GENERAL NOTES:
1. Design Wind Speed is determined by County (see WIND SPEEDS BY COUNTY).
2. Maximum sign area (single or cluster) is 30 sf.
3. Maximum sign width (X) single or cluster (including rotated sign panels) is 60 inches.
4. Shop drawings: Not required.
5. Aluminum Sign, Wind Beams and Column (Post) Materials:
   a. Aluminum Plates: ASTM B209, Alloy 6061-T6
   b. Aluminum Bars and Extruded Shapes: ASTM B221, Alloy 6061-T6
   c. Aluminum Structural Shapes: ASTM B308 Alloy 6061-T6
   d. Cold Rolled Aluminum: ASTM A36
   e. Aluminum Weld Material: ER 5556

6. Sign Mounting Bolts ( Screws), Nuts and Washers:
   a. Galvanized Bolts (Screws): ASTM F393 Alloy A, Condition A, CW1 or SH1
   b. Stainless Steel Bolts: ASTM F593
   c. Stainless Steel Nuts: ASTM F594

7. Stainless Steel Bolts, Nuts and Washers may be used in lieu of the Aluminum
   button head and flat head bolts ( Screws) as follows:
   a. Stainless Steel Bolts ( Screws): ASTM F393 Alloy Group 2, Condition A, CW1 or SH1
   b. Stainless Steel Nuts: ASTM F394

8. Sign Column (Post) Bolts, Nuts and Washers:
   a. Galvanized Bolts (Screws): ASTM A325 Type 1
   b. Galvanized High Strength Hex Head Bolts (Basic Bolts): ASTM A325 Type 1
   c. Galvanized Hex Nuts: ASTM A563 Grade 8

9. Coatings:
   a. High Strength Steel Bolts and Nuts: ASTM F339
   b. Other steel items (excluding stainless steel): Not dip galvanized – ASTM A123
   c. Repair damaged galvanizing in accordance with Specification Section 582

### REVISION INFORMATION
**DESCRIPTION:** Single Column Ground Signs

**INDEX NO.:** 11860

**SHEET NO.:** 1 of 9

**LAST REVISION:** 07/01/15

**YEAR:** 2016

**DEPARTMENT:** DESIGN STANDARDS

**REVISION:** STEPS 1, 2, 3, 4

**DESIGN STANDARDS:**

---

**GUIDE TO USE THIS STANDARD**

---

**NOTES AND EXAMPLE**

---
### Calculation of Sign Cluster Centroid

Let's calculate the centroid of a sign cluster.

\[ \begin{align*}
    X' &= \frac{\sum (X_i \times A_i)}{\sum A_i} \\
    Y' &= \frac{\sum (Y_i \times A_i)}{\sum A_i}
\end{align*} \]

- **A** = Height of the mounting elevation to the edge of pavement elevation
- **A'** = Area of individual sign
- **B** = Height of edge of pavement elevation and the bottom of the sign or cluster
- **C** = Height from the bottom of the sign or cluster to the centroid of the sign or cluster
- **h** = Individual sign height
- **h/2** = Individual sign center
- **H** = Height of sign or cluster centroid from groundline
- **X** = Individual sign width
- **X'** = Centroid horizontal location of sign or cluster from \( \xi \) Aluminum Column (Post)
- **Y'** = Centroid height of sign or cluster from bottom of sign cluster
- **Y''** = Individual sign centroid horizontal location from \( \xi \) Aluminum Column (Post)
- **Y'''** = Individual sign centroid height from bottom of sign cluster

**NOTES:**
1. For 'A' & 'B', see Index No. 17302 and Roadway Plans.
2. Do not exceed an area of 30 SF or a width of 60 inches for a sign or a sign cluster.
3. Vertical sign spacing (1" shown on Sign Cluster detail) also applies to rotated signs.

### Design Standards

**2016 DESIGN STANDARDS**

**SINGLE COLUMN GROUND SIGNS**

**INDEX NO.**

**REVISION NO.**

**SHEET NO.** 2 of 9
**SINGLE COLUMN GROUND SIGNS**

**COLUMN AND FOUNDATION TABLES**

### ALUMINUM COLUMN (POST) SELECTION TABLE

**WIND SPEED = 100 MPH**

<table>
<thead>
<tr>
<th>Height (ft)</th>
<th>Column (Post) Size</th>
<th>CANTILEVER SIGN</th>
<th>WIND SPEED = 100 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>D</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>6</td>
<td>G</td>
<td></td>
<td>2.5</td>
</tr>
<tr>
<td>7</td>
<td>H</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>8</td>
<td>I</td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>9</td>
<td>J</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>10</td>
<td>K</td>
<td></td>
<td>4.5</td>
</tr>
</tbody>
</table>

### ALUMINUM COLUMN (POST) SELECTION TABLE

**WIND SPEED = 130 MPH**

<table>
<thead>
<tr>
<th>Height (ft)</th>
<th>Column (Post) Size</th>
<th>CANTILEVER SIGN</th>
<th>WIND SPEED = 130 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>D</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>6</td>
<td>G</td>
<td></td>
<td>2.5</td>
</tr>
<tr>
<td>7</td>
<td>H</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>8</td>
<td>I</td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>9</td>
<td>J</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>10</td>
<td>K</td>
<td></td>
<td>4.5</td>
</tr>
</tbody>
</table>

### ALUMINUM COLUMN (POST) SELECTION TABLE

**WIND SPEED = 150 MPH**

<table>
<thead>
<tr>
<th>Height (ft)</th>
<th>Column (Post) Size</th>
<th>CANTILEVER SIGN</th>
<th>WIND SPEED = 150 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>D</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>6</td>
<td>G</td>
<td></td>
<td>2.5</td>
</tr>
<tr>
<td>7</td>
<td>H</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>8</td>
<td>I</td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>9</td>
<td>J</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>10</td>
<td>K</td>
<td></td>
<td>4.5</td>
</tr>
</tbody>
</table>

**CANTILEVER SIGN**

1. For cantilever sign installations see Index 17302.
2. For cantilever signs with widths greater than 4' see Index 11861.

**NOTE:**

1. For cantilever sign installations see Index 17302.
2. For cantilever signs with widths greater than 4' see Index 11861.

**COLUMN (POST) AND FOUNDATION TABLE**

<table>
<thead>
<tr>
<th>Column (Post) Size</th>
<th>Foundation Alternatives</th>
<th>Embedment Depth (ft)</th>
<th>Embedment Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter (in)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thk.</td>
<td>Wall Thk.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COLUMN (POST) SELECTION TABLE**

**WIND SPEED = 110 MPH**

**WIND SPEED = 130 MPH**

**WIND SPEED = 150 MPH**

**UNITED STATES AIR FORCE**

**2016 DESIGN STANDARDS**

**INDEX NO.**

**SHEET NO.**
NOTES:

1. Foundation Notes for Frangible Slip Base:
   A. Place Stub into concrete to diameter and depth shown in POST AND FOUNDATION TABLE using Class I Concrete.
   B. Install precast concrete/steel section by placing into a preformed hole and backfilling with flowing fill or bagged concrete.

2. Slip Base Fabrication Notes:
   A. The difference between the O.D. of the post and I.D. of the Sleeve must be 1/8" max.
   B. Base Plate to Sleeve and Base Plate to Stub may be welded or cast.
   C. For cast base plates bolted to foundation stubs, use a foundation stub the same size as the sign column (Post).

3. Slip Base Assembly Instructions:
   A. Assemble Slip Base connections in the following manner:
      1. Insert Post into Sleeve and connect using 2 - 5/8" diameter Sleeve Bolts.
      2. Assemble top base plate to bottom Base Plate using Base Bolts (High strength) with 4 washers per bolt. (See Detail 5):
          a. Place one washer on each Base Bolt between the bottom Base Plate and the Base Bolt Head.
          b. Place the next washer between the top Base Plate and the Bolt Keeper Plate.
          c. Place the third washer between the Top Base Plate and the Nut.
      B. Orient the Bolt Keeper Plates in the Direction of Traffic.
      C. Use brass shims to plumb the post.
      D. Tighten Base Bolts as follows:
          a. Tighten Base Bolts to the maximum possible with a 12" to 15" wrench (this will bed the torque prescribed in the SLIP BASE DETAILS Table. Over tightened Base Bolts are not permitted.
          b. Loosen each Base Bolt one turn.
          c. Under the supervision of the Engineer, use a calibrated wrench to tighten bolts to the torque prescribed in the SLIP BASE DETAILS Table. Over tightened Base Bolts are not permitted.
          d. Distort bolt threads at the junction with nuts to prevent loosening. Repair damaged galvanizing.
          E. Place galvanized steel shims between the Sleeve and Post to obtain a tight fit between the Sleeve and Post.

SLIP BASE DETAILS

<table>
<thead>
<tr>
<th>Dia (NPS)</th>
<th>Material</th>
<th>Sleeve D (Max)</th>
<th>Sleeve Height</th>
<th>Base Plate</th>
<th>Base Bolt</th>
<th>Base Plate Torque</th>
<th>Hole Size D</th>
<th>SHIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1/4</td>
<td>25/32</td>
<td>6</td>
<td>1/4</td>
<td>25/32</td>
<td>6</td>
<td>4</td>
<td>1/8</td>
</tr>
<tr>
<td>4</td>
<td>3/8</td>
<td>25/32</td>
<td>6</td>
<td>1/4</td>
<td>25/32</td>
<td>7</td>
<td>4</td>
<td>1/8</td>
</tr>
<tr>
<td>6</td>
<td>1/2</td>
<td>43/64</td>
<td>3.5</td>
<td>1/2</td>
<td>32/32</td>
<td>9</td>
<td>4</td>
<td>1/8</td>
</tr>
<tr>
<td>8</td>
<td>3/4</td>
<td>43/64</td>
<td>10</td>
<td>1/2</td>
<td>32/32</td>
<td>11</td>
<td>8</td>
<td>5/8</td>
</tr>
</tbody>
</table>

SLIP BASE AND FOUNDATION DETAILS
NOTES:
1. Align Soil Plate bottom at 1/4 of embedment depth.
2. Slot up to 1" long is allowed to accommodate various Column (Post) sizes.
3. Rectangular soil plate of size 1'-2" x 1'-0" may be used as an alternative.

ALUMINUM SOIL PLATE DETAIL

CONCRETE/STUB DETAIL

Drivable Post Detail
(Frangible Post in Crossovers, Medians & Sidewalks)

Note: Concrete foundation may be Class Non Structural if poured monolithically with sidewalk or separator.
**Wind Beam Connection Notes:**
1. 3/8" Ø Stainless Steel Hex Head Bolts with Flat Washer under Head and Lockwasher under Nut may be used in lieu of 3/8" Ø Aluminum Button Head Bolts.
2. Use Nylon Washers (provided by the sheeting supplier) under the button bolt heads to protect sign sheeting.
3. Slots up to 1" long are allowed in wind beams to accommodate U-Bolts for varying Column (Post) diameters.
4. Wind beams may be oriented in either direction.

**Wind Beam Connections Details**

**Back-to-Back Sign Note:**
Use the area and the centroid location of the largest sign to determine aluminum Column (Post) size.

**Wind Beam Placement Notes:**
1. Install an additional third wind beam along the ø for signs with heights greater than 30" and less than 72". For rectangular signs greater than 72", maintain a maximum wind beam spacing of 2'-6" with the additional wind beams spaced evenly between the top and bottom wind beams. For rectangular signs up to 12" in height, use only one wind beam at ø Sign.
2. Install an additional third wind beam along the ø for Yield and School signs greater than 36".
3. Install an additional third wind beam along the ø for Diamond signs 30" or greater.