <p>If project conditions require significant deviations from these standards, the design might require a special design. Some examples might be:</p> <ul style="list-style-type: none"><li>• Additional loads not shown</li><li>• Other sign panel types such as Extinguishable Message Sign (EMS)</li><li>• Additional holes</li><li>• Deviations from dimensions</li><li>• Weak soils</li><li>• Locations where finish grade at base of standards is more than 33' above surrounding terrain</li></ul> |
|---|--|

## **Section RS – ROADSIDE SIGNS**

### **Appendix A: Post Type Selection**

#### **Introduction**

Standard Plans for roadside sign structures include 6 post type designations. Solid-sawn wood posts are used for single post roadside signs and smaller two post roadside signs. Laminated wood box posts are used for larger two post roadside signs.

- Solid-sawn wood posts (note that the sizes shown are nominal sizes)
  - 4x4
  - 4x6
  - 6x6
  - 6x8
- Laminated wood box posts
  - Type M
  - Type L

The sign designer uses this Appendix to determine the post type and shows the post type on the project plans.

## **Section RS – ROADSIDE SIGNS**

### **Appendix A: Post Type Selection**

#### **Single Post (Solid-Sawn Wood Post)**

Procedure:

- Determine the basic dimensions (see Figure 1)
  - Sign Panel Depth,  $D$ , in inches
  - Sign Panel Length,  $L$ , in feet
  - Sign Panel Area in square feet
  - Height  $H$  from groundline to center of sign panel in feet
- Verify the basic dimensions meet the following limitations.
  - For Freeway and Expressway Locations, clearances meet the requirements on Standard Plan RS1
  - Sign Panel Area must not be more than 30 square feet
  - $H$  must not be more than 12 feet
- Verify the design conforms to additional limitations
  - Details conform to the Standard Plans for single post version of wood post roadside signs
  - Must not include CMS or EMS or other electronic sign panels.
  - Center of sign panel must be no more than 33' above the surrounding terrain.
  - Use the chart in Figure 2 to choose the post size. If in the cross-hatched portion of the chart or outside the bounds of the chart, then single solid sawn wood post can not be used.

## Section RS - ROADSIDE SIGNS

### Appendix A: Post Type Selection

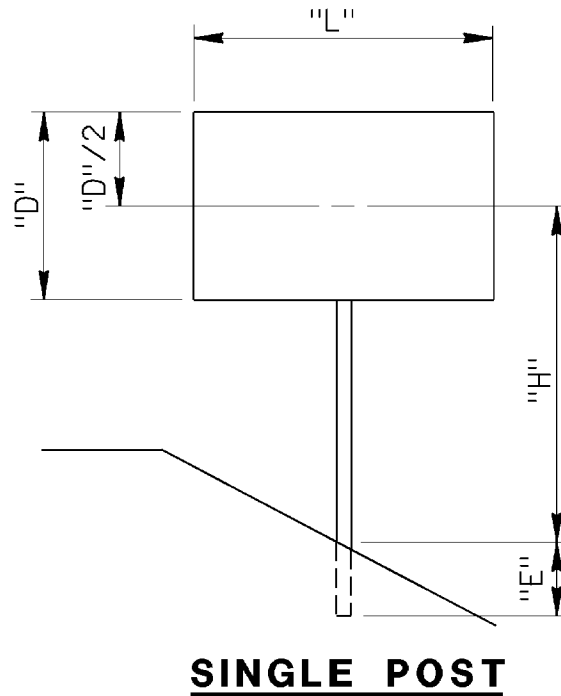


Figure 1: Explanation of Dimensions

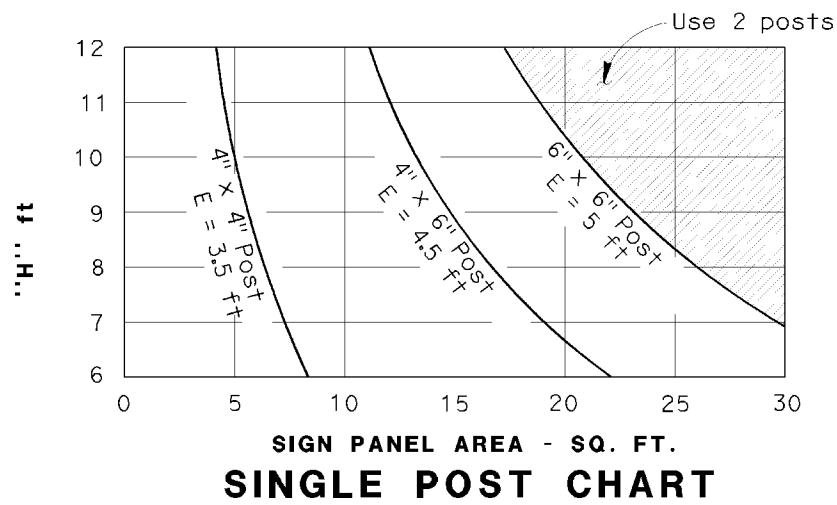


Figure 2: Post Sizing Chart

## Section RS – ROADSIDE SIGNS

### Appendix A: Post Type Selection

#### Two Post (Solid-Sawn Wood Post)

Procedure:

- Determine the basic dimensions (see Figure 3 or Figure 4 as appropriate)
  - Sign Panel Depth,  $D$ , in inches (or  $D_1$  and  $D_2$ )
  - Sign Panel Length,  $L$ , in feet
  - Sign Panel Area in square feet
  - Height  $H$  from ground line (lowest of the two posts) to center of sign panel in feet.
- Verify the basic dimensions meet the following limitations.
  - For Freeway and Expressway Locations, clearances meet the requirements on Standard Plan RS1
  - Sign Panel Area must not be more than 90 square feet
  - $H$  must not be more than 16 feet
- Verify the design conforms to additional limitations
  - Details conform to the Standard Plans for two post version of wood post roadside signs
  - Must not include CMS or EMS or other electronic sign panels.
  - Center of sign panel must be no more than 33' above the surrounding terrain.
- Use the chart in Figure 5 to choose the post size. If in the cross-hatched portion of the chart or outside the bounds of the chart, then solid sawn wood post not be used.
- Do not mix post sizes in one sign.



## Section RS – ROADSIDE SIGNS

### Appendix A: Post Type Selection

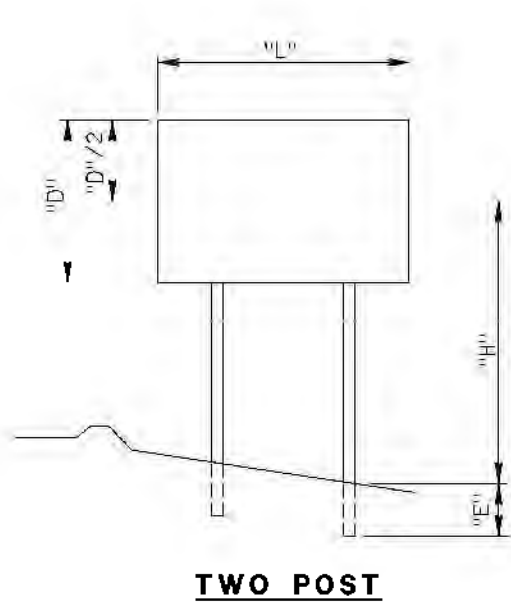


Figure 3: Explanation of Dimensions

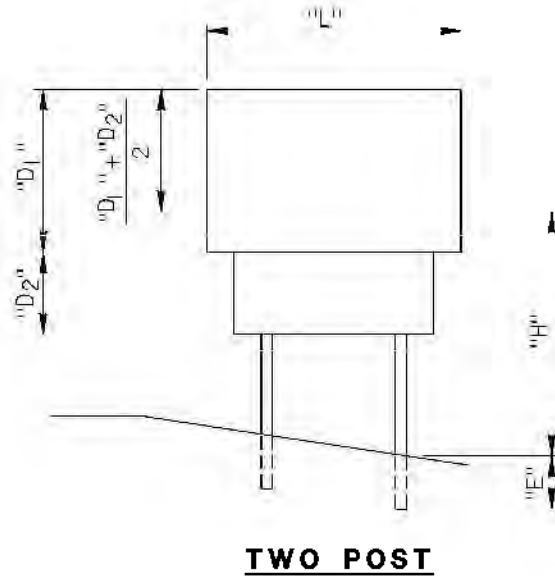


Figure 4: Explanation of Dimensions  
with Two Sign Panels

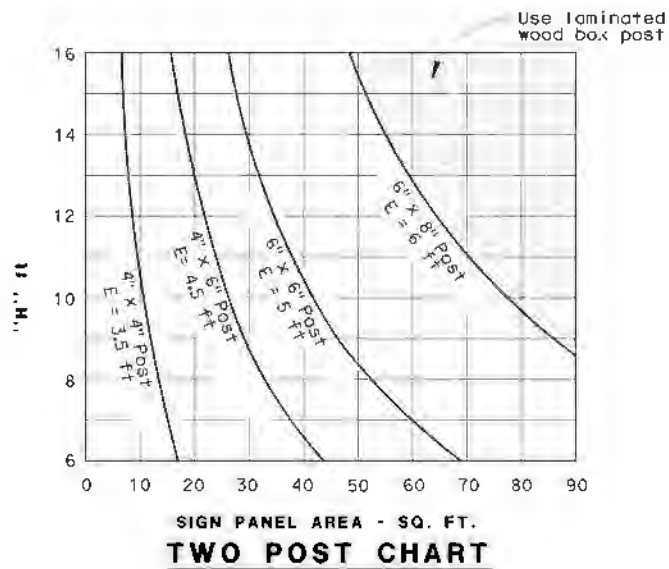


Figure 5: Post Sizing Chart

## Section RS – ROADSIDE SIGNS

### Appendix A: Post Type Selection

#### Two Post (Laminated Wood Box Posts)

Procedure:

- Determine the basic dimensions (see Figure 6)
  - Sign Panel Depth,  $D$ , in inches
  - Sign Panel Length,  $L$ , in feet
  - Heights,  $h_L$  and  $h_R$ , from ground line to center of sign panel
- Verify the basic dimensions meet the following limitations.
  - For Freeway and Expressway Locations, clearances meet the requirements on Standard Plan RS1
  - $D$  must be between 24" and 120" (inclusive) and must be in an increment of 6"
  - $L$  must be between 8' and 24' (inclusive) and must be in an increment of 1'
  - $h_L$  must not exceed 26'
  - $h_R$  must not exceed 26'
- Verify the design conforms to additional limitations
  - Details conform to the Standard Plans for two post version of laminated wood box post signs
  - Do not use for single post signs.
  - Must not include CMS or EMS or other electronic sign panels.
  - Center of sign panel must be no more than 33' above the surrounding terrain.
- Use Table M along with the longer of  $h_L$  and  $h_R$  in to check if post type M is acceptable. If not use Table L along with the longer of  $h_L$  and  $h_R$  in to check if post type L is acceptable. If not, then can not use Laminated Wood Box Post.
- Do not mix post types L and M in one sign.
- Find lengths of posts needed.
  - Find embedment required
    - For Post Type M minimum embedment,  $E_L$  and  $E_R$  are both 6'
    - For Post Type L use table E to find minimum embedments,  $E_L$  and  $E_R$
  - Find minimum lengths

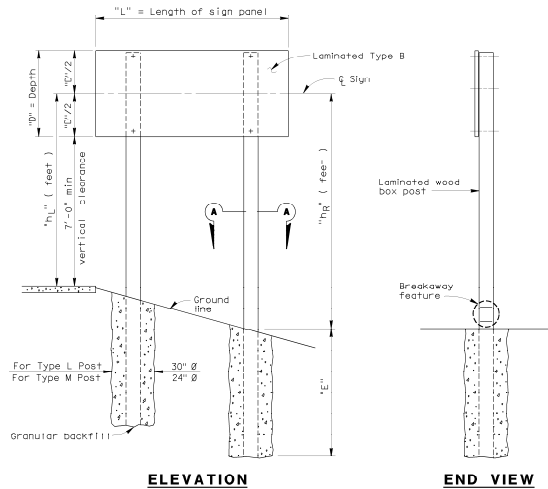
$$L_{minL} = E_L + h_L \frac{D}{2 \times 12}$$

$$L_{minR} = E_R + h_R \frac{D}{2 \times 12}$$

- Round up to next standard length in table )&\*&\_#%. Posts will be cut to final length in the field.

## Section RS – ROADSIDE SIGNS

### Appendix A: Post Type Selection



**Figure 6. Explanation of Dimensions**

| TABLE M                               |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |    |
|---------------------------------------|--------------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|--|--|--|----|
| MAXIMUM ALLOWABLE "h" FOR TYPE M POST |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |    |
| SIGN<br>DEPTH<br>"D"<br>INCHES        | SIGN LENGTH "L" ( feet ) |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |    |
|                                       | 8'                       | 9' | 10' | 11' | 12' | 13' | 14' | 15' | 16' | 17' | 18' | 19' | 20' | 21' | 22' | 23' | 24' |  |  |  |  |  |  |  |    |
| 24                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |    |
| 30                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 36                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 42                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 48                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 54                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 60                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 66                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 72                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 78                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 84                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 90                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 96                                    |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 102                                   |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 108                                   |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 114                                   |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |
| 120                                   |                          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  | 26 |

**NOTE:** Use Type L Posts when value "h" exceeds Table M

Vertical clearance is less than 7'-0"

## Section RS – ROADSIDE SIGNS

### Appendix A: Post Type Selection

| <b>TABLE L</b>                               |                          |     |     |     |     |     |     |     |
|--|--------------------------|-----|-----|-----|-----|-----|-----|-----|
| <b>MAXIMUM ALLOWABLE "h" FOR TYPE L POST</b> |                          |     |     |     |     |     |     |     |
| SIGN<br>DEPTH<br>"D"<br>INCHES               | SIGN LENGTH "L" ( feet ) |     |     |     |     |     |     |     |
|  | 17'                      | 18' | 19' | 20' | 21' | 22' | 23' | 24' |
| 71   |                          |     |     |     |     |     |     |     |
| 79   |                          |     |     |     |     |     |     |     |
| 83   |                          |     |     |     |     |     |     | 26  |
| 91   |                          |     |     |     | 26  | 26  | 26  | 25  |
| 94   |                          |     |     |     | 26  | 25  | 24  | 23  |
| 102  |                          |     |     | 26  | 25  | 24  | 23  | 22  |
| 106  |                          |     | 26  | 25  | 24  | 22  | 21  | 21  |
| 114  |                          | 26  | 25  | 23  | 22  | 21  | 20  | 19  |
| 118  | 26                       | 25  | 23  | 22  | 21  | 20  | 19  | 18  |

Table E

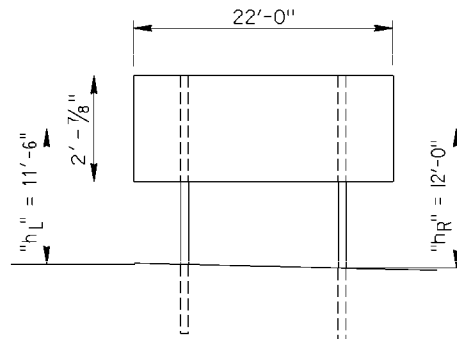
| <b>POST EMBEDMENT "E" FOR TYPE L POST</b> |                             |                 |                  |                  |                  |
|---|-----------------------------|-----------------|------------------|------------------|------------------|
| "h" feet                                  | TOTAL SIGN AREA ( $f + 2$ ) |                 |                  |                  |                  |
|   | 40<br>to<br>90              | 90<br>to<br>140 | 140<br>to<br>190 | 190<br>to<br>240 | 240<br>to<br>290 |
| 9 to 13                                   | 6'                          | 6.5'            | 7.5'             | 8.5'             | 9'               |
| 13 to 17                                  | 6'                          | 7.5'            | 8'               | 9'               | 10'              |
| 17 to 21                                  | 6'                          | 7.5'            | 9'               | 9'               |                  |
| 21 to 26                                  | 7'                          | 8'              | 9'               |                  |                  |

( Post embedment for Type M is 6' )

| Table S: Standard Supplied Lengths<br>for Laminated Wood Box Posts |             |
|--|-------------|
| Post Type M  | Post Type L |
| 20'  | 24'         |
| 24'  | 28'         |
| 28'  | 32'         |
| 32'  | 40'         |

## Section RS – ROADSIDE SIGNS

### Appendix A: Post Type Selection



Given:

L = 22'-0"

D = 15'-0"

h = 12'-0"

Enter Table M first:

Maximum allowable "h" is 7'-0"  
which is less than 12'-0"

Go to Table L:

Maximum allowable is 22'-0"  
12'-0" is ok, use Type L post

### EXAMPLE OF HOW TO SELECT POST TYPE