Standard Plans

M 21-01
August 7, 2017
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Washington State Department of Transportation
Engineering and Regional Operations
Development Division, Design Office
PO Box 47329
Olympia, WA 98504-7329

Email: designstandards@wsdot.wa.gov
[www.wsdot.wa.gov/design/standards/plans.htm](http://www.wsdot.wa.gov/design/standards/plans.htm)
Foreword

This manual contains standard engineering drawings used for road, bridge, and municipal construction. These drawings have been prepared under the direct supervision of a Washington State licensed professional engineer, who is knowledgeable in the specialized field of civil engineering depicted in each drawing. This manual standardizes fabrication, installation, and construction methods for specific items of work, and complements the contract documents and the Standard Specifications for Road, Bridge, and Municipal Construction.

Updating the manual is a continual process and revisions are issued periodically. Questions, comments, and recommendations for changes are welcome.

Contact the Design Standards Team at:

360-705-7256 (phone)
designstandards@wsdot.wa.gov (email)

For contact via conventional mail, the Comment Request Form on the reverse side of this page is provided to facilitate routing and prompt delivery. Making a copy will preserve the original form for future use. Attach a copy of the form as a cover sheet when sending comments or sketches made on other documents, such as marked copies of specific Standard Plans. Your questions, comments, and/or recommendations should be sent to:

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Further information, as well as Bentley Micro Station (.dgn) CAD files, Adobe Acrobat (.pdf) files, and some AutoCAD (.dwg) CAD files, can be found on the Design Standards website at: www.wsdot.wa.gov/eesc/design/designstandards

Contact the Engineering Publications Office at 360-705-7430 if you require additional copies of this manual.

/s/Jeff Carpenter
Jeff Carpenter
State Design Engineer
### Comments

<table>
<thead>
<tr>
<th>From:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phone:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>To: Design Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington State Department of Transportation</td>
</tr>
<tr>
<td>Transportation Building</td>
</tr>
<tr>
<td>PO Box 47329</td>
</tr>
<tr>
<td>Olympia, WA 98504-7329</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject: Standard Plans Manual Comment</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Comment:</th>
<th>See attached</th>
</tr>
</thead>
</table>

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### Section A  Roadway Construction

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th>Sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-10.10-00</td>
<td>Survey Stakes</td>
<td>8/7/07</td>
<td>2</td>
</tr>
<tr>
<td>A-10.20-00</td>
<td>Survey Monument Types 1 and 2</td>
<td>10/5/07</td>
<td></td>
</tr>
<tr>
<td>A-10.30-00</td>
<td>Monument Case and Cover</td>
<td>10/5/07</td>
<td></td>
</tr>
<tr>
<td>A-20.10-00</td>
<td>Slope Treatment</td>
<td>8/31/07</td>
<td></td>
</tr>
<tr>
<td>A-30.10-00</td>
<td>Concrete Slope Protection</td>
<td>11/8/07</td>
<td></td>
</tr>
<tr>
<td>A-30.30-01</td>
<td>Wire Mesh Slope Protection</td>
<td>6/16/11</td>
<td></td>
</tr>
<tr>
<td>A-30.35-00</td>
<td>Slope Protection Anchors</td>
<td>10/12/07</td>
<td></td>
</tr>
<tr>
<td>A-40.00-00</td>
<td>Dowel Bar Baskets</td>
<td>8/11/09</td>
<td></td>
</tr>
<tr>
<td>A-40.10-03</td>
<td>Cement Concrete Pavement Joints</td>
<td>12/23/14</td>
<td></td>
</tr>
<tr>
<td>A-40.15-00</td>
<td>PCC Pavement Isolation Joints</td>
<td>8/11/09</td>
<td>2</td>
</tr>
<tr>
<td>A-40.20-04</td>
<td>Bridge Paving Joint Seals</td>
<td>1/18/17</td>
<td>2</td>
</tr>
<tr>
<td>A-40.50-02</td>
<td>Bridge Approach Slab</td>
<td>12/23/14</td>
<td>2</td>
</tr>
<tr>
<td>A-50.10-00</td>
<td>Embankment Widening at Bridge End with Wing Wall</td>
<td>11/17/08</td>
<td>2</td>
</tr>
<tr>
<td>A-50.20-01</td>
<td>Embankment Widening at Bridge End with Curtain Wall</td>
<td>9/22/09</td>
<td>2</td>
</tr>
<tr>
<td>A-50.30-00</td>
<td>Embankment Widening at Bridge End with &quot;L&quot; Shaped Abutment</td>
<td>11/17/08</td>
<td>2</td>
</tr>
<tr>
<td>A-50.40-00</td>
<td>Embankment Widening at Bridge End with Sidewalk</td>
<td>11/17/08</td>
<td></td>
</tr>
<tr>
<td>A-60.10-03</td>
<td>Cement Concrete Pavement Rehabilitation</td>
<td>12/23/14</td>
<td>2</td>
</tr>
<tr>
<td>A-60.20-03</td>
<td>Dowel Bar Retrofit for Cement Concrete Pavement</td>
<td>12/23/14</td>
<td>2</td>
</tr>
<tr>
<td>A-60.30-00</td>
<td>Bridge Deck Transition for HMA Overlay</td>
<td>11/8/07</td>
<td></td>
</tr>
<tr>
<td>A-60.40-00</td>
<td>HMA Overlay Further Deck Preparation</td>
<td>8/31/07</td>
<td></td>
</tr>
</tbody>
</table>

### Section B  Drainage Structures and Hydraulics

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th>Sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-5.20-02</td>
<td>Catch Basin Type 1</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-5.40-02</td>
<td>Catch Basin Type 1L</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-5.60-02</td>
<td>Catch Basin Type 1P (for Parking Lot)</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-10.20-01</td>
<td>Catch Basin Type 2</td>
<td>2/7/12</td>
<td></td>
</tr>
<tr>
<td>B-10.40-01</td>
<td>Catch Basin Type 2 with Flow Restrictor</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-10.60-00</td>
<td>Catch Basin Type 2 with Baffle Type Flow Restrictor</td>
<td>6/8/06</td>
<td></td>
</tr>
<tr>
<td>B-10.70-00</td>
<td>Catch Basin ~ PVC</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-15.20-01</td>
<td>Manhole Type 1</td>
<td>2/7/12</td>
<td></td>
</tr>
<tr>
<td>B-15.40-01</td>
<td>Manhole Type 2</td>
<td>2/7/12</td>
<td></td>
</tr>
<tr>
<td>B-15.60-02</td>
<td>Manhole Type 3</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-20.20-02</td>
<td>Drywell Type 1 (for Swale)</td>
<td>3/16/12</td>
<td></td>
</tr>
<tr>
<td>B-20.40-03</td>
<td>Drywell Type 2 (with Pipe Inlet)</td>
<td>3/16/12</td>
<td></td>
</tr>
<tr>
<td>B-20.60-03</td>
<td>Drywell Type 3 (at At-Grade Inlet)</td>
<td>3/15/12</td>
<td></td>
</tr>
<tr>
<td>B-25.20-01</td>
<td>Combination Inlet</td>
<td>3/15/12</td>
<td></td>
</tr>
<tr>
<td>B-25.60-01</td>
<td>Concrete Inlet</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-30.10-02</td>
<td>Rectangular Frame (Reversible)</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-30.20-03</td>
<td>Rectangular Solid Metal Cover</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-30.30-02</td>
<td>Rectangular Vaned Grate</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-30.40-02</td>
<td>Rectangular Bi-Directional Vaned Grate</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-30.50-02</td>
<td>Rectangular Herringbone Grate</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-30.70-03</td>
<td>Circular Frame (Ring) and Cover</td>
<td>4/26/12</td>
<td></td>
</tr>
<tr>
<td>B-30.80-00</td>
<td>Circular Grate</td>
<td>6/8/06</td>
<td></td>
</tr>
<tr>
<td>B-30.90-02</td>
<td>Miscellaneous Details for Drainage Structures</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-35.20-00</td>
<td>Grate Inlet Type 1 (Cast-In-Place)</td>
<td>6/8/06</td>
<td></td>
</tr>
<tr>
<td>B-35.40-00</td>
<td>Grate Inlet Type 2</td>
<td>6/8/06</td>
<td></td>
</tr>
<tr>
<td>B-40.20-00</td>
<td>Welded Grates for Grate Inlet</td>
<td>6/1/06</td>
<td></td>
</tr>
<tr>
<td>B-40.40-02</td>
<td>Frame and Dual Vaned Grates for Grate Inlet</td>
<td>1/26/17</td>
<td></td>
</tr>
<tr>
<td>B-45.20-01</td>
<td>Drop Inlet Type 1</td>
<td>7/11/17</td>
<td></td>
</tr>
</tbody>
</table>
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-45.40-01</td>
<td>Drop Inlet Type 2</td>
<td>7/21/17</td>
</tr>
<tr>
<td>B-50.20-00</td>
<td>Grates for Drop Inlet</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-55.20-01</td>
<td>Pipe Zone Bedding and Backfill</td>
<td>1/26/17</td>
</tr>
<tr>
<td>B-60.20-00</td>
<td>Connection Details for Dissimilar Culvert Pipe</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-60.40-00</td>
<td>Coupling Bands for Corrugated Metal Pipe</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-65.20-01</td>
<td>Animal Underpass</td>
<td>4/26/12</td>
</tr>
<tr>
<td>B-65.40-00</td>
<td>Equipment Underpass</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-70.20-00</td>
<td>Beveled End Sections (for Culverts 30&quot; Diameter or Less)</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-70.60-01</td>
<td>Flared End Sections</td>
<td>1/26/17 2 Sheets</td>
</tr>
<tr>
<td>B-75.20-01</td>
<td>Headwalls for Culvert Pipe and Underpass</td>
<td>6/10/08</td>
</tr>
<tr>
<td>B-75.50-01</td>
<td>Type 1 Safety Bars for Stepped Culvert Pipe or Pipe Arch</td>
<td>6/10/08</td>
</tr>
<tr>
<td>B-75.60-00</td>
<td>Type 2 Safety Bars for Culvert Pipe or Pipe Arch (On Cross Road)</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-80.20-00</td>
<td>Tapered End Section with Type 3 Safety Bars</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-80.40-00</td>
<td>Tapered End Section with Type 4 Safety Bars (On Cross Road)</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-82.20-00</td>
<td>Residential Storm Drain, Under Sidewalk</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-85.10-01</td>
<td>Vertical Connection (for Sanitary Sewer Use)</td>
<td>6/10/08</td>
</tr>
<tr>
<td>B-85.20-00</td>
<td>Side Sewer Connection (for Sanitary Sewer Use)</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-85.30-00</td>
<td>Standing Side Sewer Connection (for Sanitary Sewer Use)</td>
<td>6/1/06</td>
</tr>
<tr>
<td>B-85.40-00</td>
<td>8 Inch Sewer Clean-Out (for Sanitary Sewer Use)</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-85.50-01</td>
<td>Drop Connections (for Sanitary Sewer Use)</td>
<td>6/10/08</td>
</tr>
<tr>
<td>B-90.10-00</td>
<td>Hydrant Setting Types A and B</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-90.20-00</td>
<td>2 Inch Blowoff Assembly</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-90.30-00</td>
<td>Combination Air Release / Air Vacuum Valve Assembly</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-90.40-01</td>
<td>Concrete Thrust Block</td>
<td>1/26/17</td>
</tr>
<tr>
<td>B-90.50-00</td>
<td>Concrete Thrust Block for Convex Vertical Bends</td>
<td>6/8/06</td>
</tr>
<tr>
<td>B-95.20-01</td>
<td>Median Barrier Drainage Installation</td>
<td>2/3/09</td>
</tr>
<tr>
<td>B-95.40-00</td>
<td>Inlet Placement at Bridge End</td>
<td>6/8/06</td>
</tr>
</tbody>
</table>

### Section C (Guardrail)

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1a</td>
<td>Beam Guardrail (Thrie Beam)</td>
<td>7/14/15 2 Sheets</td>
</tr>
<tr>
<td>C-1b</td>
<td>Beam Guardrail Posts and Blocks</td>
<td>7/14/15 2 Sheets</td>
</tr>
<tr>
<td>C-1d</td>
<td>Thrie Beam Guardrail Reducer Section</td>
<td>10/31/03</td>
</tr>
<tr>
<td>C-7</td>
<td>Beam Guardrail End Sections</td>
<td>6/16/11</td>
</tr>
<tr>
<td>C-7a</td>
<td>Thrie Beam End Sections</td>
<td>6/16/11</td>
</tr>
<tr>
<td>C-20.10-04</td>
<td>Beam Guardrail Type 31</td>
<td>7/21/17</td>
</tr>
<tr>
<td>C-20.11-00</td>
<td>Beam Guardrail Type 31 Components</td>
<td>7/21/17</td>
</tr>
<tr>
<td>C-20.14-03</td>
<td>Beam Guardrail Type 31 Placement (Cases 1-31, 2-31 &amp; 3-31)</td>
<td>6/11/14</td>
</tr>
<tr>
<td>C-20.15-02</td>
<td>Beam Guardrail Type 31 Placement (Cases 4-31 &amp; 5-31)</td>
<td>6/11/14</td>
</tr>
<tr>
<td>C-20.18-02</td>
<td>Beam Guardrail Type 31 Placement (Cases 10A-31, 10B-31 &amp; 10C-31)</td>
<td>6/11/14</td>
</tr>
<tr>
<td>C-20.19-02</td>
<td>Beam Guardrail Type 31 Placement (Cases 11A-31, 11B-31 &amp; 11C-31)</td>
<td>6/11/14</td>
</tr>
<tr>
<td>C-20.40-06</td>
<td>Beam Guardrail Type 31 Placement 12' - 6&quot;, 18' - 9&quot;, or 25' - 0&quot; Span</td>
<td>7/21/17</td>
</tr>
<tr>
<td>C-20.41-01</td>
<td>Box Culvert Guardrail Steel Post ~ Type 31</td>
<td>7/14/15</td>
</tr>
</tbody>
</table>
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-20.42-05</td>
<td>Guardrail Placement Strong Post ~ Type 31 Intersection Design</td>
<td>7/14/15</td>
</tr>
<tr>
<td>C-20.45-01</td>
<td>Beam Guardrail Type 31 - DS (Double sided) (W-Beam)</td>
<td>7/2/12</td>
</tr>
<tr>
<td>C-22.16-06</td>
<td>Beam Guardrail Type 31 ~ Buried Terminal Type 2</td>
<td>7/21/17</td>
</tr>
<tr>
<td>C-22.40-06</td>
<td>Beam Guardrail Type 31 Non-Flared Terminal (All Posted Speeds)</td>
<td>7/21/17</td>
</tr>
<tr>
<td>C-22.45-03</td>
<td>Beam Guardrail Type 31 Non-Flared Terminal (Posted Speed - 45 MPH and Below)</td>
<td>7/21/17</td>
</tr>
<tr>
<td>C-23.60-04</td>
<td>Beam Guardrail (Type 31) Anchor Type 10</td>
<td>6/11/14</td>
</tr>
<tr>
<td>C-24.10-01</td>
<td>Guardrail Connection to Bridge Rail or Concrete Barrier</td>
<td>7/14/15</td>
</tr>
<tr>
<td>C-25.20-06</td>
<td>Beam Guardrail (Type 31) Transition Section Type 21</td>
<td>7/14/15</td>
</tr>
<tr>
<td>C-25.22-05</td>
<td>Beam Guardrail (Type 31) Transition Section Type 22</td>
<td>7/14/15</td>
</tr>
<tr>
<td>C-25.26-03</td>
<td>Beam Guardrail (Type 31) Transition Section Type 23</td>
<td>7/14/15</td>
</tr>
<tr>
<td>C-25.80-04</td>
<td>Beam Guardrail Type 31 to Beam Guardrail Type 1 Adaptor</td>
<td>7/15/16</td>
</tr>
<tr>
<td>C-40.14-02</td>
<td>Barrier Placement Cable to Thrie Beam Bull Nose Connection</td>
<td>7/2/12</td>
</tr>
<tr>
<td>C-40.16-02</td>
<td>Barrier Placement ~ Cable to W-Beam Shielding for Redirectional Landform</td>
<td>7/2/12</td>
</tr>
</tbody>
</table>

### Section C  (Older Guardrail Styles, being phased out)

Use Type 31 guardrail for new installations. See Design Manual for exceptions

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th>Sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1</td>
<td>Beam Guardrail Types 1 - 4 (W-Beam)</td>
<td>7/12/16</td>
<td>2</td>
</tr>
<tr>
<td>C-1c</td>
<td>Beam Guardrail</td>
<td>7/12/16</td>
<td></td>
</tr>
<tr>
<td>C-2</td>
<td>Guardrail Placement (Cases 1, 2 &amp; 3)</td>
<td>1/6/00</td>
<td></td>
</tr>
<tr>
<td>C-2a</td>
<td>Guardrail Placement (Cases 4, 5 &amp; 6)</td>
<td>6/21/06</td>
<td></td>
</tr>
<tr>
<td>C-2b</td>
<td>Guardrail Placement (Cases 7 &amp; 8)</td>
<td>6/21/06</td>
<td></td>
</tr>
<tr>
<td>C-2c</td>
<td>Guardrail Placement Median Bull Nose (Cases 9A, 9B &amp; 9C)</td>
<td>6/21/06</td>
<td></td>
</tr>
<tr>
<td>C-2d</td>
<td>Guardrail Placement (Cases 10A, 10B &amp; 10C)</td>
<td>6/21/06</td>
<td></td>
</tr>
<tr>
<td>C-2e</td>
<td>Guardrail Placement (Cases 11A, 11B &amp; 11C)</td>
<td>6/21/06</td>
<td></td>
</tr>
<tr>
<td>C-2f</td>
<td>Guardrail Placement Weak Post Intersection Design (8' - 6&quot; Max. Radius) (Cases 12AC, 12AD, 12BC &amp; 12BD)</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>C-2g</td>
<td>Guardrail Placement Weak Post Intersection Design (35' Max. Radius) (Cases 13AC, 13AD, 13BC &amp; 13BD)</td>
<td>7/27/01</td>
<td></td>
</tr>
<tr>
<td>C-2h</td>
<td>Guardrail Placement (Case 14)</td>
<td>3/28/97</td>
<td></td>
</tr>
<tr>
<td>C-2i</td>
<td>Guardrail Placement (Case 15)</td>
<td>3/28/97</td>
<td></td>
</tr>
<tr>
<td>C-2j</td>
<td>Guardrail Placement (Cases 16, 17 &amp; 18)</td>
<td>6/12/98</td>
<td></td>
</tr>
<tr>
<td>C-2k</td>
<td>Guardrail Placement 12' - 6&quot; Span (Cases 19A &amp; 19B)</td>
<td>7/12/16</td>
<td></td>
</tr>
<tr>
<td>C-2n</td>
<td>Guardrail Placement 18' - 9&quot; Span (Case 20)</td>
<td>7/12/16</td>
<td></td>
</tr>
<tr>
<td>C-2o</td>
<td>Guardrail Placement 25' Span (Case 21)</td>
<td>7/13/01</td>
<td></td>
</tr>
<tr>
<td>C-2p</td>
<td>Guardrail Placement Strong Post Intersection Design (Cases 22AC, 22AD, 22BC &amp; 22BD)</td>
<td>10/31/03</td>
<td></td>
</tr>
<tr>
<td>C-3</td>
<td>Beam Guardrail Transition Sections (Types 1, 1A, &amp; 1B)</td>
<td>7/2/12</td>
<td></td>
</tr>
</tbody>
</table>
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C-3a</td>
<td>Beam Guardrail Transition Sections (Types 2, 4, 5, &amp; 6)</td>
<td>10/4/05</td>
<td></td>
</tr>
<tr>
<td>C-3b</td>
<td>Beam Guardrail Transition Sections (Types 10 ~ 15)</td>
<td>6/27/11</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>C-3c</td>
<td>Beam Guardrail Transition Sections (Types 16, 17, &amp; 18)</td>
<td>6/27/11</td>
<td></td>
</tr>
<tr>
<td>C-4b</td>
<td>Beam Guardrail Flared Terminal</td>
<td>7/15/16</td>
<td></td>
</tr>
<tr>
<td>C-4e</td>
<td>Beam Guardrail Non-Flared Terminal</td>
<td>7/15/16</td>
<td></td>
</tr>
<tr>
<td>C-4f</td>
<td>Beam Guardrail Bull Nose Terminal</td>
<td>7/2/12</td>
<td>4 Sheets</td>
</tr>
<tr>
<td>C-6</td>
<td>Beam Guardrail Anchor Type 1</td>
<td>7/15/16</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>C-6a</td>
<td>Beam Guardrail Anchor Type 2</td>
<td>10/14/09</td>
<td></td>
</tr>
<tr>
<td>C-6c</td>
<td>Beam Guardrail Anchor Type 4</td>
<td>7/15/16</td>
<td></td>
</tr>
<tr>
<td>C-6d</td>
<td>Beam Guardrail Anchor Type 5</td>
<td>7/15/16</td>
<td></td>
</tr>
<tr>
<td>C-6f</td>
<td>Beam Guardrail Anchor Type 7</td>
<td>7/15/16</td>
<td></td>
</tr>
<tr>
<td>C-10</td>
<td>Box Culvert Guardrail Steel Post</td>
<td>7/15/16</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>C-22.14-04</td>
<td>Beam Guardrail Type 1 ~ Buried Terminal Type 2</td>
<td>7/15/16</td>
<td></td>
</tr>
<tr>
<td>C-8</td>
<td>Concrete Barrier Type 2</td>
<td>2/10/09</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>C-8a</td>
<td>Concrete Barrier Type 4 and Transition Section</td>
<td>7/25/97</td>
<td></td>
</tr>
<tr>
<td>C-8b</td>
<td>Concrete Barrier Light Standard Section</td>
<td>2/29/16</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>C-8e</td>
<td>Precast Concrete Barrier Anchor ~ Type 3 (Permanent)</td>
<td>2/21/07</td>
<td></td>
</tr>
<tr>
<td>C-8f</td>
<td>Concrete Barrier Transition Type 2 to Bridge F-Shape</td>
<td>6/30/04</td>
<td></td>
</tr>
<tr>
<td>C-70.10-01</td>
<td>Single-Slope Concrete Barrier (Precast)</td>
<td>6/17/14</td>
<td>3 Sheets</td>
</tr>
<tr>
<td>C-75.10-01</td>
<td>Single-Slope Concrete Barrier (Precast)/Transition Section</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-75.20-01</td>
<td>Single-Slope Concrete Barrier (Precast) Vertical Back</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-75.30-01</td>
<td>Single-Slope Concrete Barrier (Precast) Terminal</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-80.10-01</td>
<td>Single-Slope Concrete Barrier (Cast-in-Place) Dual-Faced</td>
<td>6/11/14</td>
<td>3 Sheets</td>
</tr>
<tr>
<td>C-80.20-01</td>
<td>Single-Slope Concrete Barrier (Cast-in-Place) Terminal</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-80.30-01</td>
<td>Single-Slope Concrete Barrier (Cast-in-Place) Transition Section</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-80.40-01</td>
<td>Single-Slope Concrete Barrier (Cast-in-Place) Vertical Back</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-80.50-00</td>
<td>Concrete Barrier Transition Type 2 to Single-Slope</td>
<td>4/18/12</td>
<td></td>
</tr>
<tr>
<td>C-85.10-00</td>
<td>Single-Slope Concrete Barrier Placement (Split)</td>
<td>4/18/12</td>
<td></td>
</tr>
<tr>
<td>C-85.11-00</td>
<td>Single-Slope Concrete Barrier Placement (Wrap)</td>
<td>4/18/12</td>
<td></td>
</tr>
<tr>
<td>C-85.14-01</td>
<td>Single-Slope Concrete Barrier Light Standard Foundation</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-85.15-01</td>
<td>Single-Slope Concrete Barrier (42&quot;) Light Standard Foundation</td>
<td>6/30/14</td>
<td></td>
</tr>
<tr>
<td>C-85.16-01</td>
<td>Single-Slope Concrete Barrier Sign Bridge Foundation</td>
<td>6/17/14</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>C-85.18-01</td>
<td>Single-Slope Concrete Barrier Transition for Monotube Sign Support</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>C-85.20-01</td>
<td>Single-Slope Concrete Barrier Cantilever Sign Structure Foundation</td>
<td>6/11/14</td>
<td>2 Sheets</td>
</tr>
</tbody>
</table>

**Section C (Concrete Barrier)**

C-8  Concrete Barrier Type 2               2/10/09  2 Sheets
C-8a Concrete Barrier Type 4 and Transition Section  7/25/97  
C-8b Concrete Barrier Light Standard Section  2/29/16  2 Sheets
C-8e Precast Concrete Barrier Anchor ~ Type 3 (Permanent)  2/21/07  
C-8f Concrete Barrier Transition Type 2 to Bridge F-Shape  6/30/04  
C-70.10-01 Single-Slope Concrete Barrier (Precast)  6/17/14  3 Sheets
C-75.10-01 Single-Slope Concrete Barrier (Precast)/Transition Section  6/11/14  
C-75.20-01 Single-Slope Concrete Barrier (Precast) Vertical Back  6/11/14  
C-75.30-01 Single-Slope Concrete Barrier (Precast) Terminal  6/11/14  
C-80.10-01 Single-Slope Concrete Barrier (Cast-in-Place) Dual-Faced  6/11/14  3 Sheets
C-80.20-01 Single-Slope Concrete Barrier (Cast-in-Place) Terminal  6/11/14  
C-80.30-01 Single-Slope Concrete Barrier (Cast-in-Place) Transition Section  6/11/14  
C-80.40-01 Single-Slope Concrete Barrier (Cast-in-Place) Vertical Back  6/11/14  
C-80.50-00 Concrete Barrier Transition Type 2 to Single-Slope  4/18/12  
C-85.10-00 Single-Slope Concrete Barrier Placement (Split)  4/18/12  
C-85.11-00 Single-Slope Concrete Barrier Placement (Wrap)  4/18/12  
C-85.14-01 Single-Slope Concrete Barrier Light Standard Foundation  6/11/14  
C-85.15-01 Single-Slope Concrete Barrier (42") Light Standard Foundation  6/30/14  
C-85.16-01 Single-Slope Concrete Barrier Sign Bridge Foundation  6/17/14  2 Sheets
C-85.18-01 Single-Slope Concrete Barrier Transition for Monotube Sign Support  6/11/14  
C-85.20-01 Single-Slope Concrete Barrier Cantilever Sign Structure Foundation  6/11/14  2 Sheets
### Section C (Miscellaneous)

- **C-16a**: Traffic Barrier Shoulder Widening ~ for Shoulders 8.0” and Wider
  - Effective: August 7, 2017 TO August 5, 2018

- **C-40.18-03**: Barrier Placement ~ Cable Barrier Shielding for Redirectional Landform
  - Effective: January 7, 2008 TO August 3, 2008

- **C-90.10-00**: Impact Attenuator Inertial Barrier Configurations
  - Effective: January 7, 2008 TO August 3, 2008

### Section D  Retaining, Noise Barrier, and Geosynthetic Walls

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-2.04-00</td>
<td>Noise Barrier Wall Type 2 (CIP Wall on Spread Footing)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.06-01</td>
<td>Noise Barrier Wall Type 3 (on Offset Spread Footing)</td>
<td>1/6/09 2 Sheets</td>
</tr>
<tr>
<td>D-2.08-00</td>
<td>Noise Barrier Wall Type 4 (on Shaft Foundation)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.14-00</td>
<td>Noise Barrier Wall Type 6 (w/Traffic Barrier on Spread Footing)</td>
<td>11/10/05</td>
</tr>
<tr>
<td>D-2.16-00</td>
<td>Noise Barrier Wall Type 6SS (w/S. S. Traffic Barrier on Spread Footing)</td>
<td>11/10/05</td>
</tr>
<tr>
<td>D-2.18-00</td>
<td>Noise Barrier Wall Type 7 (w/Traffic Barrier on Shaft Foundation)</td>
<td>11/10/05</td>
</tr>
<tr>
<td>D-2.20-00</td>
<td>Noise Barrier Wall Type 7SS (w/S. S. Traffic Barrier on Shaft Foundation)</td>
<td>11/10/05</td>
</tr>
<tr>
<td>D-2.32-00</td>
<td>Noise Barrier Wall Type 9 (Precast Wall on Spread Footing)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.34-01</td>
<td>Noise Barrier Wall Type 10 (on Offset Spread Footing)</td>
<td>1/6/09 2 Sheets</td>
</tr>
<tr>
<td>D-2.36-03</td>
<td>Noise Barrier Wall Type 11 (on Shaft Foundation)</td>
<td>6/11/14 3 Sheets</td>
</tr>
<tr>
<td>D-2.42-00</td>
<td>Noise Barrier Wall Type 13 (w/Traffic Barrier on Spread Footing)</td>
<td>11/10/05</td>
</tr>
<tr>
<td>D-2.44-00</td>
<td>Noise Barrier Wall Type 13SS (w/S. S. Traffic Barrier on Spread Footing)</td>
<td>11/10/05</td>
</tr>
<tr>
<td>D-2.46-01</td>
<td>Noise Barrier Wall Type 14 (w/Traffic Barrier on Shaft Foundation)(Precast Conc. w/ Traffic Barrier on Shaft Foundation)</td>
<td>6/11/14 3 Sheets</td>
</tr>
<tr>
<td>D-2.48-00</td>
<td>Noise Barrier Wall Type 14SS (w/S. S. Traffic Barrier on Shaft Foundation)(Precast Conc. w/ Single Slope Traffic Barrier on Shaft Fdn.)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.60-00</td>
<td>Noise Barrier Wall Type 16 (Masonry on Trench Footing)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.62-00</td>
<td>Noise Barrier Wall Type 17 (Masonry on Spread Footing)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.64-01</td>
<td>Noise Barrier Wall Type 18 (Masonry on Offset Spread Footing)</td>
<td>1/6/09 2 Sheets</td>
</tr>
<tr>
<td>D-2.66-00</td>
<td>Noise Barrier Wall Type 19 (on Shaft w/Grade Beam Foundation) (Masonry on Shaft with Grade Beam Foundation)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.68-00</td>
<td>Noise Barrier Wall Type 20 (Masonry on Shaft Foundation)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.80-00</td>
<td>Noise Barrier Wall Access Door Type 1 (for CIP Wall on Offset Spread Footing)</td>
<td>11/10/05</td>
</tr>
<tr>
<td>D-2.82-00</td>
<td>Noise Barrier Wall Access Door Type 2 (w/Traffic Barrier)</td>
<td>11/10/05 2 Sheets</td>
</tr>
<tr>
<td>D-2.84-00</td>
<td>Noise Barrier Wall Access Door Type 3 (for Precast Wall on Shaft Foundation)</td>
<td>11/10/05</td>
</tr>
</tbody>
</table>
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th>Sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-2.86-00</td>
<td>Noise Barrier Wall Access Door Type 4 (…w/Traffic Barrier on Shaft Foundation)</td>
<td>11/10/05</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-2.88-00</td>
<td>Noise Barrier Wall Access Door Type 5 (for Masonry Wall)</td>
<td>11/10/05</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-2.92-00</td>
<td>Noise Barrier Wall Access Door &amp; Frame</td>
<td>11/10/05</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-3.09-00</td>
<td>Permanent Geosynthetic Wall</td>
<td>5/17/12</td>
<td>4 sheets</td>
</tr>
<tr>
<td>D-3.10-01</td>
<td>Cast-In-Place Permanent Geosynthetic Wall Fascia and Facing</td>
<td>5/29/13</td>
<td></td>
</tr>
<tr>
<td>D-3.11-03</td>
<td>Precast Permanent Geosynthetic Wall Fascia</td>
<td>6/11/14</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-3.15-02</td>
<td>Permanent Geosynthetic Wall Single Slope Barrier</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>D-3.16-02</td>
<td>Permanent Geosynthetic Wall F-Shape Barrier</td>
<td>5/29/13</td>
<td></td>
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<tr>
<td>D-3.17-02</td>
<td>Permanent Geosynthetic Wall Expansion Joint</td>
<td>5/9/16</td>
<td></td>
</tr>
<tr>
<td>D-4</td>
<td>Backfill and Drainage for Retaining Walls</td>
<td>12/11/98</td>
<td></td>
</tr>
<tr>
<td>D-6</td>
<td>Gabions</td>
<td>6/19/98</td>
<td></td>
</tr>
<tr>
<td>D-10.10-01</td>
<td>Reinforced Concrete Retaining Wall Type 1 and 1SW</td>
<td>12/2/08</td>
<td>2 sheets</td>
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<tr>
<td>D-10.15-01</td>
<td>Reinforced Concrete Retaining Wall Type 2 and 2SW</td>
<td>12/2/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-10.20-00</td>
<td>Reinforced Concrete Retaining Wall Type 3 and 3SW</td>
<td>7/8/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-10.25-00</td>
<td>Reinforced Concrete Retaining Wall Type 4 and 4SW</td>
<td>7/8/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-10.30-00</td>
<td>Reinforced Concrete Retaining Wall Type 5</td>
<td>7/8/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-10.35-00</td>
<td>Reinforced Concrete Retaining Wall Type 6</td>
<td>7/8/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-10.40-01</td>
<td>Reinforced Concrete Retaining Wall Type 7</td>
<td>12/2/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-10.45-01</td>
<td>Reinforced Concrete Retaining Wall Type 8</td>
<td>12/2/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-15.10-01</td>
<td>Traffic Barrier Details for Reinf. Conc. Retaining Walls</td>
<td>12/2/08</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-15.20-03</td>
<td>Traffic Barrier Details for Reinf. Conc. Retaining Walls</td>
<td>5/9/16</td>
<td>2 sheets</td>
</tr>
<tr>
<td>D-15.30-01</td>
<td>Traffic Barrier Details for Reinf. Conc. Retaining Walls</td>
<td>12/2/08</td>
<td>2 sheets</td>
</tr>
</tbody>
</table>

### Section E  Bridges and Trestles

- **E-1** Date Numeral Placement on Bridge Traffic Barrier  
  Approval Date: 2/21/07  
  Sheets: 2 sheets
- **E-2** Pile or Frame Detour Bridge with Asphalt Overlay  
  Approval Date: 5/29/98  
  Sheets: 2 sheets
- **E-4** Precast Prestressed Concrete Piles  
  Approval Date: 8/27/03  
  Sheets: 2 sheets
- **E-4a** Precast Prestressed Concrete Piles Handling & Capping  
  Approval Date: 8/27/03  
  Sheets: 2 sheets

### Section F  Curbs, Sidewalks, and Driveways

- **F-10.12-03** Cement Concrete Curbs  
  Approval Date: 6/11/14  
  Sheets: 2 sheets
- **F-10.16-00** Cement Concrete Curb and Gutter Pan  
  Approval Date: 12/20/06  
  Sheets: 2 sheets
- **F-10.18-01** Roundabout Cement Concrete Curbs  
  Approval Date: 7/11/17  
  Sheets: 2 sheets
- **F-10.40-03** Extruded Curb Placement  
  Approval Date: 6/29/16  
  Sheets: 2 sheets
- **F-10.42-00** Extruded Curb  
  Approval Date: 1/23/07  
  Sheets: 2 sheets
- **F-10.62-02** Precast Sloped Mountable Curb  
  Approval Date: 4/22/14  
  Sheets: 2 sheets
- **F-10.64-03** Precast Dual Faced Sloped Mountable Curb  
  Approval Date: 4/22/14  
  Sheets: 2 sheets
- **F-30.10-03** Cement Concrete Sidewalk  
  Approval Date: 6/11/14  
  Sheets: 2 sheets
- **F-40.12-03** Parallel Curb Ramp  
  Approval Date: 6/29/16  
  Sheets: 2 sheets
- **F-40.14-03** Combination Curb Ramp  
  Approval Date: 6/29/16  
  Sheets: 2 sheets
- **F-40.15-03** Perpendicular Curb Ramp  
  Approval Date: 6/29/16  
  Sheets: 2 sheets
- **F-40.16-03** Single Direction Curb Ramp  
  Approval Date: 6/29/16  
  Sheets: 2 sheets
- **F-45.10-02** Detectable Warning Surface  
  Approval Date: 7/15/16  
  Sheets: 2 sheets
- **F-80.10-04** Cement Concrete Driveway Entrance Types 1, 2, 3, & 4  
  Approval Date: 7/15/16  
  Sheets: 2 sheets
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-10.10-00</td>
<td>Milepost</td>
<td>9/20/07</td>
</tr>
<tr>
<td>G-20.10-02</td>
<td>Ground-Mounted Sign Placement</td>
<td>6/23/15</td>
</tr>
<tr>
<td>G-22.10-03</td>
<td>Timber Sign Support</td>
<td>7/10/15</td>
</tr>
<tr>
<td>G-24.10-00</td>
<td>Steel Sign Support Type AP Installation Details</td>
<td>11/8/07</td>
</tr>
<tr>
<td>G-24.20-01</td>
<td>Steel Sign Support Type AS Installation Details</td>
<td>2/7/12</td>
</tr>
<tr>
<td>G-24.30-01</td>
<td>Steel Sign Support Types PL, PL-T, &amp; PL-U Inst. Det.</td>
<td>2/7/12</td>
</tr>
<tr>
<td>G-24.40-06</td>
<td>Steel Sign Support Types SB-1, SB-2 &amp; SB-3 Installation Details</td>
<td>2/29/16</td>
</tr>
<tr>
<td>G-24.50-04</td>
<td>Steel Sign Support Types ST-1 - ST-4 Installation Details</td>
<td>7/11/17</td>
</tr>
<tr>
<td>G-24.60-04</td>
<td>Steel Sign Support Types TP-A and TP-B Installation Details</td>
<td>6/23/15</td>
</tr>
<tr>
<td>G-25.10-04</td>
<td>Steel Sign Support Foundation Details</td>
<td>6/10/13</td>
</tr>
<tr>
<td>G-30.10-04</td>
<td>Sign Installation on Signal and Light Standards</td>
<td>6/23/15</td>
</tr>
<tr>
<td>G-50.10-02</td>
<td>Sign Bracing</td>
<td>6/23/15</td>
</tr>
<tr>
<td>G-60.10-03</td>
<td>Cantilever Sign Structure (Truss-Type)</td>
<td>6/18/15</td>
</tr>
<tr>
<td>G-60.20-02</td>
<td>Cantilever Sign Structure (Truss-Type) Foundation Type 1</td>
<td>6/18/15</td>
</tr>
<tr>
<td>G-60.30-02</td>
<td>Cantilever Sign Structure (Truss-Type) Fdn. Types 2 &amp; 3</td>
<td>6/18/15</td>
</tr>
<tr>
<td>G-70.10-03</td>
<td>Sign Bridge (Truss-Type)</td>
<td>6/18/15</td>
</tr>
<tr>
<td>G-70.20-04</td>
<td>Sign Bridge (Truss-Type) Foundation Type1</td>
<td>7/21/17</td>
</tr>
<tr>
<td>G-70.30-04</td>
<td>Sign Bridge (Truss-Type) Foundation Types 2 &amp; 3</td>
<td>7/21/17</td>
</tr>
<tr>
<td>G-90.10-03</td>
<td>Overhead Sign Bracing and Mounting</td>
<td>7/11/17</td>
</tr>
<tr>
<td>G-90.11-00</td>
<td>Overhead Sign Lighting Bracing and Placement</td>
<td>4/28/16</td>
</tr>
<tr>
<td>G-90.20-05</td>
<td>Overhead Sign Mounting (Monotube Structure)</td>
<td>7/11/17</td>
</tr>
<tr>
<td>G-90.30-04</td>
<td>Overhead Sign Mounting (Truss Structure)</td>
<td>7/11/17</td>
</tr>
<tr>
<td>G-90.40-02</td>
<td>Overhead Sign Lighting Details</td>
<td>4/28/16</td>
</tr>
<tr>
<td>G-95.10-01</td>
<td>Maintenance Walkway for Sign Bridges</td>
<td>6/2/11</td>
</tr>
<tr>
<td>G-95.20-02</td>
<td>Maintenance Walkway Mounting for Monotube Sign Bridge</td>
<td>6/2/11</td>
</tr>
<tr>
<td>G-95.30-02</td>
<td>Maintenance Walkway Mounting for Truss-Type Sign Bridge</td>
<td>6/2/11</td>
</tr>
</tbody>
</table>

## Section G  Signs and Sign Supports

- **Plan Title**: Milepost  
  **Publication Approval Date**: 9/20/07
- **Plan Title**: Ground-Mounted Sign Placement  
  **Publication Approval Date**: 6/23/15
- **Plan Title**: Timber Sign Support  
  **Publication Approval Date**: 7/10/15
- **Plan Title**: Steel Sign Support Type AP Installation Details  
  **Publication Approval Date**: 11/8/07
- **Plan Title**: Steel Sign Support Type AS Installation Details  
  **Publication Approval Date**: 2/7/12
- **Plan Title**: Steel Sign Support Types PL, PL-T, & PL-U Inst. Det.  
  **Publication Approval Date**: 2/7/12
- **Plan Title**: Steel Sign Support Types SB-1, SB-2 & SB-3 Installation Details  
  **Publication Approval Date**: 2/29/16
- **Plan Title**: Steel Sign Support Types ST-1 - ST-4 Installation Details  
  **Publication Approval Date**: 7/11/17
- **Plan Title**: Steel Sign Support Types TP-A and TP-B Installation Details  
  **Publication Approval Date**: 6/23/15
- **Plan Title**: Steel Sign Support Foundation Details  
  **Publication Approval Date**: 6/10/13
- **Plan Title**: Sign Installation on Signal and Light Standards  
  **Publication Approval Date**: 6/23/15
- **Plan Title**: Sign Bracing  
  **Publication Approval Date**: 6/23/15
- **Plan Title**: Cantilever Sign Structure (Truss-Type)  
  **Publication Approval Date**: 6/18/15
- **Plan Title**: Cantilever Sign Structure (Truss-Type) Foundation Type 1  
  **Publication Approval Date**: 6/18/15
- **Plan Title**: Cantilever Sign Structure (Truss-Type) Fdn. Types 2 & 3  
  **Publication Approval Date**: 6/18/15
- **Plan Title**: Sign Bridge (Truss-Type)  
  **Publication Approval Date**: 6/18/15
- **Plan Title**: Sign Bridge (Truss-Type) Foundation Type1  
  **Publication Approval Date**: 7/21/17
- **Plan Title**: Sign Bridge (Truss-Type) Foundation Types 2 & 3  
  **Publication Approval Date**: 7/21/17
- **Plan Title**: Overhead Sign Bracing and Mounting  
  **Publication Approval Date**: 7/11/17
- **Plan Title**: Overhead Sign Lighting Bracing and Placement  
  **Publication Approval Date**: 4/28/16
- **Plan Title**: Overhead Sign Mounting (Monotube Structure)  
  **Publication Approval Date**: 7/11/17
- **Plan Title**: Overhead Sign Mounting (Truss Structure)  
  **Publication Approval Date**: 7/11/17
- **Plan Title**: Overhead Sign Lighting Details  
  **Publication Approval Date**: 4/28/16
- **Plan Title**: Maintenance Walkway for Sign Bridges  
  **Publication Approval Date**: 6/2/11
- **Plan Title**: Maintenance Walkway Mounting for Monotube Sign Bridge  
  **Publication Approval Date**: 6/2/11
- **Plan Title**: Maintenance Walkway Mounting for Truss-Type Sign Bridge  
  **Publication Approval Date**: 6/2/11

## Section H  Roadside and Site Development

- **Plan Title**: Tree and Shrub Planting Details  
  **Publication Approval Date**: 7/3/08
- **Plan Title**: Live Stake Installations  
  **Publication Approval Date**: 7/3/08
- **Plan Title**: Crest Gage  
  **Publication Approval Date**: 10/12/07
- **Plan Title**: Automated Ground Water Monitoring Well  
  **Publication Approval Date**: 9/20/07
- **Plan Title**: Bollard Type 1  
  **Publication Approval Date**: 7/3/08
- **Plan Title**: Bollard Type 2  
  **Publication Approval Date**: 7/3/08
- **Plan Title**: Mailbox Support Type 1  
  **Publication Approval Date**: 2/7/12
- **Plan Title**: Mailbox Support Type 2  
  **Publication Approval Date**: 2/16/12
- **Plan Title**: Mailbox Support Type 3  
  **Publication Approval Date**: 2/7/12

## Section I  Site Preservation and Erosion Control

- **Plan Title**: High Visibility Fence  
  **Publication Approval Date**: 8/11/09
- **Plan Title**: Silt Fence with Backup Support  
  **Publication Approval Date**: 3/22/13
- **Plan Title**: Silt Fence  
  **Publication Approval Date**: 3/22/13
- **Plan Title**: High Visibility Silt Fence with Backup Support  
  **Publication Approval Date**: 3/22/13
- **Plan Title**: High Visibility Silt Fence  
  **Publication Approval Date**: 3/22/13

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**Standard Plans for Road, Bridge, and Municipal Construction**

**Effective August 7, 2017**
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I-30.20-00</td>
<td>Erosion Control At Culvert Ends</td>
<td>9/20/07</td>
<td></td>
</tr>
<tr>
<td>I-30.30-01</td>
<td>Wattle Installation On Slope</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>I-30.40-01</td>
<td>Compost Sock</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>I-30.60-00</td>
<td>Erosion Control Details Coir Log Placement</td>
<td>5/29/13</td>
<td></td>
</tr>
<tr>
<td>I-40.10-00</td>
<td>Temporary Silt Fence for Inlet Protection In Unpaved Areas</td>
<td>9/20/07</td>
<td></td>
</tr>
<tr>
<td>I-40.20-00</td>
<td>Storm Drain Inlet Protection</td>
<td>9/20/07</td>
<td></td>
</tr>
<tr>
<td>I-50.20-01</td>
<td>Check Dams on Channels</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>I-60.10-01</td>
<td>Biodegradable Erosion Control Blanket Placement for Slopes</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>I-60.20-01</td>
<td>Biodegradable Erosion Control Blanket Placement for Ditches</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>I-80.10-02</td>
<td>Miscellaneous Erosion Control Details</td>
<td>7/15/16</td>
<td></td>
</tr>
</tbody>
</table>

### Section J  Illumination, Signals, and ITS

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>J-10</td>
<td>Electrical Conduit Placement</td>
<td>7/18/97</td>
<td></td>
</tr>
<tr>
<td>J-10.10-03</td>
<td>Cabinet Orientation, Conduit Layout and Foundation Detail</td>
<td>6/3/15  6 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-10.15-01</td>
<td>Cabinet Enclosure on Slope</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>J-10.16-00</td>
<td>Service Cabinet Type A (0 - 60 Amp Type 120 Volt Single Phase)</td>
<td>6/3/15  2 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-10.17-00</td>
<td>Service Cabinet Type B (0 - 60 Amp Type 240/240 Volt Single Phase)</td>
<td>6/3/15  2 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-10.18-00</td>
<td>Service Cabinet Type C (0 - 60 Amp Type 240/480 Volt Single Phase)</td>
<td>6/3/15  2 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-10.20-01</td>
<td>Service Cabinet Type B Modified (0 - 200 Amp Type 120/240 Single Phase)</td>
<td>6/1/16  5 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-10.21-00</td>
<td>Service Cabinet Type D (0 - 200 Amp Type 120/240 Single Phase)</td>
<td>6/3/15</td>
<td></td>
</tr>
<tr>
<td>J-10.22-00</td>
<td>Service Cabinet Type E (0 - 200 Amp Type 240/480 Single Phase)</td>
<td>5/29/13  2 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-10.25-00</td>
<td>Transformer Cabinet (480v/240V - 240V/120V)</td>
<td>7/11/17</td>
<td></td>
</tr>
<tr>
<td>J-15.15-02</td>
<td>Span Wire Installation</td>
<td>7/10/15</td>
<td></td>
</tr>
<tr>
<td>J-20.10-03</td>
<td>Accessible Pedestrian PushButton Post (PPB) and Foundation</td>
<td>6/30/14</td>
<td></td>
</tr>
<tr>
<td>J-20.11-02</td>
<td>Accessible Pedestrian PushButton with Curb Base (PPB) Post</td>
<td>6/30/14  2 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-20.15-03</td>
<td>Accessible Breakaway Pedestrian PushButton (PPB) Post</td>
<td>6/30/14</td>
<td></td>
</tr>
<tr>
<td>J-20.16-02</td>
<td>Pedestrian Signal Standard (Type PS) Details</td>
<td>6/30/14</td>
<td></td>
</tr>
<tr>
<td>J-20.20-02</td>
<td>Pedestrian Signal Standard (Type PS) Electrical Details</td>
<td>5/20/13</td>
<td></td>
</tr>
<tr>
<td>J-20.26-01</td>
<td>Accessible Pedestrian PushButton (PPB) Details</td>
<td>7/12/12  2 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-21.10-04</td>
<td>Type PS, Type 1, RM &amp; FB Signal Standard Foundation Details</td>
<td>6/30/14  2 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-21.15-01</td>
<td>Type 1 Signal Standard Details</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>J-21.16-01</td>
<td>Flashing Beacon Type 1 Signal Standard Details</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>J-21.17-01</td>
<td>Flashing Beacon Type 1 Signal Standard Electrical Details</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>J-21.20-01</td>
<td>Type 1 Signal Standard Electrical Details</td>
<td>6/10/13</td>
<td></td>
</tr>
<tr>
<td>J-22.15-02</td>
<td>Ramp Meter Signal Standard Details</td>
<td>7/10/15  3 Sheets</td>
<td></td>
</tr>
<tr>
<td>J-22.16-03</td>
<td>Ramp Meter Signal Standard Electrical Details</td>
<td>7/10/15</td>
<td></td>
</tr>
<tr>
<td>Plan No.</td>
<td>Plan Title</td>
<td>Publication Approval Date</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>---</td>
</tr>
<tr>
<td>J-26.10-03</td>
<td>Traffic Signal Standard Foundation</td>
<td>7/21/16</td>
<td></td>
</tr>
<tr>
<td>J-26.15-01</td>
<td>Signal Standard Foundation Placements</td>
<td>5/17/12</td>
<td>3</td>
</tr>
<tr>
<td>J-26.20-00</td>
<td>Temporary Signal Standard Adaptor</td>
<td>6/11/14</td>
<td>5</td>
</tr>
<tr>
<td>J-27.10-01</td>
<td>Type 4 and 5 Strain Pole Foundation</td>
<td>7/21/16</td>
<td></td>
</tr>
<tr>
<td>J-27.15-00</td>
<td>Type 4 and 5 Strain Pole Standard</td>
<td>3/15/12</td>
<td></td>
</tr>
<tr>
<td>J-28.22-00</td>
<td>Steel Light Standard Placement (Slip Base)</td>
<td>8/7/07</td>
<td>2</td>
</tr>
<tr>
<td>J-28.24-01</td>
<td>Steel Light Standard Placement (Fixed Base)</td>
<td>6/3/15</td>
<td></td>
</tr>
<tr>
<td>J-28.26-01</td>
<td>Steel Light Standard Placement Miscellaneous</td>
<td>12/2/08</td>
<td></td>
</tr>
<tr>
<td>J-28.30-03</td>
<td>Steel Light Standard Foundation Types A &amp; B</td>
<td>6/11/14</td>
<td>2</td>
</tr>
<tr>
<td>J-28.43-00</td>
<td>Slip Base Adaptor for 4-Bolt Light Standard Base</td>
<td>6/11/14</td>
<td></td>
</tr>
<tr>
<td>J-28.45-03</td>
<td>Steel Light Standard Elbow Mounting on Bridge &amp; Retaining Wall</td>
<td>7/21/16</td>
<td>2</td>
</tr>
<tr>
<td>J-28.50-03</td>
<td>Steel Light Standard Pole Base and Hand Hole Details</td>
<td>7/21/16</td>
<td></td>
</tr>
<tr>
<td>J-28.60-02</td>
<td>Steel Light Standard Barrier Mounted Base</td>
<td>7/21/16</td>
<td></td>
</tr>
<tr>
<td>J-28.70-03</td>
<td>Steel Light Standard Wiring Details</td>
<td>7/21/17</td>
<td>2</td>
</tr>
<tr>
<td>J-29.10-01</td>
<td>Type CCTV Traffic Signal Standard (Camera Pole) Foundation Details</td>
<td>7/21/16</td>
<td></td>
</tr>
<tr>
<td>J-29.15-01</td>
<td>Type CCTV Traffic Signal Standard (Camera Pole)</td>
<td>7/21/16</td>
<td>2</td>
</tr>
<tr>
<td>J-29.16-01</td>
<td>Type CCTV Traffic Signal Standard (Camera Pole) Elbow Details</td>
<td>7/21/16</td>
<td></td>
</tr>
<tr>
<td>J-30.10-00</td>
<td>High Mast Luminaire Maintenance Pad</td>
<td>6/18/15</td>
<td>2</td>
</tr>
<tr>
<td>J-40.05-00</td>
<td>Existing Junction Box Retrofit Grounding Details</td>
<td>7/21/16</td>
<td></td>
</tr>
<tr>
<td>J-40.10-04</td>
<td>Locking Lid Standard Duty Junction Box Types 1 &amp; 2</td>
<td>4/28/16</td>
<td>2</td>
</tr>
<tr>
<td>J-40.20-03</td>
<td>Heavy-Duty Junction Box Types 4, 5 &amp; 6</td>
<td>4/28/16</td>
<td>2</td>
</tr>
<tr>
<td>J-40.30-04</td>
<td>Locking Lid Standard Duty Junction Box Type 8</td>
<td>4/28/16</td>
<td>2</td>
</tr>
<tr>
<td>J-40.35-01</td>
<td>Sign Post-Mounted Junction Box</td>
<td>5/29/13</td>
<td>3</td>
</tr>
<tr>
<td>J-40.36-02</td>
<td>Nema 4X Non-Adjustable Junction Box</td>
<td>7/21/17</td>
<td>2</td>
</tr>
<tr>
<td>J-40.37-02</td>
<td>Nema 3R Adjustable Flush-Mount Junction Box</td>
<td>7/21/17</td>
<td>3</td>
</tr>
<tr>
<td>J-40.38-01</td>
<td>Top Entry Nema 4X Surface-Mount Junction Box</td>
<td>5/20/13</td>
<td></td>
</tr>
<tr>
<td>J-40.39-00</td>
<td>Front Entry Nema 4X Surface-Mount Junction Box</td>
<td>5/20/13</td>
<td></td>
</tr>
<tr>
<td>J-40.40-01</td>
<td>Nema 4X Junction Box in Sidewalk Located on Structure</td>
<td>4/28/16</td>
<td></td>
</tr>
<tr>
<td>J-45.36-00</td>
<td>Nema 3R and 4X Flush-Mount Junction Box - Grounding</td>
<td>7/21/17</td>
<td></td>
</tr>
<tr>
<td>J-50.05-00</td>
<td>Loop Splice Details</td>
<td>7/21/17</td>
<td></td>
</tr>
<tr>
<td>J-50.10-00</td>
<td>Type 1 Induction Loop</td>
<td>6/3/11</td>
<td></td>
</tr>
<tr>
<td>J-50.11-01</td>
<td>Type 2 Induction Loop</td>
<td>7/21/17</td>
<td>2</td>
</tr>
<tr>
<td>J-50.12-01</td>
<td>Type 3 Induction Loop</td>
<td>7/21/17</td>
<td>3</td>
</tr>
<tr>
<td>J-50.15-01</td>
<td>Induction Loop Details</td>
<td>7/21/17</td>
<td>3</td>
</tr>
<tr>
<td>J-50.16-01</td>
<td>Prefloored Loop Installation Details for New Bridge Decks</td>
<td>3/22/13</td>
<td>2</td>
</tr>
<tr>
<td>J-50.20-00</td>
<td>Permanent Traffic Recorder Installations</td>
<td>6/3/11</td>
<td>3</td>
</tr>
<tr>
<td>J-50.25-00</td>
<td>Weigh-In Motion Site Installation Details</td>
<td>6/3/11</td>
<td>2</td>
</tr>
<tr>
<td>J-50.30-00</td>
<td>Permanent Traffic Recorder &amp; Weigh-In-Motion Details</td>
<td>6/3/11</td>
<td>3</td>
</tr>
</tbody>
</table>
Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-60.05-01</td>
<td>Typical Grounding Details</td>
<td>7/21/16</td>
<td>3 Sheets</td>
</tr>
<tr>
<td>J-60.11-00</td>
<td>Conduit Installation in Traffic Barrier on Retaining Wall</td>
<td>5/20/13</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>J-60.12-00</td>
<td>Conduit Installation in Single-Slope Concrete Barrier (Dual Faced)</td>
<td>5/20/13</td>
<td></td>
</tr>
<tr>
<td>J-60.13-00</td>
<td>Stainless Steel Channel</td>
<td>6/16/10</td>
<td></td>
</tr>
<tr>
<td>J-60.14-00</td>
<td>Stainless Steel Channel Mounting Details on Column or Pole</td>
<td>6/16/10</td>
<td></td>
</tr>
<tr>
<td>J-75.10-02</td>
<td>Signal Head Mounting Details ~ Pole and Post Top Mountings</td>
<td>7/10/15</td>
<td></td>
</tr>
<tr>
<td>J-75.20-01</td>
<td>Signal Head Mounting Details ~ Mast Arm and Span Wire Mountings</td>
<td>7/10/15</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>J-75.30-02</td>
<td>Miscellaneous Signal Details</td>
<td>7/10/15</td>
<td></td>
</tr>
<tr>
<td>J-75.40-02</td>
<td>Overhead Sign Electrical Details (Monotube Structure)</td>
<td>6/1/16</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>J-75.41-01</td>
<td>Signal Bridge Standard Electrical Details</td>
<td>6/29/16</td>
<td>4 Sheets</td>
</tr>
<tr>
<td>J-75.45-02</td>
<td>Overhead Sign Electrical Details (Truss Structure)</td>
<td>6/1/16</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>J-90.10-02</td>
<td>Pull Box</td>
<td>4/28/16</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>J-90.20-02</td>
<td>Cable Vault</td>
<td>4/28/16</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>J-90.21-01</td>
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<td>Wire Fence Types 1 &amp; 2 and Wire Gates</td>
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Standard Plans for Road, Bridge, and Municipal Construction

Effective August 7, 2017
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<td>Roundabout Pavement Markings</td>
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<td>M-15.10-01</td>
<td>Crosswalk Layout</td>
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<td>Longitudinal Marking Patterns</td>
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<td>Profiled and Embossed Plastic Lines</td>
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<td>Traffic Letter and Numeral Applications</td>
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<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
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</table>
ALIGMENT STAKE
STAKE EVERY 100 FEET ON TANGENTS, EVERY 25 FEET ON CURVES

CLEARING/GRUBBING (C&G) LATH
STAKE AT EACH FULL STATION, 100 FEET ON TANGENTS, EVERY 25 FEET ON CURVES. NO HUB NECESSARY.

OFFSET FROM SLOPE STAKE CATCH (10 FEET)
FILL AT RP STAKE (1.2 FEET)
CUT AT CATCH POINT (BACK OF DITCH)
DISTANCE FROM C TO CATCH POINT (27.6 FEET)
SIDE SLOPE RATIO (4H:1V)
BACK OF DITCH

LATH FOR SLOPE REFERENCES

CUT TO BACK OF DITCH (2.2 FEET)
DISTANCE FROM C TO CATCH (BACK OF DITCH) (25.7 FEET)
SIDE SLOPE RATIO (4H:1V)
BACK OF DITCH

CUT AT CATCH POINT (2.2 FEET)
DISTANCE FROM C TO CATCH (BACK OF DITCH) (23.5 FEET)
SIDE SLOPE RATIO (3H:1V)
LINE STATIONING
HUNDRED FOOT INCREMENTS

SLOPE TREATMENT (ST) STAKE FOR CUT SECTIONS

DAYLIGHT CATCH (CUT 0.0 FEET)
FILL (0.1 FEET)
SIDE SLOPE TO A 2% ROADWAY SLOPE (59H:1V)
DISTANCE FROM C (16.2 FEET)

DAYLIGHT (D/L) STAKE

SURVEY STAKES
STANDARD PLAN A-10.10-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. The Brass Disc will be furnished by the State.
2. The text in the shaded area (see TOP VIEW) shall be 3/16" high and will be stamped by WSDOT personnel prior to setting the cap. Only the assigned identification letters and numbers are to be placed on the Brass Disc.
3. The hole shall be 32" minimum in depth or 6" below the deepest recorded frost line. All loose material shall be removed from the bottom of the hole so that the concrete is placed on firm undisturbed earth.
4. The top of the concrete shall be troweled smooth and the Brass Disc set in the center with top flush and level. The top of the monument may be recessed or protruding, depending on conditions.
5. The Brass Disc shall be rotated so it can be read while the observer is facing north.
6. When the concrete is set, cover the entire monument with moist earth and leave for three days.
7. To replace a Public Land Survey System (PLSS) corner, consult a licensed Professional Land Surveyor (PLS).

SURVEY MONUMENT
TYPES 1 AND 2
STANDARD PLAN A-10.20-00

SECTION VIEW
GENERAL INSTALLATION
MONUMENT CASE AND COVER
STANDARD PLAN A-10.30-00

NOTES
1. Dimensions may vary according to manufacturer.
2. Base to be placed on a well compacted foundation.
3. Monument case to be installed by contractor.

APPROXIMATE WEIGHTS
<table>
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<tr>
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<th>CASE</th>
<th>COVER</th>
<th>TOTAL</th>
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<tr>
<td></td>
<td>60 LBS</td>
<td>19 LBS</td>
<td>79 LBS</td>
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### Notes

1. Slope treatment shall be constructed simultaneously with the roadway excavation. Hand trimming will not be required if satisfactory results are obtained with mechanical equipment.

2. Slope treatment is used to provide a transition between the existing ground and the cut slope. The intended purpose is to eliminate the abrupt edge and give the area a more natural appearance. The dimensions shown are approximate and can vary to achieve this purpose.

### Table: Slope Treatment

<table>
<thead>
<tr>
<th>Class A</th>
<th>Class B</th>
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<td>L = 10.0'</td>
<td>L = 5.0'</td>
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<table>
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<th>Ground Line (H : V)</th>
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<td>0.5'</td>
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<td>+3 : 1</td>
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<td>0.5'</td>
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<tr>
<td>+4 : 1</td>
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</tr>
<tr>
<td>+6 : 1</td>
<td></td>
<td>1.2'</td>
<td>0.5'</td>
</tr>
<tr>
<td>≡ Level</td>
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<td>1.0'</td>
</tr>
<tr>
<td>-6 : 1</td>
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<td>2.5'</td>
<td>1.0'</td>
</tr>
<tr>
<td>-3 : 1</td>
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<td>3.0'</td>
<td>1.5'</td>
</tr>
<tr>
<td>+3 : 1</td>
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<td>+4 : 1</td>
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<tr>
<td>≡ Level</td>
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<td>1.5'</td>
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<tr>
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<tr>
<td>+3 : 1</td>
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<tr>
<td>-3 : 1</td>
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# SLOPE TREATMENT

**STANDARD PLAN A-20.10-00**

**CERTIFICATE NO. 000598**

**SLOPE TREATMENT NOT REQUIRED**
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

CONCRETE SLOPE PROTECTION
STANDARD PLAN A-30.10-00

gage 1 of 1 SHEET

STATE DESIGN ENGINEER
Washington State Department of Transportation
Maximum anchor spacing (A) for debris and impact loads required as per table for a minimum allowable anchor capacity of 20,000 lbs. Systems subjected to snow loads may require narrower maximum spacing.

Hexagonal mesh must meet minimum requirements of ASTM A975 for gabions.

U-Section of wire rope clip must be applied to the dead end, and saddle of wire rope clip must be applied to the live end of the rope as shown.

All wire rope loops shall include a standard weight thimble.
GROUNDED LINE

REINFORCED CONCRETE POST = 12" X 12" X 60" MIN. PLACE WIRE ROPE AT CENTER OF POST

#3 BAR (TYP.) - FOUR REQUIRED

REINFORCED CONCRETE POST = 8" SQUARE OR 8" DIAM. X 60" MIN. PLACE WIRE ROPE AT CENTER OF POST

#3 BAR (TYP.) - FOUR REQUIRED

GROUND LINE WIRE ROPE CLIP (TYP.)

WIRE ROPE CLIP (TYP.)

REINFORCED CONCRETE POST - 12" X 12" X 60" MIN. PLACE WIRE ROPE AT CENTER OF POST

10" - 2" MIN.

GROUND LINE

REINFORCED CONCRETE POST (TYP.) - 12" X 12" X 60" Min. PLACE WIRE ROPE AT CENTER OF POST

14" MIN.

14" MIN.

TYPE 1
DEADMAN (FOR USE IN SOIL)

TYPE 2
DEADMAN (FOR USE IN SOIL)

HOLLOW CORE THREADED BAR

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE

THIMBLE

FERRULE

STEEL BEARING PLATES

SACRIFICIAL DRILL BIT

CEMENT GROUT

COUPLER

NO. 3 GRADE 80 DEFORMED STEEL THREADED BAR

CEMENT GROUT

TYPE 3
DRILLABLE - GROUTABLE (FOR USE IN ROCK)

TYPE 4
3/4" WIRE ROPE (FOR USE IN ROCK OR SOIL)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE

TYPE 5
MECHANICAL ANCHOR (FOR USE IN SOIL)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE

3/4" WIRE ROPE CLIP (TYP.)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE

TYPE 6
DEFORMED STEEL THREADED BAR (FOR USE IN ROCK)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE

SUGGESTED MINIMUM DEPTH

MINIMUM ALLOWABLE ANCHOR CAPACITY SHALL BE 20,000 LBS.

NOTES

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

SLOPE PROTECTION ANCHORS

STANDARD PLAN A-30.35-00

EXPRESS NOVEMBER 8, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
**Dowel Bar Basket**

**Plan View**

"U" Shape Assembly Shown

**Notes**

1. The "U" shape or "V" shape are both acceptable.
2. Wire sizes shown are minimum required.
3. All wire intersections are to be welded.
4. Basket must be firmly attached to existing or new base.
5. Dowels and Tie Bars shall be held firmly in the above welded assembly.
6. Do not clip Spreader Wires.

**Dowel Bar Basket Details**

**Detail C**

Wire Leg Details

**Section A**

Elevation View

"U" Shape Assembly Shown

**Section B**

Elevation View

"U" Shape Assembly Shown

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**Washington State Department of Transportation**

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
### TYPICAL ISOLATION JOINT GUIDELINES

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<th>CONTINUOUS VERTICAL FACE THROUGH THE PAVEMENT SECTION</th>
<th>DISTANCE FROM NEAREST TRANSVERSE JOINT</th>
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<td>USE</td>
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<td>—</td>
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<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td>—</td>
<td>—</td>
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<tr>
<td>C</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
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<td>—</td>
<td>&gt; 4 FT FROM JOINT</td>
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<td>USE</td>
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* WITH RECTANGULAR GRATE CAST INTO ADJUSTMENT SECTION
NOTES

1. Use the 1/2 inch joint details for bridges with expansion length less than 100 feet and for bridges with L type abutments. Use the 1 inch joint details for other applications. Use Detail 5 on steel trusses and timber bridges with concrete deck panels.

2. Sawcut shall be as described in Standard Specification Section 5-05.3(8) and sealed in accordance with Standard Specification Section 5-05.3(8B).

3. The Contractor shall avoid sawcutting concrete at all locations. For Details 1 and 2, the construction tolerance to locate the sawcut is 1/4 inch (0 min. to 1/2 inch max.) from the concrete.

4. For Details 1, 2, 3, and 4, the item "HMA SAWCUT AND SEAL" shall be used for payment. For Details 5 and 6, the item "PAVED PANEL JOINT SEAL" shall be used for payment. For Detail 7, the item "SEALING EXISTING LONGITUDINAL AND TRANSVERSE JOINT" shall be used for payment.
EMBANKMENT WIDENING AT BRIDGE END WITH WING WALL
STANDARD PLAN A-50.10-00

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

WING WALL
EMBANKMENT
ISOMETRIC VIEW

PLAN
EDGE OF EMBANKMENT WIDENING
25' - 0" TAPER

EDGE OF SHOULDER (CURB LINE)

PLAN
EDGE OF EMBANKMENT WIDENING
25' - 0" TAPER

EDGE OF SHOULDER (CURB LINE)

ELEVATION
TYPE 21 TRANSITION SHOWN

APPRAOCH SLAB (WHEN SHOWN IN CONTRACT)

TAPERED BARRIER TOE
BACK OF PAVEMENT SEAT
BRIDGE TRAFFIC BARRIER

TAPERED BARRIER TOE
BACK OF PAVEMENT SEAT
BRIDGE TRAFFIC BARRIER

VARIES - SEE CONTRACT

WING WALL
EMBANKMENT

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
**PLAN WITH TYPE 2 UNRESTRAINED BARRIER**

- PRECAST CONCRETE BARRIER TYPE 2 (UNRESTRAINED)
- CONCRETE BARRIER TRANSITION TYPE 2 TO BRIDGE F-SHAPE - SEE STD. PLAN C-8
- WIRE ROPE LOOPS - SEE STANDARD PLAN C-6
- EDGE OF SHOULDER (CURB LINE)
- SEE NOTE: OMIT TAPERED BARRIER TOE
- BACK OF PAVEMENT SEAT
- BRIDGE F-SHAPE TRAFFIC BARRIER

**PLAN WITH ANCHORED BARRIER**

- PRECAST CONCRETE BARRIER TYPE 2 (ANCHORED)
- CONCRETE BARRIER TRANSITION TYPE 2 TO BRIDGE F-SHAPE - SEE STD. PLAN C-8
- WIRE ROPE LOOPS - SEE STANDARD PLAN C-6
- EDGE OF SHOULDER (CURB LINE)
- SEE NOTE: OMIT TAPERED BARRIER TOE
- BACK OF PAVEMENT SEAT
- BRIDGE F-SHAPE TRAFFIC BARRIER

**NOTE:**

- OMIT BEVELED ENDS ON TOP OF BRIDGE TRAFFIC BARRIER WHEN CONNECTING TO CONCRETE BARRIERS.

**PLAN WITH SINGLE SLOPE BARRIER**

- SINGLE SLOPE CONCRETE BARRIER (DUAL FACE)
- EDGE OF EMBANKMENT WIDENING
- VARIIES - SEE CONTRACT

**EMBANKMENT WIDENING FOR BRIDGE END WITH WING WALL STANDARD PLAN A-50.10-00**

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**Washington State Department of Transportation**

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
PLAN

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL TYPE 31
TRANSITION SECTION TYPE 31
- SEE STANDARD PLAN C-26.20

EDGE OF EMBANKMENT WIDENING
23'-0" TAPER

EDGE OF SHOULDER (CURB LINE)
TAPE RAD OR TOE

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

CURTAIN WALL

EMBANKMENT
CURTAIN WALL

ISOMETRIC VIEW

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

PRECAST GIRDER
EXPANSION JOINT
CURTAIN WALL
BRIDGE TRAFFIC BARRIER
BACK OF PAVEMENT SEAT
TAPERED BARRIER TOE
EXPANSION JOINT
BRIDGE TRAFFIC BARRIER

PLAN

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

CURTAIN WALL

EMBANKMENT
CURTAIN WALL

ISOMETRIC VIEW

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

CURTAIN WALL

EMBANKMENT
CURTAIN WALL

ISOMETRIC VIEW

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

CURTAIN WALL

EMBANKMENT
CURTAIN WALL

ISOMETRIC VIEW

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

CURTAIN WALL

EMBANKMENT
CURTAIN WALL

ISOMETRIC VIEW

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

CURTAIN WALL

EMBANKMENT
CURTAIN WALL

ISOMETRIC VIEW
NOTES

1. Install tie bars across longitudinal joints between new panels (complete and partial) and existing cement concrete pavement lane or shoulder when four or more adjacent panels are replaced. Place new tie bars between existing tie bars. Tie bars are not installed between cement concrete pavement and hot mix asphalt shoulders.

2. Place a bond-breaking material such as polyethylene film, roofing paper, or other material approved by the Engineer along all existing concrete surfaces and between the bottom of the slab and bases prior to placing concrete.

3. Place new dowel bars between existing dowel bars. The 1'-0" dimension from the edge of the panel may be increased by 6" (in) to avoid bar in existing panel.

4. Bars shall meet the requirements of Standard Specification 9-07.5(1) or 9-07.5(2).
PLAN VIEW
Dowel Bar Retrofit
For two-lane divided highway (one-way traffic)
For each lane in undivided highway (two-way traffic)
NOTES

1. A typical bridge overlay will remove 0.07 feet of Asphaltic Concrete Pavement (ACP) and place 0.15 feet of new Hot Mixed Asphalt (HMA). Depth of removal and placement will vary for each bridge. Total depth of HMA on the bridge shall not exceed 0.25 feet, unless shown otherwise in the plans.

2. If the existing depth of asphalt on the bridge deck is 0.25 feet, then the overlay will remove 0.15 feet of ACP and place 0.15 feet of new HMA. The existing bridge grade will remain unchanged.

3. FINAL GRADE TRANSITION: The maximum longitudinal taper slope to transition an increase in roadway grade to the new or existing bridge grade will be at most 1 inch rise to 40 feet run (1V-480H or flatter) (0.2% maximum). If several overlays are present, extended taper lengths shall be required to maintain the transition slope (1V-480H or flatter) (0.2% maximum).

4. If the ACP and membrane is to be removed from the bridge deck, see GSP 023106 for deck preparation before placing new membrane.

5. In accordance with Standard Specification 5-05.3(12), when pavement abuts bridges, the finished pavement parallel to centerline shall be uniform to a degree that no variations greater than 1/8-inch are present when tested with a 10-foot straightedge.

ELEVATION VIEW
HMA OVERLAY WITHOUT BRIDGE APPROACH SLAB

ELEVATION VIEW
HMA OVERLAY WITH BRIDGE APPROACH SLAB

Bridge Deck Transition for HMA Overlay
Standard Plan A-60.30-00
Sheet 1 of 1 Sheet
Approved for publication by
Washington State Department of Transportation

Effective: August 7, 2017 to August 5, 2018
1. If a zone has rebar section loss or full depth repairs, then the concrete deck repair in each zone shall achieve 3,000 PSI before progressing to the adjacent zone.

2. Remove all concrete 3/4” minimum clearance around all exposed reinforcement bars in accordance with Standard Specification 6-09.3(6).

3. For tension zones of continuous structures, when a longitudinal reinforcement bar has greater than 20% section loss (or damage), remove concrete a minimum of 3' - 6” on each side of section loss and place 2 supplemental reinforcement bars, adjacent and parallel to the deficient bar, extending 3' - 0” beyond each side having 20% section loss. Mechanical splices may be used to facilitate placement of #4 reinforcement bars.

4. For typical rebar repairs, when the reinforcement has greater than 20% section loss (or damage), remove concrete a minimum of 2' - 6” on each side of section loss, and replace with new supplemental reinforcement, same diameter as original, adjacent and parallel to the deficient bar, extending 2' - 3” beyond each end of section having 20% section loss.
NOTES

1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.

2. The knockout diameter shall not be greater than 20" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification Section 9-04.3.

3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).

4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.

5. The Precast Base Section may have a rounded floor, and the walls may be slopped at a rate of 1 : 24 or steeper.

6. The opening shall be measured at the top of the Precast Base Section.

7. All pickup holes shall be grouted full after the basin has been placed.
### EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

#### PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER (INCHES)</th>
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<tbody>
<tr>
<td>REINFORCED OR PLAN CONCRETE</td>
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<tr>
<td>ALL METAL PIPE</td>
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<td>CP/SP (STD. SPEC. SECT. 5-05.20)</td>
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<td>SOLID WALL PVC (STD. SPEC. SECT. 1-05.12(1))</td>
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<td>PROFILE WALL PVC (STD. SPEC. SECT. 1-05.12(2))</td>
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<tr>
<td>★ CORRUGATED POLYETHYLENE STORM SEWER PIPE</td>
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#### NOTES

1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot, shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.

2. The knockout shall not be greater than 20" (in), in any direction. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification Section 9-04.3.

3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).

4. The frame and grate may be installed with the flange down or integrally cast into the adjustment section with flange up.

5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1:24 or steeper.

6. The opening shall be measured at the top of the Precast Base Section.

7. All pickup holes shall be grouted full after the basin has been placed.

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**CATCH BASIN TYPE 1L**

**STANDARD PLAN B-5.40-02**

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**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
NOTES

1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot, shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.

2. The knockout diameter shall not be greater than 18" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification Section 9-04.3.

3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).

4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.

5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1:24 or steeper.

6. The opening shall be measured at the top of the Precast Base Section.

7. All pickup holes shall be grouted full after the basin has been placed.
NOTES

1. No steps are required when height is 4" or less.
2. The bottom of the precast catch basin may be sloped to facilitate cleaning.
3. The rectangular frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
4. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.

CATCH BASIN DIAMETERS

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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PIECE ALLOWANCES

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<th>PIPE MATERIAL WITH ALL METAL</th>
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CATCH BASIN TYPE 2

STANDARD PLAN B-10.20-01

Sheet 1 of 1 Sheet

1-3-12

Corrugated Polyethylene Storm Sewer Pipe (Standard Specification 9-05.20)

(Standard Specification 9-05.12(1))

(Standard Specification 9-05.12(2))
NOTES

1. The pipe supports and the flow restrictor shall be constructed of the same material and be anchored at a maximum spacing of 36" (in). Attach the pipe supports to the manhole with 5/8" (in) stainless steel expansion bolts or embed the supports into the manhole wall 2" (in).

2. The vertical riser stem of the flow restrictor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8" (in).

3. The flow restrictor shall be fabricated from one of the following materials:
   - 0.060" (in) Corrugated Aluminum Alloy Drain Pipe
   - 0.064" (in) Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.064" (in) Corrugated Aluminumized Steel Drain Pipe
   - 0.060" (in) Aluminum alloy flat sheet, in accordance with ASTM B 209, 5052 H32 or EPS High Density Polyethylene Storm Sewer Pipe

4. The frame and ladder or steps are to be offset so that: the shear gate is visible from the top; the climb-down space is clear of the riser and gate; the frame is clear of the curb.

5. The multi-orifice elbows may be located as shown, or placed on all one side of the riser to assure ladder clearance. The size of the elbows and their placement shall be specified in the Contract.

6. Restrictor plate with orifice as specified in the Contract. The opening is to be cut round and smooth.

7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 26 and ASTM B 275, designation Z932A; or cast iron in accordance with ASTM A 48, Class 30B.

8. The shear gate maximum opening shall be controlled by limited hinge movement, a stop tab, or some other device.

9. Alternative shear gate designs are acceptable if material specifications are met.
NOTES

1. See Contract for size and location of all pipes and orifices.
2. Baffle wall shall have #4 Bar at 12" spacing each way.
3. Precast baffle shall be keyed and grouted in place.
4. Bottom orifice plate shall be galvanized steel with a minimum thickness of 1/4". Attach orifice with 1/2" stainless steel bolts.
5. Upper flow orifice plates and elbows shall be aluminum, aluminized steel or galvanized steel. Galvanized steel shall have Treatment 1.
NOTES

1. Drain basin to be custom manufactured according to plan details.
   Risers are needed for basins over 84" (in) due to shipping restrictions.
   The maximum depth from finished grade to the lowest invert shall be 8' (ft).

2. Drainage connections shall utilize flexible elastomeric seals conforming
to ASTM F477 and shall meet the requirements of ASTM D3212.

3. Risers can be trimmed down to 3" (in) extension without interfering
   with the installation of the frame.

4. These structures can be used for Type 1, Type 1L, and Type 2 structures.
   Usage for the Type 2 structures shall be limited to pipe size use only.

5. Basins shall be manufactured from PVC pipe stock meeting the require-
   ments of ASTM D1764, cell classification 12454.

6. Ductile iron castings for PVC catch basins shall conform to the require-
   ments of ASTM A536, grade 70-50-06, and shall meet the proof load testing
   requirements of AASHTO M 306.

7. Bolt-down capability is required on all frames, grates, and covers, unless
   specified otherwise in the Contract. Provide 2 holes in the frame that are
   vertically aligned with the grate or cover slots. The frame shall accept the
   304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) alien head cap screw
   by being tapped, or other approved mechanism. Location of bolt-down
   holes varies by manufacturer.
GRAVEL BACKFILL FOR PIPE ZONE BEDDING

STEPS OR LADDER 24:1 SLOPE

SEPARATE BASE PRECAST

INTEGRAL BASE PRECAST WITH RISER

CIRCULAR ADJUSTMENT SECTION (TYP.)

ECCENTRIC CONE SECTION

PRECAST RISER SECTIONS

CHANNEL AND SHELF

REINFORCING STEEL (TYP.)

NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
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NOTES
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2. For pipe allowances, see Standard Plan B-10.20.

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MANHOLE TYPE 2
STANDARD PLAN B-15.40-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
NOTES
1. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum.
2. For pipe allowances, see Standard Plan B-10.20.
3. No steps are required when height is 4' (ft) or less.

MANHOLE DIMENSION TABLE

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MANHOLE TYPE 3

STANDARD PLAN B-15.60-02
NOTES

1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. Connect inlet pipe to structure using precast hose or core drilled hole.
4. For depths over 16" - 24" use 72" x 8" Alternative Precast Footing
5. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seeage port orientation varies among manufacturers.
3. For depths over 18'-2" use 72" x 8" Alternative Precast Footing.
4. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.
NOTES

1. This inlet requires the precast catch basin unit to be rotated 90 degrees so that the narrow side is parallel to the curb line. When calculating offsets from curb to CL of the precast catch basin, please note that the CL of the grate is not the CL of the precast catch basin. See Section A.

2. The dimensions of the frame and hood may vary slightly among different manufacturers. The Frame may have cast features intended to support a debris guard. Hood units may be mounted inside or outside of the frame. The methods for fastening the safety bar / debris guard rod to the hood may vary. The hood may include casting lugs. The top of the hood may be cast with a pattern.

3. Attach the hood to the frame with two 3/4" x 2" hex head bolts, nuts, and oversize washers. The washers shall have diameters adequate to ensure full bearing across the slots.

4. Bolt-down capability is required on all frames, grates and covers, unless specified in the Contract. Provide two holes in the Frame that are vertically aligned with the grate slots. The frame shall accept the 5/8" x 11 NC x 2" allen head cap screw by being tapped, or other approved mechanism. The location of bolt-down holes varies among manufacturers.

5. Only ductile iron Vaned Grates shall be used. See Standard Plans B-30.30 and B-30.40 for grate details. Refer to Standard Specification 9-05.15(2) for additional requirements.

6. This plan is intended to show the installation details of a manufactured product. This plan is not intended to show the specific details necessary to fabricate the castings depicted in this drawing.
**NOTES**

1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.

2. The knockout diameter shall not be greater than 18" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification Section 9-04.3.

3. The maximum depth from the finished grade to the lowest pipe invert shall be 5" (ft).

4. The frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.

5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1:24 or steeper.

6. The opening shall be measured at the top of the precast base section.

7. All pickup holes shall be grouted full after the inlet has been placed.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

1. This frame is designed to accommodate 20" (in) x 24" (in) grates or covers as shown on Standard Plans B-30.20, B-30.30, B-30.40, and B-30.50.

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

3. Refer to Standard Specification Section 9-05.15(2) for additional requirements.

RECTANGULAR FRAME (REVERSIBLE)

STANDARD PLAN B-30.10-02

ISOMETRIC VIEW SHOWING THE VARIATIONS

FRAME CAST INTO PRECAST ADJUSTMENT SECTION - SEE STANDARD PLAN B-30.85 FOR ADJUSTMENT SECTION DETAILS

FLANGE UPWARD

BOLT-DOWN DETAILS

SEE NOTE 2

RECESSED ALLEN HEAD CAP SCREW

304 S.S. 5/8" (in) - 11 NC x 2" (in)

GRATE

FRAME

HOLE

SECTION A

TOP

BOLT-DOWN HOLE (TYP.) - 5/8" (in) - 11 NC (SEE DETAIL & NOTE 2)

29 1/4"

24 1/4"

7/8" 1/8" 3/4"

4 1/2" 1 1/4"

3/4"

3/4"

1 1/4"

1 1/4"

1 1/4"
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Alternative reinforcing designs are acceptable in lieu of the rib design.

3. Refer to Standard Specification Section 9-05.15(2) for additional requirements.

4. For frame details, see Standard Plan B-30.10.

RECTANGULAR SOLID METAL COVER

STANDARD PLAN B-30.20-05

ISOMETRIC
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification Section 9-05.15(2) for additional requirements.

3. For frame details, see Standard Plan B-30.10.
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8\" (in) - 11 NC x 2\" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification Section B-05.16(2) for additional requirements.

3. For frame details, see Standard Plan B-30.10.

RECTANGULAR BI-DIRECTIONAL VANED GRATE
STANDARD PLAN B-30.40-02
1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification section 9-05.16(2) for additional requirements.

3. For frame details, see Standard Plan B-30.10.

4. The thickness of the grate shall not exceed 1 5/8" (in).

NOTES

RECESSED ALLEN HEAD CAP SCREW 304 S.S. 5/8" (IN) - 11 NC x 2" (IN)

GRATE

FRAME

HOLE

SLOT

TOP

ISOMETRIC

RETRACTED HERRINGBONE GRATE

STANDARD PLAN B-30.50-02

UNITED STATES OF AMERICA

STATE DESIGN ENGINEER

Washington State Department of Transportation

Hollman, Julie

Jan 23 2017 3:00 PM

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. The gasket and groove may be in the seat (frame) or in the underside of the cover. The gasket may be "T" shaped in section. The groove may be cast or machined.

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 3 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 5/8" x 1 NC x 2" Allen head cap screw by being tapped, or other approved mechanism. Location of bolt down holes varies by manufacturer.

3. For bolt-down manhole ring and covers that are not designated "Watertight," the neoprene gasket, groove, and washer are not required.

4. Washer shall be neoprene (Detail "B").

5. In lieu of blind pick notch for manhole covers, a single 1" pick hole is acceptable. Hole location and number of holes may vary by manufacturer.

6. Alternative reinforcing designs are acceptable in lieu of the rib design.

7. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1.5 times the horizontal scale (1H:1.5V).
NOTES

1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-20.20 and B-20.60.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**Typical Orientation for Access and Steps**

As an acceptable alternative to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used for adjustment sections.

As an acceptable alternative to conventional steel reinforcement, manufacturers shall use Synthetic Structural Fibers meeting the requirements of Standard Specification Section 9-05.50(10).

**Circular Adjustment Section**

For rectangular and circular adjustment sections, approved alternate material compositions are acceptable in lieu of precast concrete designs.

**Rectangular Adjustment Section**

**Eccentric Cone Section**

**84" (IN) or 96" (IN) Flat Slab Top**

**72" (IN) Flat Slab Top**

**24" (IN) diam., 48" (IN) diam., or 60" (IN) diam. Opening**

**24" (IN) diam., 48" (IN) diam., or 60" (IN) diam. Opening**

**20" (IN) x 24" (IN), or 42" (IN) x 24" (IN) Rectangular Opening**

**24" (IN) diam., 48" (IN) diam., or 62" (IN) diam. Opening**

**20" (IN) x 24" (IN), or 42" (IN) x 24" (IN) Rectangular Opening**

**24" (IN) diam., 48" (IN) diam., or 62" (IN) diam. Opening**

**4" Min. - 6" Max.**

**12" Min.**

**18" Max.**

**4" Min. - 6" Max.**

**2", 4", 6", 12", or 24" (IN)**

**ONE #3 BAR HOOP FOR 2", 4", OR 6" (IN)**

**TWO #3 BAR HOOPS FOR 12" (IN)**

**FOUR #3 BAR HOOPS FOR 24" (IN)**

**PREFABRICATED LADDER**

**STEP**

**NOTE**

1. Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 199.

**MISCELLANEOUS DETAILS**

**FOR DRAINAGE STRUCTURES**

**STANDARD PLAN B-30.90-02**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**STATE DESIGN ENGINEER**

**TOLLEFSON, J.H.**

**RECOMMENDATION**

**APPROVED: 06/30/01**

**9:53 AM**

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.

2. All exposed concrete shall be finished with a 1/2" radius.

3. The grade line of the top inside of any pipe shall enter no lower than the grade line of the top inside of the outlet pipe.

4. Pipes may enter through the knockouts on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.

UNITS "J" & "K"

SECTION C UNIT "J"

SECTION C UNIT "K"

SECTION D UNIT "H"

NOTES
1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.
2. Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section.
3. All exposed concrete edges shall be finished with a 1/2" radius.
4. Pipes may enter through the knockouts on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.
5. The flow line of the outlet pipe shall be 18" minimum above the inside bottom of the inlet structure.
6. The grade line of the top inside of any inlet pipe shall enter no lower than the grade line of the top inside of the outlet pipe.
7. Unit "H" and optional extension units "J" and "K" shall be grouted in place to the satisfaction of the Engineer.
8. All pickup holes shall be grouted full after the basin has been placed.

BAR LIST

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BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)

NOTES:

GRATE INLET TYPE 2

STANDARD PLAN B-35.40-00

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
ELEVEN EQUAL SPACES

CROSS BARS - 3/8" ROUND, OR RECTANGULAR OR HEXAGONAL BAR OF EQUIVALENT AREA.

GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

1. The Contract may specify a rotated inlet installation. Orient the grates in the frame so they intercept flow.

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

3. Refer to Standard Specification Section 9-05-16(2) for additional requirements.

4. Frame and Grates shall be Ductile Iron.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.

2. Bevel or round exposed concrete edges 1/2" (in).

3. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.

4. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.

5. All pickup holes shall be grouted full after the inlet has been placed.

6. The steel angles shall be set so that each bearing bar of the grate shall have full sealing on both ends. The finished top of concrete shall be even with the grate surface. For grates, see Standard Plan B-50-20.

7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.

8. The inside wall taper for form removal shall not result in any wall section thinner than 6" (in) except in pipe knockout areas.

9. Precast inlets shall be marked with the manufacturer's identification on the inside of the structure in some readily accessible location.

---

DIKE INSTALLATION FOR PREFERRED SLOPE

SECTION ON DITCH LINE

PLAN

SECTION A

SECTION B

GRATE SUPPORT DETAIL

(FOUR SUPPORTS REQUIRED)

ISOMETRIC

(SHOWN WITH TYPE 1 GRATE)
NOTES
1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.
2. Bevel or round exposed concrete edges 1/2" (in).
3. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.
4. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.
5. All pickup holes shall be grouted full after the inlet has been placed.
6. The steel angles shall be set so that each bearing bar of the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface. For grates, see Standard Plan B-50.20.
7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.
8. The inside wall taper for form removal shall not result in any wall section thinner than 6" (in) except in pipe knockout areas.
9. Precast inlets shall be marked with the manufacturer’s identification on the inside of the structure in some readily accessible location.
GRATES FOR DROP INLET

STANDARD PLAN B-50.20-00

SECTION A

SECTION B

SECTION C

GRADES FOR DROP INLET

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES
1. See Standard Specifications Section 7-08.3(3) for Pipe Zone Backfill.
2. See Standard Specifications Section 9-03.12(3) for Gravel Backfill for Pipe Zone Bedding.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.
CONCRETE COLLAR OPTION

CAST-IN-PLACE CONCRETE COLLAR

STEEL WELDED WIRE FABRIC - SEE NOTE 2

NOTES

1. The Concrete Collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum Concrete Collar width shall be 12". Concrete Collars may be used with all pipe materials and diameters. The Concrete Collar option shall only be used to extend existing pipes.

2. Steel Welded Wire Fabric shall be in accordance with Standard Specification 9-07.7. Install two wraps for size 6 x 6 W1.4 x W1.4 (10 Gage) Steel Welded Wire Fabric or one wrap for any of the following sizes:
   - 6 x 6 W2.1 x W2.1 (8 Gage)
   - 6 x 6 W2.9 x W2.9 (6 Gage)
   - 4 x 4 W2.9 x W2.9 (6 Gage)
   - 4 x 4 W4.0 x W4.0 (4 Gage)

3. When a Coupling Band connection requires attachment to the bell end of a concrete pipe, the bell end of the pipe shall be removed before the connection is installed.

4. Increase the outside diameter of the metal pipe to match the outside diameter of the concrete pipe by installing 12" wide rubber gaskets, thickness as required (Coupling Band only). The rubber gaskets shall be in accordance with Standard Specification 9-04.4(3).

5. Use a flat Type K Coupling Band. Type K Coupling Bands with dimples are not allowed for the installation detail shown. The Coupling Band option shall only be used for extending existing pipes that have an inside diameter of 36" or less.

CONNECTION DETAILS FOR DISSIMILAR CULVERT PIPE

STANDARD PLAN B-60.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPRESS JULY 1, 2007

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. Span and rise dimensions are nominal and are measured to the inside crests of corrugations.

2. Allowable heights of cover shall be within the limits indicated in the table included hereon. Minimums and maximums are shown.

3. Unless indicated otherwise a 10" depth (over the inside crests of corrugations) of earth shall be placed in the invert of the Structural Plate Underpass, Design 1, for its full width and length. The earth shall consist of naturally occurring materials available in the vicinity of the structural plate underpass installation. See Standard Specification 7-03.3(4).

4. Designed for H-20 live load and maximum allowable soil pressure of 6 Kips per square foot.

ALLOWABLE HEIGHTS OF COVER

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Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.

**DIMENSIONS**

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**ALLOWABLE HEIGHTS OF COVER**

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NOTES

1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4H:1V. When slopes are between 4H:1V and 6H:1V, shape the slope in the vicinity of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.

2. Field cutting of culvert ends is permitted when approved by the Engineer. All field-cut culvert pipe shall be treated with treatment as shown in the Standard Specifications or General Special Provisions.

3. FOR CULVERTS 30" DIAMETER OR LESS

END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))

THERMOPLASTIC PIPE

CONCRETE PIPE

METAL PIPE
1. The diameter of the end section of Design B shall match the inside diameter of the concrete pipe.

2. Skirt sections shall be made in one piece for round pipe with a diameter of 12" (in) to 24" (in) inclusive and for pipe arches with a rise of 13" (in) to 20" (in) inclusive. Skirt sections for larger sizes of pipes may be multiple pieces in conformance with the tabulated values shown.

3. Design A and sections for 42" (in) thru 84" (in) diameter and 49" (in) thru 63" (in) x 57" (in) arch with annular corrugations and all helically corrugated pipe arch include one foot of pipe length as a connector section. The connector section shall be attached to the end section by welds, rivets or bolts and shall be the same thickness as the end section.

4. Design C may be used in lieu of Design A for all metal pipe sizes except as noted. Coupling bands may be any acceptable type for the pipe specified.

5. Multiple panel skirts shall have 2" (in) lap seams tightly joined by 3/8" (in) stainless steel rivets or galvanized bolts on 6" (in) max. centers.

6. The reinforced edges of the following size End Sections shall be supplemented with galvanized steel stiffener angles:
   - 60" (in) thru 72" (in) diameter pipe
   - 77" (in) x 52" (in) & 83" (in) x 57" (in) pipe arch
   - 72" (in) thru 84" (in) diam. pipe and 77" (in) x 52" (in) & 83" (in) x 57" (in) pipe arch End Sections

7. The above galvanized angles shall be attached by 3/8" (in) galvanized nuts and bolts.

8. As an alternative to the connector lug and threaded rod used on 12" (in) thru 24" (in) culvert pipe, the attachment may be made with a 1" (in) wide strap, 16 gauge galvanized steel fastened with a 1/2" (in) diam., 6" (in) long galvanized bolt and one squarehead nut.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**TYPE 1**
CONNECTION TO METAL PIPE

**TYPE 2**
CONNECTION TO METAL OR CONCRETE PIPE

**TYPE 3**
CONNECTION TO METAL PIPE

DESIGN A

DESIGN B
CONNECTION TO CONCRETE OR HDPE PIPE
INLET END ONLY

DESIGN C
CONNECTION TO METAL OR CONCRETE PIPE
OUTLET ONLY

FOR 12" (IN) THRU 24" (IN) PIPE
AND 17" (IN) x 13/8" (IN) THRU
20" (IN) x 25/32" (IN) PIPE ARCH WITH
ANNULAR END CORRUGATIONS

FOR 30" (IN) THRU 64" (IN) PIPE
AND 35" (IN) x 24" (IN) THRU
83" (IN) x 57" (IN) PIPE ARCH WITH
ANNULAR END CORRUGATIONS

FOR 42" (IN) THRU 64" (IN) PIPE AND
49" (IN) x 33" (IN) THRU 83" (IN) x 57" (IN) PIPE ARCH
WITH ANNULAR END CORRUGATIONS, AND ALL
HELICAL END CORRUGATED PIPE AND PIPE ARCH

**DESIGN A**

**DESIGN B**
CONNECTION TO CONCRETE OR HDPE PIPE
INLET END ONLY

**DESIGN C**
CONNECTION TO METAL OR CONCRETE PIPE
OUTLET ONLY

SMOOTH TAPERED SLEEVE DETAIL
FOR USE WITH CONCRETE OR HDPE PIPE

PIM PAYMENT TO THIIS POINT
CONNECTOR LG (SEE NOTES)
END SECTION

PIECE PAYMENT TO THIS POINT
CONNECTOR LG
END SECTION

PIECE PAYMENT TO THIS POINT
CONNECTOR LG
END SECTION

PIECE PAYMENT TO THIS POINT
CONNECTOR LG
END SECTION

PRINTED BY:
HELMAN, JULIE
25 JUNE 2017 3:39 PM

STANDARD PLAN B-70.60.0
HEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE ENGINEER

Mastic where required

ALTENATE VIEW FOR FEMALE END

PIPE PAYMENT TO THIS POINT

Nominal Diameter: 1-1/2"

FORM 1/2" (IN) X 2 3/32" (IN) CORRUGATIONS
- MAINTAIN INSIDE DIAMETER OF SLEEVE
FINISHED END TO BE SAME DIAMETER AS
CORRUGATED STEEL PIPE DIAMETER
NOTES
1. The variable dimension indicated for the height of step for step mitered pipes shall conform to the manufacturers recommendations unless specified differently on the plans or in the Special Provisions.
2. Reinforcing steel shall have 1 1/2" min. cover to all concrete surfaces.
3. Headwalls for concrete culvert pipe may omit anchor bolt attachment.
4. When steel pipe safety bars are used, headwall thickness shall be increased to 8".

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

HEADWALLS FOR CULVERT PIPE AND UNDERPASS

STANDARD PLAN B-75.20-01

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES
1. The variable dimension indicated for the height of step for step mitered pipes shall conform to the manufacturers recommendations unless specified differently on the plans or in the Special Provisions.
2. Reinforcing steel shall have 1 1/2" min. cover to all concrete surfaces.
3. Headwalls for concrete culvert pipe may omit anchor bolt attachment.
4. When steel pipe safety bars are used, headwall thickness shall be increased to 8".
NOTES

1. Sockets shall be 3" extra strong steel pipe (3 1/2" O.D.). Sockets must be the proper angle and height so that safety bars are parallel with headwall and side slope, and are easily removable.

2. Safety Bars shall be 4" extra strong steel pipe (4 1/2" O.D.), or 4 1/2" O.D. (250" wall thickness) steel tubing. Length (20" maximum) shall be the minimum required to achieve Resin Bonded Anchor placement in full depth concrete. When multiple bars are required (see table) place bars at equal spacing (30" max.).

3. Bevel culvert pipe to match side slope.

4. Resin bonded anchors shall be 7" in length (5" embedment).

5. Centerline of headwall shall be normal to roadway centerline.
NOTES

1. D = Inside Diameter of Culvert Pipe, or Pipe Arch Span Width, 36" maximum.

2. The distance between the safety bars, and between the top bar and the culvert crown, shall be equal spaces of no more than 24". The distance may vary ±1" between bars to facilitate placement.

3. Slope shall match Side Slope; 6H:1V preferred, not steeper than 4H:1V.

FINISHED GROUND

CULVERT PIPE OR PIPE ARCH

STANDARD PLAN B-75.60-00

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
1. All pipes or pipe arches shall be attached as shown in CONNECTOR DETAIL.
2. When a Toe Plate Extension is required, it shall be the same gage as the End Section. The dimensions shall be 8" high, and 6" less than the overall width. Install centered, and lapped 2", fasten with 3/8" x 3/4" galvanized bolts on 12" maximum centers.
3. Cross Drainage Bar and Safety Bars shall be 3' Schedule 40 galvanized steel pipe. Cross Drainage Bars shall be placed a maximum 30" apart.
4. Slotted holes for safety bar attachment shall be provided on end sections.
5. Number of Safety Bars required will vary depending upon the length of the end section.
**NOTES**

1. As an alternative connection on 15" through 24" pipe, a 1" wide strap of 16 gauge or 12 gauge galvanized steel, fastened with a 1/2" diam., 6" long galvanized bolt and square head nut, may be used.

2. Number of safety bars required will vary depending upon the length of the end section.

---

### METAL END SECTIONS FOR CIRCULAR PIPES

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<th>PIPE DIA. (INCHES)</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
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### METAL END SECTIONS FOR ARCHED PIPES

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### CROSS ROAD DRAINAGE STRUCTURE

- **Reinforced Edge**
  - Head Bolts (TYP.)
  - Edge of End Section Sheet Rolled Snugly Against Steel Rod

- **Toe Plate Extension**
  - When Required, Same Gage as End Section, 6" Less Than Overall Width, Centered, 2" Lap, Fasten W 3/8 x 3/4" Galv. Bolts on 12" Max. CTs.

- **Safety Bar (TYP.) See Note 2**
  - 1/2" Diam. CARRIAGE HEAD BOLTS

- **Safety Bar (TYP.) See Note 2**
  - 3/8" Diam. HEX Head Bolts (TYP.)

- **Reinforced Edge (See Section)**

- **Reinforced Edge - Full Length of End Section (See Section)**

- **Isometric View**

- **Standard Plan B-80.40-00**

- **Approach Road Publication**

- **State Design Engineer**

- **Washington State Department of Transportation**
TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT

CONCRETE SIDEWALK

PLANTING STRIP

CONCRETE Curb — TYPE MAY VARY

ROADWAY

(REINFORCEMENT NOT SHOWN)

PLAN

SECTION A

WIRE MESH REINFORCEMENT

8 x 8 W4.0 x W4.0 (4 GAGE)
4 x 4 W0.9 x W2.9 (6 GAGE)
(SEE STD. SPEC. 9-07.7)

1/2" MINIMUM COVER

INVERT OF DRAIN SHALL BE AT OR ABOVE GUTTER LINE

CONCRETE Curb — TYPE MAY VARY

ROADWAY

DUMMY JOINT

4" DRAIN PIPE

WIRE MESH

4" DRAIN PIPE CAPPED AT EDGE OF RW

CONCRETE SIDEWALK

PLANTING STRIP

ROADWAY

ISOMETRIC

RESIDENTIAL STORM DRAIN, UNDER SIDEWALK

STANDARD PLAN B-82.20-00

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
FOR SANITARY SEWER USE

VERTICAL CONNECTION

STANDARD PLAN B-85.10-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gaskets for new sewer installations.

2. Mark location of sewer stub in accordance with Contracting Agency requirements.

For sanitary sewer use

Side sewer connection

Standard Plan B-85.20-00

Sheet 1 of 1 sheet

Approved for publication

6/1/06

6/1/06
8 INCH SEWER CLEAN-OUT

STANDARD PLAN B-85.40-00

FOR SANITARY SEWER USE

CAST IRON RING AND COVER

1/2" WIDE, 1/8" HIGH RAISED BORDER

3/4" RAISED SQUARES, 3/4" APART, 1/8" HIGH

10"
9"
8 3/4"
8"
7"
7 3/4"
6 1/2"
5/2"
3/4"
1/2"
1/2"
One length of ductile iron pipe (Class 50) to solid bearing when span is more than 48" shall be concrete encased.

Flexible joint

Backfill with compacted material as directed by engineer

Commercial concrete block - poured in place

Typical manhole foundation construction

Ductile iron drop connection

Mortar dam or plug as required by engineer

For sanitary sewer use

Drop connections

Standard plan B-85.50-01

Effective: August 7, 2017 to August 5, 2018
NOTES
1. Steel tie rods to be heavily coated with asphalt after installation.
2. Restrained joints may be substituted for tie rods.
3. Surface of ground within 36" of hydrant shall be smooth.

ELEVATION

TYPE A

LENGTH OF LOWER BARREL TO SUIT TRENCH DEPTH

15 POUND ASPHALTIC FELT

6 CUBIC FEET MIN. GRAVEL POCKET

12" x 12" x 4" MIN. CONCRETE BLOCK

MECHANICAL JOINT WITH TIE ROD LUGG

ELEVATION

TYPE B

LENGTH OF LOWER BARREL TO SUIT TRENCH DEPTH

15 POUND ASPHALTIC FELT

6 CUBIC FEET MIN. GRAVEL POCKET

12" x 12" x 4" MIN. CONCRETE BLOCK

HUB AND FLANGE CASTING

AUXILIARY GATE VALVE
1. Coat the pipe threads with asphalt after assembly.
2. All piping shall be galvanized steel.
3. Valve and piping to valve shall be 2" unless otherwise noted in the Contract.
4. Locate blowoff outlet near property corner if possible.
NOTES

1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.

2. Locate at the high point of the main, tap top of main.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES
1. Contractor to provide blocking adequate to withstand full test pressure.
2. Divide thrust by safe bearing load to determine required area (in square feet) of concrete to distribute load.
3. Areas to be adjusted for other pressure conditions.
4. Provide two 1" (in) minimum diameter rods on valves up through 10" (in) diameter. Valves larger than 10" (in) require special tie rod design.

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SOIL TYPE
- MUCK, FET, ETC.: 0
- SOFT CLAY: 1,000
- SAND: 2,000
- SAND AND GRAVEL: 3,000
- SAND AND GRAVEL CEMENTED WITH CLAY: 4,000
- HARD SHALE: 10,000
Steel tie rods to be heavily coated with asphalt after installation.

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<th>TEST PRESSURE (PSI)</th>
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CONCRETE BARRIER TYPE 2

SECTION A

PIPE (TYPICAL) – SEE CONTRACT

CONCRETE BARRIER TYPE 2

SECTION B

FINISHED GRADE

PRECAST CEMENT CONCRETE
ADJUSTMENT SECTIONS (TYP.)
– AS REQUIRED

UNIT 7½" (TYP.)
– SEE STANDARD PLAN B-36.40

FRAME AND DUAL VANE G RATES (TYP.)
– SEE STANDARD PLAN B-40.45

PLAN VIEW

MEDIAN BARRIER

PRECAST CEMENT CONCRETE

HMA OR CONCRETE
(SEE CONTRACT FOR
SURFACE DETAILS)

FINISHED GRADE

MEDIAN BARRIER (SINGLE SLOPE
CONCRETE BARRIER SHOWN)
– SEE SECTION BELOW FOR USE
WITH CONCRETE BARRIER TYPE 2

FINISHED GRADE

MEDIAN BARRIER

54" 54¼" 46 5/4"
MINIMUM CURB LENGTH

- SEE NOTE 5

BEAM GUARDRAIL POST (TYP.)

12' MIN.

BEAM GUARDRAIL BLOCKS AND RAIL ELEMENTS NOT SHOWN FOR CLARITY

PLAN

NOTES

1. The beam guardrail type, post type, beam guardrail transition section type, connection type, and bridge traffic barrier shape may vary from that shown on this plan.

2. The Catch Basin or Grate Inlet shall be centered between the Beam Guardrail Posts.

3. With Beam Guardrail Transition Section Types 2, 4, and 5, use Extruded Curb Types 1, 2, 4a, 5, or 5a.

4. With Beam Guardrail Transition Section Types 1, 1A, 1B, 10, 11, and 12, use Extruded Curb Type 2 (Extruded Asphalt Concrete Curb).

5. See Contract Plans for length of Curb.
NOTES

1. Type 10 post shall be 6 x 8 timber, OR either W6 x 9, or W6 x 8.5 steel.
   Type 11 post shall be 10 x 10 timber or W6 x 15.
   For additional details see Standard Plan C-1b.

2. Type 10 guardrail post spacing shall be 6'-3" on center.
   Type 11 shall be a maximum of 5'-1 1/2" on center.

3. Spacing may vary depending on application. See Standard Specification Section 9-16.3(1) for rail element requirements.

TYPICAL RAIL ELEMENT

WOOD POST ASSEMBLY

TYPE 10

WOOD POST ASSEMBLY

TYPE 11

BEAM GUARDRAIL (THRIE BEAM)

STANDARD PLAN C-1a

SMOOTH EDGE GUARDRAIL

EXPANSION SECTION

13" - 6 1/2"

POST BOLT SLOT (Typ.) =
3/4" (In) x 2 1/2" (In)

1 3/4" (In) POST BOLT WASHER

5/8" (In) x 1 1/4" (In) BUTTON HEAD SPICE
BOLT WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT - TWELVE (12)
REQUIRED PER SPICE

5/8" (In) x 16" (In) BUTTON HEAD BOLT
WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT

5/8" (In) x 16" (In) BUTTON HEAD BOLT
WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT

5/8" (In) x 16" (In) BUTTON HEAD BOLT
WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT

5/8" (In) x 16" (In) BUTTON HEAD BOLT
WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT

13" - 6 1/2"

POST BOLT SLOT (Typ.) =
3/4" (In) x 2 1/2" (In)

1 3/4" (In) POST BOLT WASHER

5/8" (In) x 1 1/4" (In) BUTTON HEAD SPICE
BOLT WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT - TWELVE (12)
REQUIRED PER SPICE

5/8" (In) x 35" (In) BUTTON HEAD BOLT
WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT

5/8" (In) x 1 1/4" (In) BUTTON HEAD SPICE
BOLT WITH 7/8" (In) OVAL GRIP AND
RECESSED HEX NUT - TWELVE (12)
REQUIRED PER SPICE

5/8" (In) x 12" (In) BUTTON HEAD BOLT
WITH 7/8" (In) OVAL GRIP &
HEX NUT W/ CUT WASHER

TIMBER BLOCK
FOR STEEL POST

THRIE BEAM GUARDRAIL
NESTED FOR TYPE 11

3/4" (In) x 3 3/4" (In)

TYPE 10 AND 11

STEEL POST ASSEMBLY
NOTES
1. Wood posts for all guardrail placement plans shall be 6 x 6 except where noted otherwise.
2. Lower hole is for Rub Rail of Type 2 and Type 3 Beam Guardrail.
3. WS-8.5 or WS-9 steel posts and timber blocks are alternates for 6 x 8 timber posts and blocks. WS-15 steel posts and timber blocks are alternates for 10 x 10 timber posts and blocks.
4. Holes shall be located on approaching traffic side of web.
5. When "Beam Guardrail Type - ___ Fl Long Post" is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" (in) min. high and 3/4" (in) wide at the location where the letter "H" is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4" (in). For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor's responsibility to ensure the stamped numbers remain visible.
6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.
THREE BEAM GUARDRAIL REDUCER SECTION

TYPE A

(Left section shown, right section reversed)

NOTES
1. For wood posts, saw top of post and block to 1" above three beam guardrail reducer section. For steel posts, drive post down to 1" maximum above the three beam guardrail reducer section.
NOTES

1. End Section Design G shall be used except where noted on the plans or contract.

2. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. 8-05.64, with thin slab female inserts or resin bonded anchors. See the Contract Plans.

3. A single piece having similar dimensional shape to Design G and mating with the W-beam guardrail is an alternate.

4. In cases where Design "F" end section is lapped on the outside of the guardrail, a galvanized 1" ID, 2" OD, 0.134" thick, narrow Type A Plain Washer or an anchor rail washer shall be placed under the splice bolt heads.
NOTES

1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. 5-96.6(4), with thin slab female inserts or resin bonded anchors. See the Contract Plans.

2. In cases where Design F End Section is lapped on the outside of the guardrail, a galvanized 1" ID, 2" OD, 0.134" thick, narrow Type A Plain Washer or an anchor rail washer will be placed under the splice bolt heads.
NOTES

1. When required by the Contract, a Snow Load Post Washer shall be used on the backside of the post (in lieu of the 1 3/4" (In) Post Bolt Washer) and a Snow Load Rail Washer shall be placed on the face side of Beam Guardrail Types 1 and 2. Snow Load Rail Washers shall not be installed on terminals.

2. Rail Washers, also called "Snow Load Rail Washers", are not required on new installation, except as called for in Note 1. Unnecessary Rail washers need not be removed from existing installations, except those on posts 2 through 8 of a BCT installation shall be removed.

3. Timber blocks shall be toe-nailed to the post with a 16d galvanized nail to prevent block rotation.

4. For post and block details, see Standard Plan C-1b.

5. When "Beam Guardrail Type 1-.... PL Long Post" is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" (In) min. high and 3 4" (In) wide at the location where the letter "H" is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4" (In). For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor's responsibility to ensure the stamped numbers remain visible.

6. Existing posts shall not be raised. Replace posts as necessary to achieve required guardrail height.

7. Holes shall be located on approaching traffic side of web.
NOTES
1. For component details, see Standard Plan C-23.60.
2. For terminal type and details, see Contract Plans and applicable drawings.
3. The slope from the edge of the shoulder into the face of the guardrail cannot exceed 10%:1 when the face of the guardrail is less than 12'-0" from the edge of the shoulder.
4. For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10; see Standard Plan C-23.60.
5. Where a crashworthy terminal is required, use a Beam Guardrail Type 31 Non-Flared Terminal; see Standard Plan C-22.40.
6. Timber or steel post. Steel post shown.

CASE 1-31

CASE 2-31

CASE 3-31
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

1. For details, see Standard Plan C-22.40.

2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10H : 1V when the guardrail is within 12'-0" from the edge of the shoulder.

3. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier. See Standard Plan C-24.10 for connection details.

4. Timber or steel post. Steel post shown.

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FLARE RATE TABLE

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NOTES

1. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H : 1V when the guardrail is within 12'-0" from the edge of the shoulder.

2. For details, see Standard Plan C-23.60.

3. For details, see Standard Plan C-22.40.

4. Timber or steel post. Steel post shown.

CASE 10A-31, 10B-31, OR 10C-31
(APPROACH END)
NOTES

1. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H : 1V when the guardrail is within 12'-0" from the edge of the shoulder.

2. Attach the standard wood block to the rail using two 5/8" (in) x 4" (in) lag bolts.

3. Beam Guardrail Anchor Type 10 (W-Beam) or Type 10 (Thrie Beam) required. For details, see Standard Plan C-23.69.

4. For details, see Standard Plan C-25.20.

5. For details, see Standard Plan C-22.40.

6. Timber or steel post. Steel post shown.
1. Attach Guardrail Post to Box Culvert with 7/8" (in) diameter high-strength threaded rods 8 1/2" (in) in length with resin-bonded anchors.

2. Wood blocks are shown. Blocks of an approved alternative may be used. See Standard Specification 9-16.3(2).
NOTES

1. See Contract for transition and connection type.

2. For additional installation requirements for Non-Flared Terminal placement, see Standard Plan C-22.40.

3. Guardrail installation shall be Beam Guardrail Type 31 with standard post and block. See Standard Plan C-20.10 for additional details.

4. The first letter of case designation indicates the end treatment on the side road. The second letter indicates the end treatment on the main road. For instance, a terminal on a side road and a bridge connection on the main road would be Case 22BC-31.

5. The radius dimension shall be etched into the plate as shown in the example on the Identification Plate Detail. Numerals shall be 1 1/2" (h) high minimum, and 3/4" (h) wide maximum. Plate shall be galvanized after etching and the letter shall remain permanently legible.

6. The guardrail Identification Plate shall be mounted at the lower splice bolt on the back side of the rail element at the PC of the guardrail radius.
NOTES

1. Beam Guardrail post spacing shall be 6'-3" on centers.
2. Use a single or combination of blocks to achieve the actual 12" offset. See Standard Specification S-16.3(2). Wood blocks shall be toe-nailed to post (and blocks, if block combinations are used) with 16d galvanized nails to prevent block rotation.
3. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.
4. For details not shown, see Standard Plan C-20.10.
5. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification S-16.3(2).
NOTES

1. The Implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan. Non-Flared terminals shall be selected from the WSDOT Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

2. This terminal is MASH compliant at Test Level Three (TL-3) and may be used for all posted speeds.

3. An MSKT-SP-MGS (TL-3) as manufactured by Road Systems, Inc. or SOFTSTOP (TL-3) as manufactured by Trinity Highway Products, LLC shall be installed according to manufacturer's recommendations.

4. A reflectorized object marker shall be installed according to manufacturer's recommendations.

5. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the terminal limits.

6. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While this terminal does not require an offset at the end, a taper is recommended. For the MSKT-SP-MGS (TL-3), a maximum taper of 25:1 or flatter over the length of the terminal is allowed with a maximum offset of 24" (in) over 50' (ft).

   For the SOFTSTOP (TL-3) a maximum taper of 25:4:1 or flatter is allowed over the system length of 50' - 9 1/2" with a maximum offset of 24" (in) at the anchor post.

7. For terminal details, see WSDOT approved manufacturer's drawings.

8. These terminals are supplied with steel posts only. They can be used with beam guardrail Type 31 or wood guardrail posts.
NOTES

1. The implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan. Non-Flared terminals shall be selected from the WSDOT Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

2. This terminal is MASH compliant at Test Level Two (TL-2) and may be used in applications with posted speeds of 45 mph or less.

3. An MSK-SM-MGS (TL-2) as manufactured by Road Systems, Inc. or SOFTSTOP (TL-2) as manufactured by Trinity Highway Products, LLC shall be installed according to manufacturer's recommendations.

4. A reflectorized object marker shall be installed according to manufacturer's recommendations.

5. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the terminal limits.

6. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While this terminal does not require an offset at the end, a flare is recommended. For the MSK-SM-MGS (TL-2), a maximum flare of 25 : 1 or flatter over the length of the terminal is allowed with a maximum offset of 24" (in) over 50' (ft).

For the SOFTSTOP (TL-2) a maximum flare of 30 : 1 or flatter is allowed over the system length of 36' - 3 1/2" with a maximum offset of 12" (in) at the anchor post.

7. For terminal details, see WSDOT approved manufacturer's drawings.

8. These terminals are supplied with steel posts only. They can be used with guardrail runs composed of steel or wood guardrail posts.
NOTES

1. For use on the end of guardrail runs when a crashworthy terminal is not required.

2. For additional details not shown, see Sheet 2 of this Plan.

3. For end section details, see Standard Plan C-7 and C-7a.

4. Use details for Wood Breakaway post shown on this plan and components shown on Standard Plan C-1b.

5. Fasten the Anchor Cable using two 1" (in) nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.

6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification, Section 5-16.3(2).

7. Posts shall match those of the connecting run: timber or steel.

8. Anchor plate may be constructed from 1/4" (in) plates welded to equal strength and dimensions as shown.

9. Eight 5/8" (in) x 1/2" (in) machine bolts with hex nut and washer. Place washer on face side of rail.
NOTES

1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety-shape barrier. The toe of the single slope and the safety-shape barrier shall be tapered or the barrier blocked out so that the toe of the barrier does not project past the face of the approach guardrail.

2. See Standard Plan C-24.10 for details regarding connection to bridge rail or traffic barrier.

3. For details of typical components, see Standard Plans C-10 and C-20.10.
NOTES

1. See Standard Plans C-1b, C-1d, C-20.10, and C-25.20 for rail elements and thrie beam block details.

2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.

TYPE 22

APPROACH END (SHOWN - SEE NOTE 2)
THRIE BEAM INSTALLED A' FACE OF BRIDGE RAIL
NOTES


2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.

3. For additional alternatives not shown, see Contract Plans.
NOTES

1. Refer to Standard Plans C-1 and C-1b for component details for Beam Guardrail Type 1 (not shown on this plan).

2. Refer to Standard Plan C-20.10 for component details for Beam Guardrail Type 31 (not shown on this plan).

3. Accommodating the wider blockout (12" in width) used with Type 31 guardrail will require widening the embankment by 4" (in) or narrowing the shoulder by 4" (in).

4. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification S-16.3(2).

5. All posts for any standard barrier run shall be of the same type: timber or steel.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
1. For post details see Standard Plan C-1b.
NOTES

1. Type 4 anchor required. For details, see Standard Plan C-6c.

2. Post spacing is 6'-3" unless otherwise shown.

3. For Terminal type and details, see Contract Plans and applicable Standard Plan(s).

4. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10:1 when the face of the guardrail is less than 12'-0" from the edge of the shoulder.

5. For one-way traffic, use Type 4 anchor. For two-way traffic, use Type 1 anchor. See applicable Standard Plan(s) for details.

6. When Beam Guardrail Flared Terminals are used on both ends a minimum of 25'-0" of Beam Guardrail shall be installed.
NOTES
1. For terminal type and details, see Contract and applicable Standard Plan(s).
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10H:1V when the guardrail is within 12'-0" from the edge of the shoulder.
3. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

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GUARDRAIL PLACEMENT
STANDARD PLAN C-2a
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION 6/21/06
Washington State Department of Transportation
EXPRES JULY 24, 2006
NOTES

1. Varying flare rates and structure widths may require a length of Beam Guardrail Type 1 or 2 between the Beam Guardrail Type 3 or 4 and the Transition on one side, and the Beam Guardrail Type 10 on the other. For Beam Guardrail Type 2 or 3, terminate the rail rubb (channel rail) at the first 6+8 post of the Beam Guardrail Transition Section Type 16, and by lapping it behind the second 8+8 post on the Beam Guardrail Type 10 side, or as approved by the Engineer.

2. Use the minimum number of nested 12' - 6" thie beam sections needed to span the structure. This run may extend past the end of the structure, and an excess of 6' - 3" maximum is acceptable. If the last 12' - 6" section extends more than 6' - 3" (but less than 12' - 6"), use a nested 6' - 3" thie beam section in its place.

3. The Beam Guardrail Transition Section Type 16 on this end shall terminate at a 10'x10' post. Place nested thie beam with 10'x10 posts at 3'-1" 1 1/2" maximum spacing between the end of the transition and the structure.

4. If full post depth cannot be achieved due to the structure foundation, post length shall be adjusted to the top of foundation. The Beam Guardrail Type 11 post height shall be 2'-6".
CASE 9A

CASE 9B

CASE 9C

NOTE
1. CASE 9C: Thrie Beam Guardrail is used when the distance from the end of the Bullnose Terminal to the beginning of the transition of the Bridge Rail is less than 100 feet.
NOTES

1. SRT Terminal shown, for terminal type and details, see Contract or applicable Standard Plan(s).
2. Post spacing is 6'-3" except where noted.
3. Type 4 anchor required. See applicable Standard Plan(s).
4. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H:1V when the guardrail is within 12'-0" from the edge of the shoulder.

EDGE OF SHOULDER

TERMINAL PAY LIMIT – SEE NOTE 1

BEAM GUARDRAIL PAY LIMIT

SEE NOTE 4

CASE 10A

ANCHOR PAY LIMIT – SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT

1'-0" MIN.

3'-0" MIN.

EDGE OF SHOULDER

ONE-WAY TRAFFIC

VARIATES – SEE CONTRACT

CASE 10B

ANCHOR PAY LIMIT – SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT

BEAM GUARDRAIL EXTENSION

LENGTH VARIES – SEE CONTRACT

EDGE OF SHOULDER

ONE-WAY TRAFFIC

VARIATES – SEE CONTRACT

CASE 10C

BEAM GUARDRAIL PAY LIMIT

TERMINAL PAY LIMIT – SEE NOTE 1

3'-0" MIN.

EDGE OF SHOULDER

VARIATES – SEE CONTRACT

CASE 10A, B, or C

ONE-WAY TRAFFIC

OR

TWO-WAY TRAFFIC

Richard Barstow

EXPIRES JULY 24, 2020

GUARDRAIL PLACEMENT

STANDARD PLAN C-2d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

05/2006

CLASIFIED DIMENSION OF CLEARANCE FOR HAZARDOUS MANS

D7

DATE

REVISION

06/21/2018
CASE 11A

CASE 11B

CASE 11C

NOTES

1. SRT Terminal shown. For terminal type and details see Contract and applicable Standard Plan(s).

2. Beam Guardrail Anchor Type 4 (W-Beam) or Type 4 (Thrie Beam) required.

3. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H:1V when the guardrail is within 12" - 0' from the edge of the shoulder.

4. If the distance from end of Beam Guardrail Type 11 to the structure exceeds 6" - 3' using 12" - 6" Thrie beam sections, add a 6" - 3' nested section of thrie beam with 10x10 posts, spaced at 3' - 1 1/2" maximum, and begin transition.

5. Guardrail post spacing for Beam Guardrail Type 11, past the end of the structure shall be spaced at 6" - 3' maximum with 6"x8 post and standard block.

6. Attach the standard wood block to the rail using two 5/8" x 4" lag bolts.

GUARDRAIL PLACEMENT
STANDARD PLAN C-2e
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
CASE 12 _D
(see Note 7)

CASE 12 _C
(see Note 7)

CASE 12 A_
(see Note 8)

CASE 12 B_
(see Note 7)

IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 6)

IDENTIFICATION PLATE
(see Note 5)

GUARDRAIL PLACEMENT
WEAK POST INTERSECTION DESIGN (8'- 6" MAX RADIUS)

NOTES
1. See Contract for guardrail connection to bridge rail and concrete barrier.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Attach to rail with 5/8" x 9" long bolt, nut and 1/2" washer on back of post.
4. For terminal type and details, see Contract applicable Standard Plans.
5. Radius dimensions shall be etched into plate replacing the letters "RH", shown on the Identification Plate Detail. Digits shall be 1/8" MIN height and 1/4" MAX width. The plate shall be galvanized after etching.
6. The guardrail radius Identification Plate shall be mounted on the back side of the Rail Element using the lowest splice bolt at the P.C. of the guardrail radius.
7. First letter of case designation placement indicates and treatment on side road. Second letter indicates and treatment on main road. For instance, a Type S Anchor on the side road and a bridge connection on the main road would be Case 12 AS.
8. For the 8'- 6" radius, five CRT posts are required including the CRT post at point B.
9. For CRT post details, see Standard Plan "Beam Guardrail Posts and Blocks".

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. For Service Level 1, Week Post Bridge Rail System,
   see Contract.

2. SRT Terminal shown. For Terminal type and details,
   see Contract and applicable Standard Plan(s).

3. The slope from the edge of the shoulder into the face
   of the guardrail should not be steeper than 10:1.

4. See Standard Plan "Beam Guardrail Posts and Blocks".

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**GUARDRAIL PLACEMENT**

**CASE 14**

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**STANDARD PLAN C-2h**

APPROVED FOR PUBLICATION

STATE HIGHWAY ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON
NOTES

1. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plans.

2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.


CASE 15

GUARDRAIL PLACEMENT

STANDARD PLAN C-21

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON
NOTES
1. Type 4 anchor required. For details, see applicable Standard Plans.
2. For terminal type and details, see contract and applicable Standard Plans.
3. Post spacing is 6'-3" except where noted.
4. For guardrail to bridge rail connection see applicable Standard Plans or Contract.
5. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1 when the guardrail is within 12'-0" from the edge of the shoulder. Beyond 12'-0", the slope shall not be steeper than 6:1.

GUARDRAIL PLACEMENT
STANDARD PLAN C-2j

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

ANCHOR PAY LIMIT
SEE NOTE 1

BEAM GUARDRAIL PAY LIMIT

TERMINAL PAY LIMIT (SRT SHOWN)
SEE NOTE 2

VARIES (SEE CONTRACT)

EDGE OF SHOULDER

ONE WAY TRAFFIC

CASE 16

TERMINAL PAY LIMIT (SRT SHOWN)
SEE NOTE 2

BEAM GUARDRAIL PAY LIMIT
SEE NOTE 3

TERMINAL PAY LIMIT (SRT SHOWN)
SEE NOTE 2

VARIES (SEE CONTRACT)

EDGE OF SHOULDER

TWO WAY TRAFFIC

CASE 17

ANCHOR PAY LIMIT
SEE NOTE 1

BEAM GUARDRAIL PAY LIMIT

BRIDGE END

CURB FACE EXTENSION LINE

ONE WAY TRAFFIC

CASE 18

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APPROVED FOR PUBLICATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EXPRES MAY 3, 2000
NOTES
1. See Standard Plan C-1b for additional details.
2. One-way traffic layouts are identical to the two-way layout with the exception that only the posts trailing the span need to be CRT's with double blocks.
NOTE

1. Install Extruded Curb at face of Guardrail. See Standard Plan F-10.40 for details.
NOTES

1. If the distance from the end of the bridge to the end of the thrie beam bridge rail section exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" section of thrie beam bridge rail to reduce the length to less than 6'-3".

2. When thrie beam is installed at the face of the bridge curb, install Extruded Curb at face of Guardrail. See Standard Plan F-10.40 for details. Match the height of existing bridge curb with a 20H : 1V transition.

3. When thrie beam is installed at the face of rigid bridge rail, an HMA ramp is required from the roadway surface to the top of the bridge curb or sidewalk. The slope of the ramp shall be 20H : 1V or flatter.
NOTES

1. See Contract for the number of thrie beam sections for Beam Guardrail Type 11.
2. If the distance from the end of the Beam Guardrail Type 11 to the column/structure exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" nested section of thrie beam to reduce the distance to less than 6'-3".
3. Install Extruded Curb (See Standard Plan F-10.40) at face of Guardrail.
4. Attach the standard block to the rail using two 5/8" x 4" lag bolts.
1. Unless otherwise indicated in the contract, the SRT - 350 (12.5, 8 Post) as manufactured by Trinity Industries, Inc., or a FLEAT 350 as manufactured by Road Systems Inc., shall be installed per manufacturer's recommendations. If specified in the Contract, the FLEAT TL2 as manufactured by Road Systems, Inc. shall be installed per manufacturer's recommendations.

2. Where terminal is placed on a curve, and post offsets would result in the rail encroaching onto the shoulder (e.g., the inside of a curve), the posts shall be installed so that the face of the rail is at the edge of the shoulder.

3. When snow load post washers and snow load rail washers are called for in the contract, the snow load rail washers must be omitted within the terminal limits.

4. Offset distances:
   - FLEAT 350 ........................................ 4'-0''
   - FLEAT TL2 ..................................... 1'-0'' minimum
NOTES

1. An SKT-350 as manufactured by Road Systems, Inc. shall be installed according to manufacturer's recommendations. When a TL2 terminal is specified in the Contract an SKT-TL2 as manufactured by Road Systems, Inc. shall be installed according to the manufacturer's recommendations.

2. A reflectorized object marker shall be installed according to manufacturer's recommendations.

3. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers must not be installed within the terminal limits.

4. Terminal shall be installed at a taper, ensuring that end piece is entirely off the shoulder.

5. Length for SKT-350 is 50' (ft). Length for SKT-TL2 is 25' (ft).
PLAN
BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 1

PLAN
BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 2

NOTE
1. For W-Beam applications extend the rail from the bullnose terminal by using a "Reducer Element Type C" followed by a standard Post and Block, spaced at 3" - 1 1/2". Continue runs with standard 6" - 3" post spacing. For additional Details see Standard Plans C-20.10 and C-25.22.
SLOTTED THRIE BEAM RAIL ELEMENT #1
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)

SLOTTED THRIE BEAM RAIL ELEMENT #2
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)

SLOTTED THRIE BEAM RAIL ELEMENT #3
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
NOTES

1. Anchor plate may be constructed from 1/4" (in) plates welded to equal strength and dimensions as shown.
2. For end section details see Standard Plan C-7.
3. For post details, see Standard Plan C-11b.
4. Eight 5/8" (in) x 1 1/2" (in) machine bolts with hex nut and washer. Place washer on face side of rail.
5. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
6. Toesail bearing plate with 10d nail at corners to prevent turning.
7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.
NOTES

1. Rail section and W8 x 18 steel post shall be fabricated to receive 5/8" hex head bolts as shown.
2. All bolts shall be high strength 5/8" hex head bolts with anchor rail washers.
NOTES
1. For anchor details, see Standard Plan C-6.
2. For end section details see Standard Plan C-7 or C-7a.
3. For post details, see Standard Plan C-1b.
4. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
5. Post and block shall match beam guardrail posts.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**NOTES**

1. Attach W-series beam to steel pipe with 5/8" (in) x 1 1/4" (in) button head bolt with no washer. No connection to the post is required.

2. For end section details see Standard Plan C-7.

3. For anchor details see Standard Plan C-6.

4. For post details see Standard Plan C-1b.

5. Outside nut shall be torqued against inside nut a minimum of 100 ft/lbs.

**Beam Guardrail**

**Type 5**

**Standard Plan C-6d**

**Sheet 1 of 1 Sheet**

**Approved for Publication**

*Signature* dated June 19, 2018

| Washington State Department of Transportation | EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018 | EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018 | EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018 | EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018 |

---

**PLAN**

- 3/4" (in) x 9'-0" cable with one swaged end
- 3/8" (in) x 4" (in) x 12" (in) steel plate
- 10" (in) x 13" (in) standard steel pipe

**Detail A**

- Tack weld 2 1/2" (in) x 2 1/2" (in) x 1/4" (in) steel plate with 1 1/16" (in) hole to tubular steel
- 1" (in) x 4" (in) stud threaded full length

**Type 5 Anchor**

- 1/4" (in) x 2" (in) button head bolt or 5/8" x 1 1/2" (in) hex head bolt and hex nut with anchor rail washers under bolt head and nut (see note 3)
- 2 1/2" (in) x 2 1/2" (in) x 1/4" (in) x 2" (in) clamp
- 3/4" (in) cable clips (5 required) torque nuts to 50 ft/lbs.

**Anchor Post Assemblies**

(see note 5)

**Anchor Plate**

(see note 3)

**End Section Design**

(see note 2)

**Beam Guardrail Pay Limit**

6'-3"
NOTES

1. For anchor details, see Standard Plan C-6.
2. The rail element is to be included in the "Beam Guardrail" pay item. The "Anchor" pay item includes the anchor post, anchor plate, anchor cable, bearing plate, nuts and washers.
3. For post details, see Standard Plan C-1b.
4. Post material shall match beam guardrail posts on rest of guardrail run.

BEAM GUARDRAIL ANCHOR
TYPE 7

STANDARD PLAN C-6F

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Carpenter, J 1:57PM 9/5/2018

Washington State Department of Transportation
NOTES

1. Length of W6 × 35, W6 × 8.5 or W6 × 9 shall be determined by measurement from ground line to top of grout pad. This distance shall be verified by the Contractor.

2. Attach Guardrail Post to Box Culvert with 3/4" (in) diameter high-strength bolts with resin-bonded anchors.

3. Drill 1 1/4" (in) diameter hole in concrete slab for 7/8" (in) diameter high-strength bolt. Length of bolt is determined by top slab of Box Culvert thickness, which shall be verified by the Contractor.

4. For details of post attachment to Double Box Culvert, see Standard Plan C-11.
NOTES

1. Wire rope loops shall be 3'-6" long, except for the top loop of the Barrier Terminal, which shall be 2'-0" long.

2. Except for the locations of the wire rope loops, the dimensions shown in END VIEW "A" are typical for both ends of a Barrier Section or opposing ends of Barrier Terminals.

3. Connecting and Drift Pin head designs vary among different manufacturers. Pin designs that are shaped differently than those shown in the detail are acceptable, if the bearing surface is within the minimum and maximum widths specified.

4. The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).
NOTES
1. This plan shall be used for 40' (t) and 50' (f) Light Standards with 16' (t) max. length double mast arms.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3' - 0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. See the Contract Plans for conduit size and placement.
5. Concrete shall be Class 4000.
6. Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If PVC conduits are specified, the conduit stub and end bell bushing shall not be glued to the coupling.

GROUNDING CONDUCTOR - ROUTE TO GROUNDING STUD (SEE NOTE 3)

CONCRETE BARRIER LIGHT STANDARD SECTION
STANDARD PLAN C-8b

SECTION A

END

ISOMETRIC

Zeldenrust, Richard
Feb 2, 2016 11:51 AM

CONTRACTOR, JEFF

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Carpenter, Jeff
Feb 29, 2016 12:30 PM

SHEET 1 OF 2 SHEETS
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

ANALYZE BOLT OR ROD (TYP.) - SEE DETAIL

SEE NOTE 4

DETAIL "A"

POLE BASE PLATE - SEE STD. PLAN J-28.60

HEAVY HEX NUTS AND WASHERS

1" (IN) Diam. Full Length Threaded Rod or Bolt - ASTM F1554 Grade 105

ANCHOR PLATE (TYP.) - SEE DETAIL

HEAVY HEX NUT AND WASHER (TYP.)

THREADED ROD OR BOLT

ANCHOR BOLT DETAIL

ALL NUTS, BOLTS, WASHERS, AND RODS SHALL BE FULLY Galvanized IN ACCORDANCE WITH ASTM F2329

BAR LIST

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<td>18</td>
<td>4&quot;-8&quot;</td>
<td>4'-8&quot;</td>
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<tr>
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<td>FOOTING</td>
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<td>6&quot;-6&quot;</td>
<td>6'-6&quot;</td>
</tr>
<tr>
<td>4</td>
<td>BARRIER</td>
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<td>5</td>
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<td>4</td>
<td>21'-0&quot;</td>
<td>21'-0&quot;</td>
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<tr>
<td>6</td>
<td>BARRIER</td>
<td>30</td>
<td>9'-3&quot; TO 8'-9&quot;</td>
<td>9'-3&quot; TO 8'-9&quot;</td>
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</tbody>
</table>

13.89" (IN) Diam. Bolt Circle

12" (IN) Diam. Bolt Circle

16" (IN) Diam. Bolt Circle

1 1/8" (IN) Diam. Galvanized in accordance with ASTM F2329

1 1/8" (IN) PLATE - ASTM A36

BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)

FIELD BEND

CONCRETE BARRIER LIGHT STANDARD SECTION

STANDARD PLAN C-8b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

CONTRACTOR, Jeff
Feb 29 2016 12:11 PM

GREAT NORTHERN ENGINEERING CO.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. The intended use of this plan is for the permanent anchoring of Precast Concrete Barrier Type 2 (see Standard Plan C-8) on hot mix asphalt pavement.

2. Remove the Type 3 Anchors by first driving the steel pins down through the barrier further into the pavement to allow lifting the barrier without interference, then remove the pins from the pavement.

3. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) Premolded Joint Filler between segments; fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.

2. TEMPORARY INSTALLATION requirement: Place a Rebar Grid in the Connection Blockout between barrier segments.

3. See Standard Plan C-70.10 for REBAR GRID DETAIL and BARRIER CONNECTION DETAIL

4. Vertical Back barrier is used only in the configurations shown in Standard Plans C-85.10 and C-85.20, and when placed against a retaining wall.

5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3" - 6" and a minimum embedment of 3" (in).
1. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slipform construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" (in) and adjust the rebar dimensions as required.

2. When connecting between cast-in-place and precast single-slope barrier, provide a Blockout, Rebar Grid, and added rebar, as shown in Standard Plan C-70.10.

3. The actual dimensions will vary as the grades change and the barrier transitions in height and width. The dimensions may be interpolated for intermediate barrier heights.

4. For barrier with a 2'-0" barrier or for High-Performance Barrier with a 3'-0" reveal, see Sheet 3.
SECTION A

4'-6" BARRIER FOR USE WITH A 0" (IN) TO 3" (IN) MAX. GRADE SEPARATION (SEE NOTE 3)

3/4" (IN) CHAMFER (TYP.)

1 1/2" LINER (TYP.)

T 125,000 LBS.

HIGH-PERFORMANCE BARRIER
NOTE
This plan is for transitions to Precast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

1. Use the barrier type, precast or cast-in-place, as specified in the Contract.
2. For Single-Slope Concrete Barrier details, see Standard Plan series C-79's (precast) or C-80's (cast-in-place).
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

1. Use the barrier type, precast or cast-in-place, as specified in the Contract.

2. For Single-Slope Concrete Barrier details, see Standard Plan series C-70's (precast) or C-80's (cast-in-place).
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**BAR LIST**

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<th>SIZE</th>
<th>QUANTITY</th>
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<td>BARRIER - BOTTOM VERTICAL</td>
<td>#4</td>
<td>12</td>
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<td>3</td>
<td>FND. &amp; BARRIER - VERTICAL</td>
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<td>15</td>
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<td>4</td>
<td>BARRIER - HORIZONTAL</td>
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<td>10</td>
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<tr>
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<td>FOUNDATION</td>
<td>#5</td>
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**TABLE**

<table>
<thead>
<tr>
<th>GRADE SEPARATION</th>
<th>BARRIER HEIGHT</th>
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<th>B</th>
<th>C</th>
<th>D</th>
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<tr>
<td>Varies (6-3 1/2)</td>
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<td>3 1/4&quot;</td>
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<td>12</td>
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<tr>
<td>Varies (6-3 1/2)</td>
<td>9-1/2&quot;</td>
<td>2&quot;</td>
<td>0&quot;</td>
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<td>3 1/4&quot;</td>
<td>5&quot;</td>
<td>1 1/2&quot;</td>
<td>12</td>
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</table>

*NOTE 1:* When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-79.10.

*NOTE 2:* See the Contract Plans for conduit placement.

*NOTE 3:* Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3" - 0" min. stack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.

*NOTE 4:* Install Conduit Coupling flush with top of foundation. Do not glue PVC stubout.

*NOTE 5:* This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 16' (ft) max. length double mast arms.

*NOTE 6:* Concrete shall be Class 4000.

*NOTE 7:* This spread footing is designed for an allowable soil bearing pressure of 2500 psi or better.

**SINGLE-SLOPE CONCRETE BARRIER LIGHT STANDARD FOUNDATION**

**STANDARD PLAN C-85.14-01**

**ISOMETRIC VIEW**

**PLAN VIEW**

**SECTION A**

**SECTION B**

**ELEVATION**
1. This Barrier/Foundation combination has been designed in accordance with AASHTO LRFD Test Level 4 requirements. The horizontal vehicle impact force at the top of the barrier is taken at 54 kips for Strength and Extreme Limit States, and 10 kips for footing stability (overturning and sliding) in the Service Limit State.

2. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-70.10.

3. Grounding conductor shall be non-insulated #4 AWG stranded copper; provide 3'-0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.

4. See the Contract Plans for conduit placement.

5. Install Conduit Coupling flush with top of foundation.

6. This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 16' (ft) max. length, double mast arms.

7. Concrete shall be Class 4000.

8. The factored soil bearing resistance shall equal or exceed the following:
   i) Service limit state = 8 ksf
   ii) Strength limit state = 24 ksf
   iii) Extreme limit state = 46 ksf

---

**Bar List**

<table>
<thead>
<tr>
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<th>QUANTITY</th>
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<td>FOUND &amp; BARRIER - VERTICAL</td>
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**Table**

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<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<td>2'-2 1/4&quot;</td>
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<td>UP TO 6' MAX</td>
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<td>VARIES TO 9'</td>
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<td>VARIES TO 9'</td>
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<td>11&quot;</td>
<td>14</td>
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NOTES
1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Section of Standard Plan C-70.10.
2. All concrete shall be class 4000.
3. This barrier transition section is designed for an allowable soil bearing pressure of 2500 psf or better.
1. From the End of Landform, use the Design Layout Line to determine the location of the downstream (with traffic) Cable Barrier Terminal.

2. Provide the Lateral Deflection Distance and show in the Contract Plans to accommodate potential opposing traffic encroachments.
NOTES
1. Approved Inertial Barrier Systems (sand barrel arrays) are listed in the Qualified Products List and shall be installed in accordance with the manufacturer's recommendations. When products not listed on the Qualified Products List are considered, a Request of Approval of Materials (RAM) form is required.
2. For temporary installations, the inertial barriers may be placed on wood pallets that are 4" or less in height.
NOTES
1. Wall to be designated Noise Barrier Wall Type 2A, 2B, 2C or 2D. The Contract specifies actual wall designs.
2. For intermediate wall heights not listed, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.

WIND EXPOSURE & VELOCITY

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<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
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<td>2B</td>
<td>B1</td>
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<td>2D</td>
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EXPRESSES AUGUST 23, 2006

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

STANDARD PLAN D-2.04-00

SHEET 1 OF 2 SHEETS

APPFOC FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOISE BARRIER WALL TYPE 2

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

NOISE BARRIER WALL
TYPE 2
STANDARD PLAN D-2.04-00

EXPIRES AUGUST 23, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. Wall to be designated Noise Barrier Wall Type 3A, 3B, 3C or 3D. The Contract specifies actual wall designations.

2. For intermediate wall heights not listed, use the next higher H.

3. Panels shall have at least 3 feet of level ground on each side.

4. Construction joints in the footing shall be spaced at 120 feet maximum.

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

NOTICE BARRIER WALL TYPE 3
STANDARD PLAN D-2.06-01

STATE OF WASHINGTON
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO AUGUST 5, 2018
**NOTES**

1. Wall to be designated Noise Barrier Wall Type 4A, 4B, 4C or 4D. The Contract specifies actual wall designations.

2. For intermediate wall heights, see next higher H.

3. Panels shall have at least 3 feet of level ground on each side.

4. Construction joints in the shaft cap shall be spaced at 120 feet maximum.

5. The Contract specifies actual foundation requirements D1 or D2.

---

**CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION**

---

**STANDARD PLAN D-2.08-00**

---

**SOIL TYPE**

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**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
### Table: Wall Heights and Types

| WALL HT | TYPE A | | TYPE B | | TYPE C | | TYPE D |
|---------|--------|---|--------|---|--------|---|
| H | W X | BARS | BARS | W X | BARS | BARS | W X | BARS | BARS |
| 6' | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" |
| 6' | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" |
| 8' | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" |
| 10' | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" |
| 14' | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" |
| 16' | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" | 5' | 3' | #4 @ 12" | #4 @ 12" |

### Notes:
1. Wall to be designated Noise Barrier Wall Type 6A, 6B, 6C or 6D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the foundation shall be spaced at 120 feet maximum.
NOTES:
1. Wall to be designated Noise Barrier Wall Type 7A, 7B, 7C or 7D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. The Contract specifies actual foundation requirements D1 or D2.

CAST-IN-PLACE CONCRETE WALL W/TRAFFIC BARRIER ON SHAFT FOUNDATION

SOIL TYPE

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>ANGLE OF INTERNAL FRICTION (DEGREES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>32</td>
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<tr>
<td>D2</td>
<td>38</td>
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</table>

SOIL TYPE

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH ROADWAY PROFILE

EXTEND SHAFT REINFORCEMENT INTO BARRIER AND BEND AS REQUIRED AT FACE OF BARRIER (TYP.)

BAR "D" CENTERED ON WALL

SECTION A

BENDING DIAGRAM

WIND EXPOSURE & VELOCITY

<table>
<thead>
<tr>
<th>NOISE BARRIER TYPE</th>
<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
</tr>
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<tr>
<td>7A</td>
<td>B1</td>
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<tr>
<td>7B</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>7C</td>
<td>B2</td>
<td>80</td>
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<td>7D</td>
<td>B2</td>
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LEVEL (TYP.)

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
### Table: Reinforcement Bars

<table>
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<tr>
<th>WALL HT</th>
<th>TYPE 7SSA</th>
<th>BARS</th>
<th>TYPE 7SSB</th>
<th>BARS</th>
<th>TYPE 7SSC</th>
<th>BARS</th>
<th>TYPE 7SSD</th>
<th>BARS</th>
<th>WALL HT</th>
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<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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<td>#4 @ 15&quot;</td>
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<td>#4 @ 9&quot;</td>
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### Notes

1. Wall to be designated Noise Barrier Wall Type 7SSA, 7SSB, 7SSC or 7SSD. The Contract specifies actual wall designs.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. The Contract specifies actual foundation requirements D1 or D2.

---

**Cast-in-Place Conc. Wall W/ Single Slope Traffic Barrier on Shaft Foundation**

---

**Noise Barrier Wall Type 7SS**

**Standard Plan D-2.20-00**

---

**Junction and Corner Detail**
### Wall Height Requirements

<table>
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<th>Wall Height</th>
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<th>Type 3C</th>
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### Wind Exposition & Velocity

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</tbody>
</table>

### Notes

1. Wall to be designated Noise Barrier Wall Type 9A, 9B, 9C, or 9D. The contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3'-0" of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.
5. All joints shall be in full contact and sealed.

---

**Noise Barrier Wall Type 9**

**Standard Plan D-2.32-00**

**Sheet 1 of 2 sheets**

**Approved for publication**

Washington State Department of Transportation

**EXPRESS AUGUST 23, 2006**

**Date of Receipt:**

**Approvals for publication:**

---

**Elevation**

**Typical Section**

---

**Figure:**

- Right-of-Way
- See contract
- 3/4" chamfer
- Alternate as shown
- 1 1/2" C/H
- Surface Treatment as required
- Final ground line
- 2" x 2" - 1" hole for dowel bar
- Bar 'A' - with 2'-0" min. space extending through construction joint (Type X)
- 3" CRM
- Construction joint (see note 4)
- Bar 'B' - alternate placement of hooks

---

**Wind Exposure & Velocity**

<table>
<thead>
<tr>
<th>Wind Exposure</th>
<th>Type 9A</th>
<th>Type 9B</th>
<th>Type 9C</th>
<th>Type 9D</th>
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<td>BARS</td>
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</tbody>
</table>

**Notes:**

- Wall to be designated Noise Barrier Wall Type 9A, 9B, 9C, or 9D. The contract specifies actual wall designation.
- For intermediate wall heights, use the next higher H.
- Panels shall have at least 3'-0" of level ground on each side.
- Construction joints in the footing shall be spaced at 120 feet maximum.
- All joints shall be in full contact and sealed.
JOINT AND CORNER DETAIL

- **BAR "D"**
- **CORNER PANEL**
- **REINFORCED PIER LISTED WALL HEIGHT REINFORCEMENT TABLE**
- **3/4" CHAMFER (TYP.)**
- **1/2" NOISE SEALER (TYP.)**
- **TRAFFIC SIDE**

**FILL THE JOINT HOLE WITH GROUT USING DUCTS:**
- **DUC TS SHALL BE LOCATED ON PANEL FACE**
- **OPPOSITE TRAFFIC**

**FOOTING WIDTH TRANSITION DETAIL**

- **BAR "A" (TYP.)**
- **TRANSVERSE BARS NOT SHOWN**

**NOISE BARRIER WALL TYPE 9**

**STANDARD PLAN D-2.32-00**

**EXPRESS AUGUST 23, 2006**

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
### Notes

1. Wall to be designated Noise Barrier Wall Type 10A, 10B, 10C or 10D. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3'-0" of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet (maximum).
5. All joints shall be in full contact and sealed.

---

### Typical Section

**WALL HT**

<table>
<thead>
<tr>
<th><strong>Type 10A</strong></th>
<th><strong>Type 10B</strong></th>
<th><strong>Type 10C</strong></th>
<th><strong>Type 10D</strong></th>
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<tr>
<td>W</td>
<td>BARS</td>
<td>BAR &quot;B&quot;</td>
<td>SPIRAL BAR &quot;G&quot;</td>
</tr>
<tr>
<td>6' - 0&quot;</td>
<td>2 - 0&quot;</td>
<td>3 - 04</td>
<td>5&quot;</td>
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<td>24' - 0&quot;</td>
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<td>3 - 04</td>
<td>5&quot;</td>
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</table>
FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC.

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

REINFORCED PER LISTED WALL HEIGHT REINFORCEMENT TABLE

JOINT AND CORNER DETAIL

FILL VOID WITH GROUT

BAR "O" SPiral

BAR "N"

JOINT HOLE - 2" I.D. WITH ROUGHENED SURFACE, OR RIGID POST-TENSIONED DUCT, OR CORRUGATED STEEL PIPE

1/2" NOISE SEALER (TYP.)

3/4" CHAMFER (TYP.)

12" NOISE SEALER (TYP.)

TRAFFIC SIDE
**NOTES**

1. All rods “A” and Anchor bolts shall be per ASTM F1554 grade 105.
2. Anchor Bolts, Nuts, Washers and Rod “A” shall have a protective coating of either Hot Dippered Galvanizing per AASHTO M232 for hardware or AASHTO M111 for Washers and Plates.
3. For intermediate wall heights, use the next higher H.
4. Panels shall have at least 3 feet of level ground on each side.
5. The Contract specifies actual foundation requirements for D1 or D2 and location of Western WA and Eastern WA.
6. Maximum panel length shall be 12 feet.
7. Materials shall meet the requirements of Standard Specification Section 6-12 and Special Provisions Section 6-12.

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 13SSA, 13SSB, 13SSC or 13SSD. The Contract specifies actual wall designations.

2. For intermediate wall heights, use the next higher H.

3. Panels shall have at least 3 feet of level ground on each side.

4. Construction joints in the footing shall be spaced at 120 feet maximum.

5. All joints shall be in full contact and sealed.

6. The Contract specifies actual foundation requirements D1 or D2.

---

**PREFACE**

- **August 7, 2017 TO August 5, 2018**

---

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**NOISE BARRIER WALL**

**TYPE 13SS**

**STANDARD PLAN**

**D-2.44-00**

**SHEET** 1 OF 1 SHEET

**APPROVED FOR PUBLICATION**

**November 11-05**

**EXPRESS AUGUST 25, 2006**

---

** freeway barrier wall WITH SINGLE SLOPE TRAFFIC BARRIER ON SPREAD FOOTING**

---

**WALL HT**

**H**

**W**

**X**

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<td>1 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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<tr>
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<td>5'-0&quot;</td>
<td>1 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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</table>
ANGLE POINT PLAN
ADJUST REINFORCEMENT AS NECESSARY TO ACCOMMODATE ANGLE POINT

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)

TYPICAL INTERMEDIATE AND END PANEL

BLOCK-OUT 0' LONG - ENCASE BASE PLATE & BLOCK-OUT W/GROUT AFTER FINAL ALIGNMENT OF WALL PANEL

1/4" X 2" X 2" WASHER (TYP.)

SET ELEVATION OF LEVELING NUT BEFORE SETTING PANEL

1 1/4" ANCHOR BOLT

TAPERED HOLE FOR #8 BAR (TYP.) - SEE BAR "B" PLATE. 1 3/4" X 3/4" X 1" - 9" ASTM A 36 GALVANIZED EMBEDDED IN GROUT. 3/4" CHAMFER ALL CORNERS.

SLOT 1 3/8" X 1 3/4" FOR 1 1/4" ANCHOR BOLT (TYP.)

BASE PLATE DETAIL

NOISE SEALER 1/2" (TYP.)

NOISE WALL

DEFORMED REINFORCEMENT BAR

DEFORMED REINFORCEMENT BAR

WEDGE HEAD SHALL BEAR FIRMLY AND UNIFORMLY AGAINST BASE PLATE. 1/4" "B" SHALL BE HELD SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.

BAR "B" SHAL L BE HELD SEC URE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.

SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.

DEFORMED REINFORCEMENT BAR

NOISE SEALER 1/2" (TYP.)

NOISE WALL

DEFORMED REINFORCEMENT BAR

WEDGE HEAD SHALL BEAR FIRMLY AND UNIFORMLY AGAINST BASE PLATE. 1/4" "B" SHALL BE HELD SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.

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DEFORMED REINFORCEMENT BAR
Typical Expansion Joint

Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

8' or 10' CMU

#5 (TYP.)

See detail A

Traffic Side

Plan View

Typical Expansion Joint

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**CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT**

**PLAN VIEW**

**EXPANSION JOINT AT WIDTH STEP**

**EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESES.**

**8" OR 10" CMU**

**TRAFFIC SIDE**

**#5 (TYP.)**

**SEE DETAIL A**

**TYPICAL EXPANSION JOINT**

**DETAIL A**

**TYPICAL BOTH SIDES OF WALL**

**BOND BEAM DETAIL**

**BOND BEAM UNITS**

**BOND BEAM GROUTING LIMIT**

**3" CLR. (TYP.)**

**F - 0' MIN. (TYP.)**

**FOOTING W1DTH TRANSITION DETAIL**

**FOOTING (TYP.)**

**W2**

**BAR "A" (TYP.)**

**NOTE: TRANSVERSE BARS NOT SHOWN**

**MASSIVE MASONRY WALL ON SPREAD FOOTING**

**NOISE BARRIER WALL TYPE 17**

**STANDARD PLAN D-2.62-00**

**SHEET 2 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**Hayden Forrest 11/10/05**

**Washington State Department of Transportation**

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**

**POLYURETHANE SEALANT**

**EXPANSION JOINT AT WIDTH STEP**

**FOOTING WIDTH TRANSITION DETAIL**

**FOR LOCATIONS WITHOUT FOOTING STEP**
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT.

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

BOND BEAM DETAIL

#5 @ 4'-0" MAX. (TYP.)

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

EXPANSION JOINT AT WIDTH STEP

8" CMU

EXPANSION JOINT AT WIDTH STEP

10" CMU

TRAFFIC SIDE

TRAFFIC SIDE

BARRIER WALL

NOISE BARRIER WALL

TYPE 18

MASONRY WALL ON OFFSET SPREAD FOOTING

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

NOTE: TRANSVERSE BARS NOT SHOWN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DIAGRAM: BILL REYNOLDS

EFFECTIVE: AUGUST 7, 2017 TO AUGUST 5, 2018
### Notes
1. Wall to be designated Noise Barrier Wall Type 19A, 19B, 19C, or 19D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells have the vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. Construction joints in the shaft cap shall be spaced 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
9. The Contract specifies actual foundation requirements D1 or D2.

### Wall Type 19A

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>CMU WIDTH</th>
<th>BAR D&quot;</th>
<th>BAR PC&quot;</th>
<th>DIAM.</th>
<th>BAR P&quot;</th>
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<th>SOIL TYPE</th>
<th>ANGLE OF INTERNAL FRICTION (DEGREES)</th>
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### Standard Plan D-2.66-00

- **No.** 1 of 2 sheets
- Approved for publication
- Washington State Department of Transportation
- Effective: August 7, 2017 to August 5, 2018
BOND BEAM DETAIL

- Cells with vertical reinforcing and bond beams shall be filled with grout.
- Expansion joint filler placed in sash block recesses.

PLAN VIEW

- Typical expansion joint.
- Plan view of bond beam units.

STEP DETAIL

- Hook parallel to wall layout line.
- Shafts parallel to wall layout line.

DETAIL B

- Typical bond beam units.
- Bond beam grouting limit.

DETAIL A

- Concrete shaft.
- W 3/4 spiral @ 6" pitch.

SECTION A

- 135° hook (typ).
- 1" 5" min lap.

NOTE:
- Spiral reinforcement shall be lapped as shown to terminate the ends of the spiral reinforcement (top and bottom).

NOISE BARRIER WALL

- Type 19
- Standard Plan D-2.66-00

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
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<th>BAR &quot;B&quot;</th>
<th>BAR &quot;C&quot;</th>
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NOTES

1. Wall to be designated Noise Barrier Wall Type 20A, 20B, 20C, or 20D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
8. The Contract specifies actual foundation requirements D1 or D2.

MASONRY WALL ON SHAFT FOUNDATION
SECTION 0
TYPICAL EXPANSION JOINT
TRAFFIC SIDE

BACKER ROD W/ POLYURETHANE SEALANT - BOTH WALL FACES
1' - 45'

PENETRATING PIPE SLEEVE 8" MIN.

SECTI0N 0
1' - #5 FULL HEIGHT
BAR "C"

3/4" DIAM. x 1' - 0" SCHED. 40 PIPE
WITH #6 x 10" Grade 40 WELDED TAIL, AS SHOWN LAPPED WITH AND SPACED PER BAR "C"

SECTI0N 0

150' HOOK (TYP.)

PILASTER REINFORCEMENT

NOTE
SPIRAL REINFORCEMENT SHALL BE LAPPED 17" MIN. A 150' HOOK THAT IS HOORED AROUND A LONGITUDINAL BAR SHALL BE USED TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.

MASONRY WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL
TYPE 20

STANDARD PLAN D-2.68-00
SHEET 2 OF 2 SHEETS

EXPRESS AUGUST 23, 2006

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO AUGUST 5, 2018
NOTES

1. All rebar shall have a minimum 1 1/2" cover.


3. See Standard Plan D-2.06 for wall reinforcement not shown.

PLAN VIEW
CONCRETE SLAB DETAIL

FOR CAST-IN-PLACE WALL
ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
ACCESS DOOR TYPE 1
STANDARD PLAN D-2.80-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
PORTWAY RAMP ACCESS DOOR TYPE 2

STANDARD PLAN D-2.82-00

EXPRESS AUGUST 31, 2006

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 2

FOR CAST-IN-PLACE WALL
W/ TRAFFIC BARRIER

DOOR DETAIL
(SEE NOTE 2)

ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

EXPANSION JOINT

BAR "K" (TYP.)

BAR "K" (TYP.)

BAR "K" (TYP.)

BAR "A" (TYP.)

BAR "B" (TYP.)

BAR "C" (TYP.)

BAR "F" (TYP.)

BAR "G" (TYP.)

FINISHED GRADE

TOP OF ROADWAY

CONCRETE SLAB DETAIL

4" CONCRETE SLAB

SHEET 2 OF 2 SHEETS

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
**NOTES**

1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.

---

CONCRETE SLAB

FINISHED GRADE

CONCRETE SLAB NOT SHOWN

DOOR DETAIL

(SEE NOTE 2)

CONCRETE SLAB (SEE NOTE 3)

48" DOOR OPENING

---

FOR PRECAST WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL

ACCESS DOOR TYPE 3

STANDARD PLAN D-2.84-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

DATE EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES
1. All rebar shall have a minimum 1 1/2" cover.

FRONT VIEW

SECTION A

SECTION B

SECTION C

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL ACCESS DOOR TYPE 4

STANDARD PLAN D-2.86-00

SHEET 1 OF 2 SHEETS

NOT EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

DRAWN BY: ADAM COCHRAN

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
DOOR DETAIL

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL ACCESS DOOR TYPE 4
STANDARD PLAN D-2.86-00
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION 11/10/05
Washington State Department of Transportation

EXPANSION JOINT

4' - 6" BAR "A"

3' (TYP.)

85 x 6' - 6" (TYP.)

BAR "A" (T BARS PER SIDE)

VARIES

VARES

BAR "B"

BAR "E"

CONCRETE SLAB DETAIL

GROUND LINE

WALL

CONCRETE SLAB NOT SHOWN

DOOR OPENING

48"

EXPANSION JOINT

#4 BAR

4 1/2"

104"

BAR "A"

BAR "F"

VARIES

VARIES

2 - 0"

4 - 0"

#4 BAR

DATE EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.68 for wall reinforcement not shown.
NOTE

All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.
KEY NOTES

- Geotextile for underground drainage Class A, moderate survivability (only needed if a geogrid is used for geosynthetic reinforcement)
- 1'-0" Min. Geotextile overlap, top & bottom

SECTION DETAIL

- Approximate final batter for face of geosynthetic layers
- Top geosynthetic layer
- Geosynthetic layers (Typ.)
- Finished grade after construction of wall facing
- Gravel borrow backfill
- Wall facing (Typ.) - See Standard Plan D-3.10 or D-3.11
- Geosynthetic reinforcement length and limits of structure excavation, wall backfill and compaction
- Finished ground line (Typ.)

NOTES

1. For the values of "L," see sheet 3, and for the values of "Sw" see sheet 2.
2. For Geosynthetic Wall Construction Sequence, see sheet 4.
3. \( A_g \) is the peak seismic ground acceleration as defined and applied in the AASHTO LRFD Bridge Design Specifications, Articles 3.10.4.1 and 11.6.5.
4. The long-term geosynthetic design strength \( T_{al} \) shall be determined in accordance with WSDOT Standard Practice T925. See Qualified Products List (QPL), Appendix "D," for products in which \( T_{al} \) has been determined. "H" and "Z" are graphically defined. "Z" is the distance from the top of the wall to a geosynthetic layer, and is used to determine "T_{al}" for that layer.
5. "L," the geosynthetic reinforcement length behind the wall face, is graphically defined. The maximum factored bearing stress acts in the vertical direction at the base of the wall. The load factors used are as specified in the AASHTO LRFD Bridge Design Specifications for each specified limit state.
6. Fascia or facing type shall be selected from Standard Plans D-3.10 or D-3.11 and called out in the Contract Plans. Region is to coordinate with the Geotechnical Services and Bridge & Structures offices.
# Permanent Geosynthetic Wall - Geosynthetic Reinforcement Design

## Wall Geometry and Reinforcement Layer Location

<table>
<thead>
<tr>
<th>Total Wall Height, H (ft)</th>
<th>Depth Below Wall Top at Face, z (ft)</th>
<th>Geosynthetic Reinforcement Vertical Spacing, S (ft)</th>
<th>Geosynthetic Wall Types 1</th>
<th>Geosynthetic Wall Types 2 and 4</th>
<th>Geosynthetic Wall Type 3</th>
<th>Geosynthetic Wall Type 5</th>
<th>Geosynthetic Wall Types 6 and 8</th>
<th>Geosynthetic Wall Type 7</th>
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| **NOTE:** See Note 4, sheet 1.
### EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN**

(Includes Design for Large Earthquake: \( A_{ul} = 0.25g \))

#### NOTE: See General Note 5, sheet 1.

**PERMANENT GEOSYNTHETIC WALL - EXTREME STABILITY DESIGN**

(Includes Design for Large Earthquake: \( A_{ul} = 0.51g \))

#### NOTE: See General Note 5, sheet 1.
GEOTEXTILE GEOSYNTHETIC WALL CONSTRUCTION SEQUENCE

SECTION VIEW

1. SET FORM ON COMPLETED LIFT.

2. UNROLL GEOSYNTHETIC AND POSITION IT SO THAT A 4" - 7" WIDE "TAIL" DRAPE OVER THE FORM. IF A GEOSGRID IS USED FOR THE GEOSYNTHETIC REINFORCEMENT, POSITION GEOTEXTILE TO PREVENT BACKFILL FROM SPILLING THROUGH GEOGRID OPENINGS.

3. PLACE THE BACKFILL UNTIL THE BACKFILL IS UP TO HALF OF THE REQUIRED VERTICAL GEOSYNTHETIC LAYER SPACING.

4. PLACE A WINDROW TO SLIGHTLY GREATER THAN FULL LIFT HEIGHT AGAINST THE FORM.

5. PLACE THE GEOSYNTHETIC "TAIL" OVER THE WINDROW AND LOCK INTO PLACE WITH BACKFILL.

6. COMPLETE BACKFILLING UNTIL THE COMPACTED BACKFILL LAYER THICKNESS IS EQUAL TO THE REQUIRED VERTICAL GEOSYNTHETIC LAYER SPACING.

7. THE FORM MAY BE LEFT IN PLACE WHILE CONSTRUCTING THE NEXT LAYER (SEE NOTE 2) OTHERWISE, RESET THE FORM AND REPEAT THE SEQUENCE.

NOTES (SHEET)

1. Use of the Temporary Form System, as detailed in this plan, is optional.

2. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.
NOTES
1. All bars shown on this plan shall be ASTM A706 unless otherwise specified in the Contract.
2. Safety cable or fence required when "H" ≥ 10'-0".
3. All cast-in-place concrete shall be class 3400.

CAST-IN-PLACE PERMANENT GEO SynTHETIC WALL FASCIA AND FACING
STANDARD PLAN D-3.10-01

TYPICAL SECTION
PERMANENT GEO SynTHETIC RETAINING WALL WITH CAST-IN-PLACE CONCRETE FACIA
**KEY NOTES**

1. The barrier geometry reference line (B.G.R.L.) is perpendicular to the transverse roadway slope (T.R.S.). For pretrained transverse roadway slopes, the B.G.R.L. on the low side of the roadway shall be perpendicular to the T.R.S. up to a maximum of 8% superelevation. The B.G.R.L. on the high side shall always be perpendicular to the T.R.S.

2. Junction box (mount box SC cover is flush with the barrier face with a 1/8" tolerance protruding beyond the barrier face and 1/8" recessed).


4. 1-1/2" concrete cover - increase the cover as required to accommodate architectural features and finish.

5. Construction joint with roughened surface.

6. The notch detailed by these dimensions and specifications is required only if the barrier is on wall facing.

7. Rustication - see rustication detail.

8. For structural details below the match line, see standard plans D-3.08, D-3.10 or D-3.11.

9. 1-1/2" expansion joint with premolded joint filler.

10. Install barrier dummy joints on traffic side only when architectural features are specified.

---

**PERMANENT GEOSYNTHETIC WALL**

**SINGLE SLOPE BARRIER**

**STANDARD PLAN D-3.15-02**

---

**ELEVATION**

**TERMINUS**

**REINFORCING STEEL BENDING DIAGRAM**

All reinforcing bars shown on this plan shall be ASTM M 31 unless otherwise noted. All dimensions are cut out cutouts. 1/16 = epoxy coated.

**SLAB BASE - 4"** (see table)

**TYPICAL SECTION SHOWN ON WALL**

**DUMMY JOINT DETAIL**

**RUSTICATION DETAIL**

---

**NOTE**

1. All cast-in-place concrete shall be class 4000.
1. Ensure that no concrete enters the PVC conduit during concrete placement.
NOTES
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.
NOTE:
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 1SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 1SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/LF.
5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.

VERTICAL FACE WALL DESIGN WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL TYPE 1 AND 1SW

STANDARD PLAN D-10.10-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES:

1. All concrete shall be Class 4000, except as noted.

2. For backfill requirements, see Standard Plan D-4.

3. When Wall Type 1SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".

4. When Wall Type 1SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/LF.

5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.

6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.

### WALL HT H

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### VERTICAL FACE WALL DESIGN

**With a 250 PSF SURCHARGE OR TRAFFIC BARRIER**

**EFFECTIVE:** AUGUST 7, 2017 TO AUGUST 5, 2018

### REINFORCEMENT NOTES

1. If traffic barrier is used, add 0.100 CFY of concrete class 4000 for barrier alternate 1.
2. Add 0.200 CFY of concrete class 4000 for barrier alternate 2. See standard plan D-16-10.
3. Add 28 lb/ft of reinforcing steel for barrier alternate 1 or 19 lb/ft of reinforcing steel for barrier alternate 2. See standard plan D-16-10.

**EFFECTIVE:** AUGUST 7, 2017 TO AUGUST 5, 2018
### Notes

1. All concrete shall be Class 4000, except as noted.

2. For backfill requirements, see Standard Plan D-4.

3. When Wall Type 25W (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".

4. When Wall Type 25W (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/LF.

5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.

6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications, 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.


---

**Bar Q #4**

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| Bottom of Footing | <= 12' | 5 |
| Bottom of Footing | 12' 1/8 | 6 |
| Bottom of Footing | 17' 22/32 | 7 |
| Bottom of Footing | 22' 28/32 | 9 |
| Bottom of Footing | 29' 15/32 | 11 |

---

**Typical Section**

1. Offset = SET TOP OF WALL BACK

2. When the contract specifies cable fence, backfill, and the cement concrete cutters shall be placed 6" min. from the top of the wall.

---

**Split Elevation View** (Showing Separate Rebar Layers)
REINFORCEMENT NOTES

1. IF TRAFFIC BARRIER IS USED, ADD 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1.
ADD 0.152 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15-10

2. ADD 16 LBF/OF REINFORCING STEEL FOR BARRIER ALTERNATE 1 OR 23 LBF/OF REINFORCING STEEL FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15-10

SLOPING FACE WALL DESIGN WITH A 250 PSF SURCHARGE

REINFORCED CONCRETE RETAINING WALL
TYPE 2 AND 25W
STANDARD PLAN D-10.15-01

APPROVED FOR SUBMISSION
Washington State Department of Transportation

DRAWN BY: BILL BEHNS

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
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**FOOTING REINFORCEMENT**

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**BAR MIN. SPICE**

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<th>SIZE</th>
<th>SPA. LENGTH</th>
<th>h</th>
<th>SIZE</th>
<th>BAR #4</th>
<th>BAR #6</th>
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<td>3'-3 1/2&quot;</td>
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**REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 3SW STANDARD PLAN D-10.20-00**
NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 4SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 4SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by \((0.003 \times H)\) CY/LF.
5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.

SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL
TYPE 4 AND 4SW
STANDARD PLAN D-10.25-00

BAR #4

LOCATION WALL HEIGHT (H) QTY.

TOP OF FOOTING
≤ 11' 4
12' - 15' 6
16' - 21' 8
22' - 25' 10
26' - 29' 12
30' - 35' 14

BOTTOM OF FOOTING
≤ 11' 4
12' - 15' 6
16' - 21' 8
22' - 25' 10
26' - 29' 12
30' - 35' 14

Approved for publication:
Washington State Department of Transportation

DATE: 5/2018

Sheet 1 of 2Sheets

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
### VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE

#### EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**DIMENSIONS**

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#### FOOTING REINFORCEMENT

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#### STEMM REINFORCEMENT

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#### REINFORCED CONCRETE RETAINING WALL

**TYPE 4 AND 4SW**

**STANDARD PLAN D-10.25-00**

**MEET 2 OF 2 LIMITS**

**APPROVED FOR PUBLICATION**

---

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications, 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

EXPANSION JOINT - 48' CENTERS, W/ 1/2" PREMOLDED JOINT FILLER
3" Diam. Drains at about 12' centers and 6" above final ground line at front face of wall

NOTES

VERTICAL FACE WALL DESIGN WITH 2 :1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 5

STANDARD PLAN D-10.30-00
VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 5
STANDARD PLAN D-10.30-00

APPROVED FOR BURIAL

WashinoD State Department of Transportation

EFFECTIVE: AUGUST 7, 2017 TO August 15, 2018
NOTES
1. All concrete shall be Class 4000, except as noted.
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SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-10.35-00

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-10.35-00

KEY DETAIL
REQUIRED ON WALLS WHERE H ≥ 28

BAR #4

LOCATION

TOP OF FOOTING (H)

BAR G#4

QTY.

14
6
16
7
21
9
25
11
30
6
24
9
30
11

1. All concrete shall be Class 4000, except as noted.
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SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-10.35-00

KEY DETAIL
REQUIRED ON WALLS WHERE H ≥ 28

BAR G#4

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14
6
16
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21
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SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-10.35-00

KEY DETAIL
REQUIRED ON WALLS WHERE H ≥ 28

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14
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SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-10.35-00

KEY DETAIL
REQUIRED ON WALLS WHERE H ≥ 28

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SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-10.35-00

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11

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2. For backfill requirements, see Standard Plan D-4.
3. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

STEM REINFORCEMENT

FOOTING REINFORCEMENT

EFFECTI
VE: AUGUST 7,2017 TO August5,2018

WALL
HT
H

DIMENSIONS
B

Cy

BAR@#4

D

hk

A

LENGTH

N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
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N/A
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N/A
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N/A
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N/A
N/A
N/A

1' -11/2"
1'- 3"
1'- 4"
1'- 5"
1' -61/2"
1'- 7 1/2"
1'- 8 1/2"
1'- 10"
1' - 11"
2'- 0"
2'- 1"
2' - 2"
2'- 3"
2'- 4 1/2"
2'- 5"
2'- 6"

3'- 4"
3'- 4"
3'- 4"
3'- 4"
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3'- 4"
3' - 7"
3'- 7"
3'- 7"
3'- 7"
3'- 10"
3'- 10"
4 1"
4'- 1"
4'- 4"
41-711

2'2'2'2'2'2'3'3' 3' 3' 3' 3'3' 3'3'4' -

2'-71/2"
2'- 8 1/2"
2' - 9 1/2"
2'- 10 1/2"
2' - 11 1/2"
3'- 1"
3'- 2"
3'- 3"
3'- 4"
3' - 5"
3'- 6"
3' - 7"
3'- 7 1/2"
3' - 9"
3' - 10"

4'- 7"
4' - 7"
4'- 10"
4'- 10"
5'- 1"
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5'- 10"
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7'- 9"
8'- 3"
9'- 0"
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2'2'2'3'3'3'3'3'3'3'3'3'4'4'4'4'-

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1'- 9"
2'- 0"
2'- 3"

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12'- 3"
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14'- 9"
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16'- 6"
16'- 9"
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18'- 9"
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4'- 6"
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5'- 3"
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6'- 3"
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7' - 0"
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11' - 9"
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12'- 0"
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13'- 6"
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13' - 6"
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14'- 0"
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14'- 6"
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15'- 3"
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16'- 3"
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16'- 6"
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17'- 0"
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17' - 6"
#4
18'- 6"
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19'- 0"

BAR@

BAR@
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1'- 6"
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LENGTH SIZE
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4' - 6"
#4
5' - 3"
#4
5'- 9"
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6'- 3"
#4
7'- 0"
7'- 6"
8'- 0"
8' - 9"
9'- 6"
10'- 0"

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10'- 9"
11'- 9"
12'- 0"
12'- 9"
13'- 6"
13'- 6"
14'- 0"
14'- 6"
15'- 3"
16'- 3"
16'- 6"
17'- 0"
17'- 6"
18'- 6"
19' - 0"

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BAR

BAR@

SPA.

LENGTH

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1'- 6"
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1'- 6"
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1'- 0"
1'- 0"
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5' - 1 1/2"
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7' - 1 1/2"
8' - 1 1/2"
9' - 1 1/2"
10' - 1 1/2"
11' -11/2"
12'- 1 1/2"
13'- 1 1/2"
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20' - 4"

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10'- 3 1/2"
9' - 3 1/2"
10'- 5"
10'- 0 1/2"
11'- 1 1/2"
14' - 5 1/2"
15'- 5 1/2"
15'- 7"
15'- 4"
13'- 5 1/2"
14' - 6 1/2"
16'- 3"
15'- 5 1/2"
16'- 4"
16'- 2 1/2"

9' - 4 1/2"
8' - 4 1/2"
9' - 6"
9'- 1 1/2"
10'- 3"
13'- 5"
14' - 5 1/2"
14' - 6 1/2"
14' - 3 1/2"
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14' - 10 1/2"
14'- 1"
15'- 1"
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1'- 8"

SIZE SPA.
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LENGTH
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1'- 4"
6' - 2"
1'- 0"
6'- 2"
1'- 0"
6'- 5"
10"
6'- 5"
6'- 8"
10"
1'- 4"
7'- 9"
1' - 4"
7'- 9"
1'- 2"
8'- 0"
8'- 0"
1'- 0"
10"
9'- 7"
10"
9' - 10"
1'- 0" 11'- 51/2"
10"
11'- 81/2"
10"
11'- 81/2"
11' -111/2"
9"

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5' - 2"
5'- 2"
5'- 5"
5'- 511
5'- 8"
6'- 8"
6'- 8"
6'- 11"
6'- 11"
8'- 3"
8' - 6"
10'- 0"
10' - 3"
10'- 3"
10'- 6"

CD

MATERIAL MAXIMUM SOIL PRESSURE (PSF)
QUANTITY

@#4

SERVICE STRENGTH

EXTREME
EVENT 1

b
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
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N/A

SIZE
N/A
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SPA.
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LENGTH
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N/A
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N/A

LENGTH

CONC.
CY/LF

STEEL
LBS/LF

3'- 9"
4'- 9"
5'- 9"
6'- 9"
7'- 10 1/2"
8'- 9 1/2"
9' - 6 1/2"
10'- 6 1/2"
11'- 6 1/2"
12'- 6 1/2"
13' - 3 1/2"
14'- 3 1/2"
15'- 0 1/2"
16'- 1"
16'- 10"
17'- 7"

0.30
0.34
0.39
0.44
0.50
0.56
0.67
0.77
0.86
0.96
1.12
1.22
1.39
1.52
1.73
1.93

20.5
23.0
24.1
26.6
27.7
31.5
36.8
38.8
46.2
54.5
62.7
72.1
80.1
93.9
110.7
123.5

591
709
815
887
998
1145
1368
1540
1664
1875
1987
2202
2348
2441
2556
2702

771
925
1061
1146
1354
1580
1892
2125
2305
2604
2754
3058
3265
3391
3545
3752

733
871
992
1066
1236
1412
1686
1899
2049
2310
2450
2716
2894
3010
3153
3331

1' - 1"
1' - 1"
1' - 1 11
1' - 1"
1' - 1"
1'- 3"
1' - 3"
1'- 3"
1' - 3"
1'- 6"
1'- 6"
1'- 8"
1'- 8"
1'- 8"
1'- 8"

#7
#7
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#8

1'- 4"
1'- 0"
1'- 0"
10"
10"
1'- 4"
1'- 4"
1'- 2"
1' - 0"
10"
10"
1'- 0"
10"
10"
9"

18'- 6"
19'- 6"
20' - 3"
21' - 3"
22'- 0"
23' - 0"
24'- 0"
24'- 9"
25'- 9"
26'- 6"
27'- 3"
28'- 0"
28'- 9"
29'- 9"
30' - 6"

18'- 7"
19'- 7"
20' - 4"
21'- 4"
22' - 1"
23'- 1"
24' - 1 1/2"
24'- 10 1/2"
25'- 10 1/2"
26' - 7 1/2"
27' - 4 1/2"
28' - 1 1/2"
28'- 10 1/2"
29'- 10 1/2"
30' - 7 1/2"

2.09
2.27
2.48
2.66
2.94
3.27
3.44
3.71
3.92
4.28
4.56
4.88
5.21
5.50
5.86

125.5
153.1
160.1
184.9
197.0
194.2
201 .9
222.8
255.3
341.4
353.0
387.7
442.0
471 .7
516.0

2800
2876
3046
3147
3190
3248
3298
3450
3556
3591
3760
3910
4060
4072
4221

3886
3983
4229
4368
4424
4543
4620
4832
4976
5010
5254
5464
5675
5680
5889

3454
3552
3756
3883
3933
3997
4054
4238
4370
4414
4616
4799
4982
4997
5179

#8
#8
#8
#9
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#10
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SLOPING FACE WALL DESIGN
WITH 2 :1 BACKSLOPE

RADIUS
(SEE TABLE)

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BAR@
1'- 6" CENTERS

BAR
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#5
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0::
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BAR
#4

RADIUS
1 1/2"
1 7/8"
2 1/4"
2 5/8"
3"
4 3/4"
5 3/8"
6"

#5
#6
#7
#8
#9
#10

BARS@ AND@

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

MIN. SPLICE
2'- 0"
2'- 0"
2' - 0"
2'- 6"
3'- 3"
4'- 2"
5'- 3"

REINFORCED CONCRETE
RETAINING WALL
TYPE&
STANDARD PLAN D-10.35-00
SHEET 2 OF 2 SHEETS

....

VI

DATE

Washington State Depar1ment of Transpor1ation

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTI
VE: AUGUST 7,2017 TO August5,2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018


NOTES

1. All concrete shall be Class 4000, except as noted.

2. For backfill requirements, see Standard Plan D-4.

3. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.

4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

SLOPING FACE WALL DESIGN
WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL
TYPE 8
STANDARD PLAN D-10.45-01

TABLE 1

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>WALL HEIGHT (ft)</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP OF FOOTING</td>
<td>≤ 12</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>13 ≤ 16</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>17 ≤ 22</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>23 ≤ 30</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>31 ≤ 35</td>
<td>11</td>
</tr>
<tr>
<td>BOTTOM FOOTING</td>
<td>12 ≤ 16</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>17 ≤ 22</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>23 ≤ 30</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>31 ≤ 35</td>
<td>11</td>
</tr>
</tbody>
</table>

NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4
3. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.
TRAFFIC BARRIER DETAILS
FOR REINFORCED CONCRETE
RETAINING WALLS
STANDARD PLAN D-15.10-01

BEAM GUARDRAIL TRANSITION TYPE 20 CONNECTION
BEAM GUARDRAIL TRANSITION TYPE 21 CONNECTION
PERSPECTIVE VIEW

F-SHAPE TRAFFIC BARRIER ON RETAINING WALL
REINFORCING STEEL BENDING DIAGRAM

USED WITH SLOPED FACE RETAINING WALL

USED WITH VERTICAL FACE RETAINING WALL

USED WITH SLOPED FACE RETAINING WALL

USED WITH VERTICAL FACE RETAINING WALL

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

NOTE
SEE ELEVATION FOR LAP SPICE REQUIREMENTS

ALL DIMENSIONS ARE OUT TO OUT
SEE STD. SPEC. FOR BENDING DIAMETERS

PLAN VIEW
FRACTURED FIN FINISH DETAIL

DUMMY JOINT DETAIL

TRAFFIC BARRIER DETAILS
FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.10-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

REINFORCING STEEL BENDING DIAGRAM

CONSTRUCTION JOINT – LEVEL TRANSVERSE WITH ROUGHENED SURFACE

\[ 1\,$^{1/2}$ x $1/4$ \]
\[ R = 1/4" \]

1/4" TO 1/2" DEEP IRREGULAR FRACTURE

PLAN VIEW
FRACTURED FIN FINISH DETAIL

NOTE
SEE ELEVATION FOR LAP SPICE REQUIREMENTS

USED WITH A SLOPED FRONT FACE OF A RETAINING WALL
USED WITH A VERTICAL FRONT FACE OF A RETAINING WALL

(\( \text{VARY}\) )

5'-0"

10'-0"

VARY

(\( \text{R2}\) )

2'-0"

7'

(\( \text{R1}\) )

4'-0"

2'-0"

5'-3/16"

T'-1"

6'

3/4"

T'

(\( \text{W1}\) )

ALL DIMENSIONS ARE OUT TO OUT
SEE STD. SPEC. FOR BENDING DIAMETERS

DUMMY JOINT DETAIL

Bijan Khaleshi
Traffic Barrier Details
For Reinforced Concrete Retaining Walls
Standard Plan D-15.20-09
Sheet 2 of 2 Sheets

Approved for publication
Carpenet, MD
July 2018
Washington State Department of Transportation
DUMMY JOINT - SEE DETAIL
DUMMY JOINT TO BE OMITTED ON BACK FACE OF BARRIER

BRIDGE RAILING TYPE BP

8'-0" SPACING BETWEEN JOINTS (TYPICAL)

PLAN

SIDEWALK CURB LINE

8'-0" SPACING BETWEEN JOINTS (TYPICAL)

ELEVATION

1 1/2" CLR

FIELD BEND

SEE GUARDRAIL CONNECTION DETAILS

PLAN VIEW

FRACTURED FIN FINISH DETAIL

OBLIQUE VIEW

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS

STANDARD PLAN D-15.30-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTE
FOR GUARDRAIL DETAILS NOT SHOWN - SEE BEAM GUARDRAIL (TYPE 31) TRANSITION SECTION TYPE 22, STANDARD PLAN C-25.22

FOR GUARDRAIL CONNECTION DETAIL (HOLE PATTERN) AND HARDWARE REQUIRED - SEE BEAM GUARDRAIL TRANSITION TYPE 21 CONNECTION, THIS SHEET

ATTACH GUARDRAIL TO CONCRETE TRAFFIC BARRIER WITH 7/8” DIAM HIGH STRENGTH BOLTS (STANDARD SPECIFICATION 9-06.5(4)) WITH THIN SLAB FERRULE INSERTS OR RESIN BONDED ANCHORS. SEE THE CONTRACT PLANS.

NOTE
FOR GUARDRAIL DETAILS NOT SHOWN - SEE BEAM GUARDRAIL (TYPE 31) TRANSITION SECTION TYPE 21, STANDARD PLAN C-25.20

REINFORCING STEEL BENDING DIAGRAM

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

ALL DIMENSIONS ARE OUT TO OUT

SEE STD. SPEC. FOR BENDING DIAMETERS

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.30-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES
1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.
2. Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is 3/4".
3. Traffic Barrier Connections between the bridge and the approaching roadway vary and may consist of concrete barrier extensions. Install the Date Numerals on the traffic barrier of the bridge itself.

DATE NUMERALS
ALIGN THE NUMERALS PARALLEL TO TOP OF TRAFFIC BARRIER

TOP OF ROADWAY
DATE NUMERAL DETAIL

DATE NUMERAL DETAILS

TYPICAL DATE NUMERALS
TYPICAL SECTION VIEW

NUMERAL "1"

PERSPECTIVE VIEW

DATE NUMERAL PLACEMENT ON BRIDGE TRAFFIC BARRIER
STANDARD PLAN E-1

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 26, 2017

APPROVED FOR PUBLICATION
NOTES
1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
3. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
4. All hardware shall be black, ungalvanized.
5. Each deck plank shall be nailed to each stringer with two 7" spikes, number 1 or larger.
6. On 17' spans, stringers shall be 6x16 SIE. On 15' spans, stringers shall be 6x16 SIE.
7. Two-lane bridges shall use thirteen lines of stringers, one-lane bridges shall use seven lines of stringers.
8. Overlay thickness must be sufficient to cover bolts.

SECTION A-A

DISTRIBUTION PLATE DETAIL

BASE PLATE DETAIL

BACKING PLATE DETAIL
**Spiral Reinforcement**

### Table: Pile Type Details

<table>
<thead>
<tr>
<th>PILE TYPE</th>
<th>D (in.)</th>
<th>PERIMETER (in.)</th>
<th>UNIT WEIGHT (lbs./ft.)</th>
<th>AREA (in²)</th>
<th>MOMENT OF INERTIA (in⁴)</th>
<th>RADIUS OF GYRATION (in)</th>
<th>NUMBER OF STRANDS</th>
</tr>
</thead>
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<tr>
<td>SQUARE</td>
<td>12</td>
<td>48.0</td>
<td>158</td>
<td>144</td>
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<td>14</td>
<td>56.0</td>
<td>215</td>
<td>190</td>
<td>3201</td>
<td>4.0</td>
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<td>16</td>
<td>64.0</td>
<td>281</td>
<td>258</td>
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<td>OCTAGONAL</td>
<td>14</td>
<td>40.4</td>
<td>178</td>
<td>182</td>
<td>2103</td>
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<tr>
<td></td>
<td>16</td>
<td>54.7</td>
<td>247</td>
<td>226</td>
<td>4057</td>
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<td></td>
<td>18</td>
<td>59.6</td>
<td>295</td>
<td>260</td>
<td>5746</td>
<td>4.6</td>
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<tr>
<td></td>
<td>20</td>
<td>66.3</td>
<td>354</td>
<td>331</td>
<td>8758</td>
<td>5.1</td>
<td>9</td>
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<td></td>
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<td>524</td>
<td>477</td>
<td>13161</td>
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<td>13</td>
</tr>
</tbody>
</table>

**Notes**

1. Place lifting loops at the lifting points shown in the PILE HANDLING DIAGRAM, Standard Plan E-4a, for the case stated in the contract.

2. Spirals shall be spliced either by lapping one full turn and bending the end of the spiral to a 135° seismic hook, by welding, or by the use of a mechanical connector that develops 125% of the minimum yield strength of the spiral. Welding shall meet the requirements of Standard Specification E-623(24)E.

3. All prestressing strands are 1/2" or 0.6" diameter ($d_p$), Grade 270, uncoated strands, AASHTO M203, jack to 0.75 $F_{pu}$ maximum.

4. Strength of concrete shall be 5.0 ksi at release and 7.0 ksi at final.

5. 2 1/2" cover if pile is exposed to salt water.
**Precast Piles, Handling Notes**

1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.

2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground.

3. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.

4. When directed to remove a lifting loop, cut it off at the bottom of the recess and patch the recess by filling it with 1:2 mortar, finishing it to the level of the pile face. The patch shall be allowed to cure at least 24 hours prior to driving the pile.

5. The length of the formed or drilled hole shall allow for potential cutoff and full development length of the steel reinforcement. The holes must be roughened and filled with epoxy resin.

6. Expose the spiral reinforcement at the pile head and splice with new spiral in accordance with Standard Plan E-4, Note 2.

7. For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E-4.

8. Piles stored on the ground should be bunched on level dunnage at no more than 20’ on center, with a maximum overhang of 10’.
FACE OF CURB V A R I E S 12" TO 24" MATCH ROADWAY SLOPE ROADWAY 1" (IN) R.
FACE OF CURB V A R I E S 10" TO 22" MATCH ROADWAY SLOPE ROADWAY 1" (IN) R.

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

DEPRESSED CURB SECTION AT CURB RAMPS AND DRIVEWAY ENTRANCES

NOTE

FACE OF CURB V A R I E S 12" TO 24" MATCH ROADWAY SLOPE ROADWAY 1" (IN) R.
FACE OF CURB V A R I E S 10" TO 22" MATCH ROADWAY SLOPE ROADWAY 1" (IN) R.

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE PEDESTRIAN CURB AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

CEMENT CONCRETE PEDESTRIAN CURB AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

FACE OF CURB V A R I E S 12" TO 24" MATCH ROADWAY SLOPE ROADWAY 1" (IN) R.
FACE OF CURB V A R I E S 10" TO 22" MATCH ROADWAY SLOPE ROADWAY 1" (IN) R.

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE TRAFFIC CURB

MOUNTABLE CEMENT CONCRETE TRAFFIC CURB
1. The intent of this design is to facilitate the compaction of Hot Mix Asphalt pavement adjacent to a drainage structure.

2. The centerline of the drainage structure may differ from the centerline of the frame and grate.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

SECTION A
CURB PLACEMENT

SECTION B
CURB PLACEMENT

SECTION C
ROUNDABOUT SPLITTER ISLAND
CURB 4
ROUNDABOUT TRUCK APRON
CEMENT CONCRETE CURB & GUTTER
(ROLLED CURB)

CURB 2
(OUTSIDE, RIGHT SIDE OR SPLITTER ISLAND)
ROUNDABOUT CEMENT CONCRETE CURB AND GUTTER
(ROLLED CURB)

CURB 3
ROUNDABOUT CENTRAL ISLAND
CEMENT CONCRETE CURB
(ROLLED CURB)

NOTES
1. Construct curb joints at cement concrete pavement transverse joint locations. If all adjacent pavement is HMA, see Standard Plan F-30.10 for Curb Expansion and Contraction Joint Spacing.

2. A 2" vertical curb may be used where low clearance vehicles or trucks are present.

LEGEND
- Width varies ~ See Contract Plans.
- Match adjacent pavement thickness but not less than 6 inches.

DATE: JUL 11 2017 10:18 AM

W. J. Walsh

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

1. The installation of curb in areas with existing guardrail could require the removal and resetting of the guardrail or its components.

2. Extend shoulder pavement to provide a base for the extruded curb.

3. See Contract for exception to distances shown.

4. Type 3 and 6 curbs are not used on roadways with a posted speed greater than 40 mph.

5. Type 3 and 6 are not used under beam guardrail on roadways with a posted speed greater than 50 mph.

6. For extruded curb placement at Beam Guardrail Type 31, see Standard Plan C-20.10.

7. For extruded curb details, see Standard Plan C-20.42.

EXTRUDED CURB WITH SLOPE Rounding

EXTRUDED CURB WITHOUT SLOPE Rounding

EXTRUDED CURB AT BEAM GUARDRAIL
NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

SPACING OF ANCHOR BARS
(FOR TYPES 4, 5, AND 6)
#3 Rebar – Required only in tangent block when length exceeds 30" (in)
1 1/2" (in) CLR. BOTH ENDS – See Standard Specification 9-07

Typical of all

TYPICAL OF ALL END VIEW

Top View

Inside Corner Block

Outside Corner Block

18" Radius Block

30" Radius Block

Isometric Views

Inside Corner Block

18" (in) Radius Block

Outside Corner Block

30" (in) Radius Block

Precast Sloped Mountable Curb

Standard Plan F-10.62-0

Sheet 1 of 2 sheets

Approved for publication

State Design Engineer

Washington State Department of Transportation

Effective: August 7, 2017 to August 5, 2018
This table lists the calculated dimensions for casting blocks suitable for constructing various curb radii. Curved blocks, or blocks with different dimensions, may be acceptable with prior approval of the engineer.

**CURB RADIUS TABLE**

<table>
<thead>
<tr>
<th>CURB RADIUS</th>
<th>DIMENSION A</th>
<th>DIMENSION B</th>
<th>DIMENSION C</th>
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<tr>
<td>3'</td>
<td>12&quot;</td>
<td>2&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>4' TO 9'</td>
<td>12&quot;</td>
<td>1 1/2&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>6'</td>
<td>12&quot;</td>
<td>1&quot;</td>
<td>10&quot;</td>
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<td>7'</td>
<td>12&quot;</td>
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<td>16' TO 17'</td>
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<td>3/4&quot;</td>
<td>22 1/2&quot;</td>
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<tr>
<td>18' TO 22'</td>
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<td>5 3/4&quot;</td>
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<td>23' TO 29'</td>
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<td>OVER 60'</td>
<td>USE TANGENT BLOCK, SEE SHEET 1</td>
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**NOTE:**
- INSIDE RADIUS BLOCK
- OUTSIDE RADIUS BLOCK
- ISOMETRIC VIEWS

**PRECAST SLOPED MOUNTABLE CURB**

**STANDARD PLAN F-10.62-0**

**APPROVED FOR PUBLICATION**
Washington State Department of Transportation

**EFFECTIVE:** AUGUST 7, 2017 TO August 5, 2018

**DATE:** Apr 22 2014 9:20 AM

**ENGINEER:**
- NAME: [Redacted]
- OFFICE: [Redacted]
1. The dual faced curb may be constructed by using two precast sloped mountable curbs (longitudinal halves) so long as the installation is consistent with the dimensions shown in the plan.

Four feet of the sidewalk width shall be the minimum pedestrian accessible route free of vertical and horizontal obstructions. Gratings, Access Covers, Junction Boxes, Cable Vaults, Pull Boxes and other appurtenances within the sidewalk must have slip resistant surfaces, be flush with surface, and match grade of the sidewalk.

**NOTE**

1. Four feet of the sidewalk width shall be the minimum pedestrian accessible route free of vertical and horizontal obstructions. Gratings, Access Covers, Junction Boxes, Cable Vaults, Pull Boxes and other appurtenances within the sidewalk must have slip resistant surfaces, be flush with surface, and match grade of the sidewalk.
NOTES
1. At marked crosswalks, the connection between the landing and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in the Depressed Curb and Gutter where the Landing connects to the roadway.
5. The Bid Item "Cement Concrete Curb Ramp Type "A" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
6. The Curb Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length, the running slope of the curb ramp is allowed to exceed 6.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet. Do not include abutting landing(s) in the 15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the walkway.
8. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will be no material to retain.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES
1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in the Depressed Curb and Gutter where the landing connects to the roadway.
6. The Bid Item "Concrete Curb Ramp Type ___" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length, the running slope of the curb ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet. Do not include the abutting landing in the 15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the walkway.
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

LEGEND
- SLOPE IN EITHER DIRECTION
- ** 15 OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
- *** 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.)

COMBINATION CURB RAMP

STANDARD PLAN F-40.14-0:

SECTION A
- DETECTABLE WARNING SURFACE - SEE STANDARD PLAN F-45.10
- CEMENT CONCRETE PEDESTRIAN CURB - SEE NOTE 9
- CEMENT CONCRETE CURB AND GUTTER - SEE NOTES 4 & 6
- CEMENT CONCRETE PEDESTRIAN CURB - SEE NOTE 9
- CURB RAMP
- BUFFER STRIP (TYP.) - SEE CONTRACT PLANS
- MATCH SIDEWALK (4'-0" MIN.) - SEE CONTRACT PLANS
- 3/8" (IN) EXPANSION JOINT (TYP.) - SEE STANDARD PLAN F-30.10
- DETECTABLE WARNING SURFACE - SEE STANDARD PLAN F-45.10
- DEPRESSED CURB AND GUTTER - SEE NOTES 4 & 6
- DETAIL D  Curb Radius Detail

SECTION B
- CURB RAMP
- 4'-0" MIN. - SEE CONTRACT PLANS
- 3'-0" MIN. (TYP.) - SEE CONTRACT PLANS
- BUFFER STRIP - TOP OF ROADWAY
- CRACK JOINT (TYP.) - SEE STANDARD PLAN F-30.10
- CONTRACTION JOINT (TYP.) - SEE STANDARD PLAN F-30.10
- FOR CURB RAMP LENGTHS GREATER THAN 4'-0" PROVIDE CONTRACTION JOINT EQUALLY SPACED 4'-0" MIN. OC.
- CEMENT CONCRETE PEDESTRIAN CURB (TYP.) - SEE NOTE 9
- LANDING
- CURB RAMP
- TOP OF ROADWAY
- CEMENT CONCRETE CURB AND GUTTER - SEE NOTES 4 & 6

SECTION C
- CURB RAMP
- 15'-0" MAX. (TYP.) - SEE NOTE 7
- 4'-0" MIN. - SEE CONTRACT PLANS
- CURB RAMP
- 15'-0" MAX. (TYP.) - SEE NOTE 7
- LANDING
- 3/8" (IN) EXPANSION JOINT (TYP.) - SEE STANDARD PLAN F-30.10
- DETECTABLE WARNING SURFACE - SEE STANDARD PLAN F-45.10
- DETAIL D  Curb Radius Detail
- DEPRESSED CURB AND GUTTER - SEE NOTES 4 & 6
- DEPRESSED CURB AND GUTTER - SEE STANDARD PLAN F-10.12 AND NOTE 6
- TOP OF ROADWAY
- TOP OF ROADWAY
- CEMENT CONCRETE CURB RAMP TYPE COMBINATION PAY LIMIT - SEE NOTE 6
- ISOMETRIC VIEW
- TYPE COMBINATION PAY LIMIT

Zeller, Scott
Jun 24 2016 7:30 AM

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. The Detectable Warning Surface (DWS) shall extend the full width of the curb ramp, landing, or other roadway entrance as applicable. Exception: If the Manufacturer of the DWS requires a concrete border around the DWS, a variance of up to 2 inches on each side of the DWS is permitted.

2. The Detectable Warning Surface (DWS) shall be placed at the back of curb, with the two leading corners of the DWS panel placed adjacent to the back of the curb, and with no more than a 2 inch gap between the DWS and the back of the curb measured at the center of the DWS panel. Exception: If the Manufacturer of the selected DWS requires a concrete border around the DWS, a variance of up to 2 inches from the back of the curb is permitted (measured at the leading corners of the DWS panel).

3. The rows of truncated domes shall be aligned to be perpendicular to the grade break at the back of curb.

4. The rows of truncated domes shall be aligned to be parallel to the direction of travel.

5. If curb and gutter are not present, such as a shared-use path connection, the Detectable Warning Surface shall be placed at the pavement edge.


7. If a curb ramp is required, the location of the Detectable Warning Surface must be at the bottom of the ramp and within the required distance from the rail.

8. When the grade break between the curb ramp and the landing is less than or equal to 5 ft from the back of curb at all points, place the Detectable Warning Surface on the bottom of the curb ramp directly above the grade break.
TYPICAL INSTALLATION FOR SINGLE-FACED SIGNS

NOTES


2. Provide Supplemental Plaques and install on Mileposts where indicated in the Contract.

3. See the Contract for the width of the Single-Faced Milepost Signs required (10" or 12").

4. For lateral installations behind traffic barrier, 6" high curbs, and ditches, see Standard Plan G-20.10.

5. Install at the locations shown in the Contract. Installation may be moved 50 feet or less (longitudinally) before or after the contract location if obstructions are encountered, or to utilize the post of another sign. Mileposts that cannot be placed within this degree of accuracy shall be omitted entirely.

TYPICAL INSTALLATION FOR DOUBLE-FACED SIGNS

MILEPOST
STANDARD PLAN G-10.10-00

SUPPLEMENTAL PLAQUE - MOUNTING DETAIL

SEE NOTE 2
NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

2. For Steel Sign Support Foundation, see Standard Plan G-25.10.

3. For "H1" refer to the Sign Specification Sheet in the Contract.

4. Mounting brackets with steel straps shall be the stainless steel one bolt, flared leg bracket and 3/4" wide, 0.030" thick strap "Band-it" products or an approved equal.
**NOTES**

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

2. For Steel Sign Support Foundations, see Standard Plan G-25.10.

3. For "H1" refer to the Sign Specification Sheet in the Contract.

---

**STEEL SIGN SUPPORT TYPE AS INSTALLATION DETAILS STANDARD PLAN G-24.20-01**

Sheet 1 of 1 Sheet

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**EXPLODED VIEW**

**BREAKAWAY SIGN BRACKET ASSEMBLY**

**ELEVATION**

**DETAIL A**

**PERSPECTIVE VIEW**

**BREAKAWAY SIGN BRACKET ASSEMBLY**
WHEN EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

2. For Steel Sign Support Foundations, see Standard Plan G-25.10.

3. For "X", "Y", "H1", and "H2", refer to the Sign Specification Sheet in the Contract.

4. Sign posts shall be 2 1/2" nominal I.D. galvanized Schedule 80 steel pipe.

5. Do not tighten any slip plate bolt to the recommended torque before prelightening the other bolts. Progressively tighten the three slip plate bolts in 10 ft-lbs increments, alternately, to a final torque of 38 ft-lbs on each bolt.

ELEVATION TYPE PL SIGN SUPPORT

ELEVATION TYPE PL-T SIGN SUPPORT

EXPLODED VIEW PIPE CLAMP AND U-BOLT

EXPLODED VIEW TYPE PL SIGN SUPPORT

STANDARD PLAN G-24.30-01

INSTRUCTIONS DETAILS TYPES PL, PL-T, & PL-U INSTALLATIONS DETAILS

WASHINGTO STATE DEPARTMENT OF TRANSPORTATION

APPEND FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES
1. For "W", horizontal distance from edge of traveled way to center of nearest post, and "V", vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20.10.
2. For "X", "Y", "H1", "H2", "H3" and "H4", refer to the Sign Specification Sheet in the Contract.
3. Top of concrete foundations shall be smooth, dense and uniform to finished groundline.
5. Slip Base and all other materials shall meet the requirements of Standard Specification 9-08.
6. When a 2 1/4" (in) insert is used, the insert shall be a minimum of 7 feet.

WINLOAD FOR SQUARE TUBE POSTS AT 90 MPH

<table>
<thead>
<tr>
<th>POSTS</th>
<th>MAXIMUM XYZ</th>
</tr>
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<tbody>
<tr>
<td>2 1/2&quot; PSST 12-GAGE</td>
<td>172 344 516</td>
</tr>
<tr>
<td>2 1/2&quot; PSST with 3 1/4&quot; insert 12-GAGE</td>
<td>309 616 927</td>
</tr>
</tbody>
</table>

* SLIP BASE REQUIRED UNLESS BEHIND BARRIER

STANDARD PLAN G-24.40-06

STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3 ~ 8" (IN)

INSTALLATION DETAILS

Sheet 1 of 4 sheets

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
ASSEMBLY NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.

2. Do not tighten any single Slip Plate Bolt to the recommended torque before prelightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lbs increments, alternately, to a final torque of 40 ft-lbs on each.

3. Slip Base assembly and all other materials shall meet the requirements of Standard Specifications 9-06 and 9-28.
ASSEMBLY NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.

2. Do not tighten any single Slip Plate Bolt to the recommended torque before prelightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lbs increments, alternately, to a final torque of 40 ft-lbs on each.

3. Use only Slip Base manufacturer supplied hardware that meets the requirements of Standard Specifications 9-06 and 9-28.

---

**TYPE SB-1**

SLIP BASE ASSEMBLY

STEEL SIGN SUPPORT TYPES SB-1 & SB-3 ~ 10" (IN)

---

**TYPE SB-3**

SLIP BASE ASSEMBLY
SIGN INSTALLATION ON SIGNAL AND LIGHT STANDARDS

STANDARD PLAN G-30.10-0

SHEET 1 OF 2 SHEETS

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/16" (4 mm) wide and 0.030" (0.8 mm) thick. stiffness.

2. All signs installed on mast arms or standards (poles) require windbeams. All signs shall be installed with horizontal edges level. A skewed windbeam is required only when the sign is mounted within 12" (300 mm) of the mast arm base (see Detail "A").

3. The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3' (900 mm); signs larger than 36 square feet require a special design mast arm and signal pole.

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

NOTE:
Any Lane Use Sign greater than 7.5 sq ft requires a Special Design Mast Arm and Signal Pole.

DIMENSIONS

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
</table>
| 3' - 0" | 3' - 0" | 1' - 0" | 6"
| 3' - 0" | 3' - 0" | 1' - 0" | 6"
| 3' - 0" | 4' - 0" | 1' - 3" | 9"
| 4' - 0" | 2' - 6" | 1' - 3" | 9"

LEVEL

MOUNTING BRACKET AND STEEL STRAP (SEE NOTE 1)

BACK OF SIGN PANEL

SIGNAL OR LIGHT STANDARD (REFER TO APPROVED SHOP DRAWINGS FOR MAXIMUM ALLOWED SQUARE FOOTAGE)
NOTES

1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be one bolt, flared leg, steel straps shall be 3/4" (in) wide and 0.030" (in) thick.

2. Sign braces are required for sign widths of 48" (in) or greater. For sign widths of 36" (in), the sign braces are only installed when specified in the contract.

3. Sign braces are typically necessary on large sign panels that are exposed to high winds, traffic generated wind buffeting, or when snow thrown from plows might impact the sign.

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type III, IV, VIII or IX sheeting.

5. Signs 48" (in) or greater can be pinned together, back to back.

6. For signs installed back to back on a single post, no bracing is required.

SIGN BRACING

STANDARD PLAN G-50.10-0

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington, State Department of Transportation

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
### SIGN BRACE DIMENSIONS

<table>
<thead>
<tr>
<th>SIGN TYPE</th>
<th>YIELD</th>
<th>DIAMOND-SHAPED</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/3 SIGN WIDTH - 1 3/4&quot;</td>
<td>1/2 SIGN WIDTH - 2 1/4&quot;</td>
<td>1/2 SIGN WIDTH - 1&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIGN POST TYPE</th>
<th>4&quot;X4 OR 4&quot;X8 TIMBER POST</th>
<th>6&quot;X8 TIMBER POST</th>
<th>3&quot; DIAM, STEEL PIPE</th>
<th>2 1/2&quot; SQUARE TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>5 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>4 3/4&quot;</td>
<td>2 1/2&quot;</td>
</tr>
</tbody>
</table>

### NOTE

1. For sign installations on round steel posts, see Standard Plan G-30.10, sheet 2 of 2.
NOTES

1. Vertical and horizontal clearance requirements shall be as shown on the Contract Plans.

2. No post splices permitted in lower third of height, nor closer than 3’ - 0" to bottom chord, except as otherwise noted. No chord shop splices permitted in first two-thirds of the span, except as otherwise noted. A maximum of two splices are permitted in the post. For post or chord shop splice details, see Standard Plan G-70.10.

3. The back-up plates or rings for all full penetration welds shall be welded continuously to the joined pieces. This can be done by either a continuous fillet weld on the back side of the piece, or by a continuous weld in the root of the full penetration weld.

4. All bolt holes shall be drilled, and the diameter shall be 1/16" (in) larger than the nominal bolt diameter, except as noted.

5. The design and analysis of the structures has been done in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals Dated 2001, using 90 MPH wind velocity and fatigue category - I.

6. Adjust post alignment in plane normal to roadway centerline by means of leveling nuts located below base plate to maintain upward slope in cantilever arm(s). Tighten anchor nuts above base plate in accordance with Standard Specification 6-03.3(33).

7. Variable Message Signs (VMS) exceeding 700 lbs. and/or 200 sq. ft. shall not be installed on cantilever structure.

8. For electrical requirements, see Standard Plan J-75.45.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

ELEVATION

DOUBLE CANTILEVER SIGN STRUCTURE

SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE.
**CANTILEVER SIGN STRUCTURE (TRUSS TYPE)**

**STANDARD PLAN G-60.10-03**

- **SECTION B**
- **DETAIL "G"**
- **BASE WELD DETAIL**
- **POST BASE DETAILS**

**DIMENSIONS:**
- 1" - 4 1/2"
- 1" - 4 1/2"

**NOTES:**
- REMOVABLE RAIN TIGHT HAND HOLE COVER WITH GASKET = FASTEN WITH TWO STAINLESS STEEL (ASTM F 883) SCREWS
- HOLE IN POST BASE (HOLE DIAM. = POST I.D. - 2" (IN))
- 2" (IN) DIAM HOLE FOR ANCHOR BOLTS (TYP.)
- 1/2" (IN) DIAM. STEEL BOLT, 1 1/2" (IN) LONG, WITH (2) WASHERS AND (2) NUTS FOR GROUND
- INSIDE EDGES SHALL BE ROUNDED AND SMOOTH ALL AROUND

**APPROVED FOR PUBLICATION**
- Carpenter, Jeff
- Jan 18 2015 7:50 AM
1" (IN) STEEL CONDUIT OR AS PER CONTRACT - WHEN REQUIRED, CAP EACH END

CONDUIT COUPLING - INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

ANCHOR ROD - 1 3/4" (IN) DIA. X 4'-4" LONG, Threaded 8" (IN) MIN. EACH END, W/ (2) WASHERS & (6) HEAVY HEX NUTS - GALVANIZE EXPOSED. ANCHOR ROD END FOR 1'-0" MIN.

GROUNDING CONDUCTOR SHALL BE NON-INSULATED #4 AWG STRANDED COPPER - PROVIDE 3"(O.D.) BLACK ROUTE TO GROUNDING STUD

FINISH GROUND LINE

13" - 0" 18'-0" 1500 AND UP
16'-0" 22'-0" 1000 - 1469

VALUES OF Z

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>Z</td>
<td></td>
</tr>
</tbody>
</table>

1. See Standard Specification 8-21.3(9) for construction requirements.
2. Use a template to locate and secure bolts in place during foundation installation.
NOTES

1. Horizontal and vertical clearance requirements shall be as shown in Contract Plans.
2. Horizontal diagonals must join chords where vertical diagonals connect (panel points).
3. Interior diagonals shall be placed at panel points, 40 (ft) maximum spacing. Locate symmetrically about centerline of span if possible. An interior diagonal is not required at span ends.
4. No post splices permitted in lower third of height, nor closer than 3 - 0" to bottom of chord. No chord shop splices permitted in middle third of span. Maximum of one splice in each end post.
5. For electrical requirements See Standard Plan J-75.45.

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

MATERIAL SPECIFICATIONS

PIPE
CHORDS, DIAGONALS, STRUTS AND POSTS
ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR A 500 GRADE B

PLATES
ASTM A 36

SHAPES
ASTM A 36
ASTM A 992

BOLTS, NUTS, & WASHERS
STD. SPEC 9-06.53

PIPE, PLATE & SHAPE GALVANIZING
ASHTO M 111

FASTENER GALVANIZING
ASHTO M 232

ELEVATION

STRUCTURE DIMENSIONS

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>DIMENSION D</th>
<th>TOP AND BOTTOM CHORDS</th>
<th>DIAGONALS</th>
<th>END TRUSS POSTS</th>
<th>END TRUSS STRUTS AND DIAGONALS</th>
<th>TOTAL SIGN AREA (MAX.) (SQU. FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' OR LESS</td>
<td>4'-0&quot;</td>
<td>3&quot; x 216&quot;</td>
<td>1 1/4&quot; x 140&quot;</td>
<td>10&quot; x 279&quot;</td>
<td>2 1/2&quot; x 203&quot;</td>
<td>384</td>
</tr>
<tr>
<td>8' to 9'</td>
<td>5'-0&quot;</td>
<td>4&quot; x 233&quot;</td>
<td>2&quot; x 154&quot;</td>
<td>10&quot; x 279&quot;</td>
<td>2 1/2&quot; x 203&quot;</td>
<td>624</td>
</tr>
<tr>
<td>9' to 12'</td>
<td>6'-0&quot;</td>
<td>5&quot; x 255&quot;</td>
<td>2&quot; x 154&quot;</td>
<td>10&quot; x 279&quot;</td>
<td>2 1/2&quot; x 203&quot;</td>
<td>854</td>
</tr>
<tr>
<td>12' to 15'</td>
<td>7'-0&quot;</td>
<td>6&quot; x 280&quot;</td>
<td>2 1/2&quot; x 203&quot;</td>
<td>10&quot; x 366&quot;</td>
<td>3 1/2&quot; x 226&quot;</td>
<td>1104</td>
</tr>
</tbody>
</table>

ALL MEMBERS ARE PIPE. VALUES SHOWN ARE NOMINAL PIPE SIZE AND WALL THICKNESS.

Y₁ = HEIGHT OF SHALLOWEST SIGN ON STRUCTURE, D = 1'-0" MIN.
Y₂ = HEIGHT OF ANY SIGN WITH HEIGHT GREATER THAN Y₁.
ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORD OR POST. FILLET WELD SIZE TO BE DIAGONAL TUBE OR PIPE THICKNESS PLUS 1/16" (IN).

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

ALTERNATE JOINT DATA

<table>
<thead>
<tr>
<th>SPAN LENGTH (F)</th>
<th>d (IN)</th>
<th>e (IN)</th>
<th>BOLT Q (IN) DIA.</th>
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</thead>
<tbody>
<tr>
<td>60 OR LESS</td>
<td>2 1/2&quot;</td>
<td>1 1/4&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>61 TO 90</td>
<td>3&quot;</td>
<td>1 1/2&quot;</td>
<td>7/8&quot;</td>
</tr>
<tr>
<td>91 TO 120</td>
<td>3 3/4&quot;</td>
<td>7/8&quot;</td>
<td></td>
</tr>
<tr>
<td>121 TO 150</td>
<td>3 1/2&quot;</td>
<td>1 3/4&quot;</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

FOR SPAN LENGTHS NOT LISTED, INTERPOLATE VALUES OF

BOLTS Q W/ HEX NUT & WASHER (TYP.)

- NOT SHOWN FOR CLARITY

DEAD LOAD CAMBER

SIGN BRIDGE (TRUSS-TYPE)

STANDARD PLAN G-70.10-03

APPROVED FOR PUBLICATION

Jan 18, 2015 7:53 AM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>SHAFT</th>
<th>CONCRETE</th>
<th>CLASS 4000P</th>
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<tbody>
<tr>
<td>ALL OTHER CONCRETE</td>
<td>CLASS 4000</td>
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</tr>
<tr>
<td>STEEL REINF. BAR</td>
<td>AASHTO M 31 GRADE 60</td>
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<tr>
<td>ANCHOR RODS</td>
<td>ASTM F 1554 GRADE 150</td>
<td></td>
</tr>
<tr>
<td>ANCHOR NUTS</td>
<td>AASHTO M 291</td>
<td></td>
</tr>
<tr>
<td>ANCHOR WASHERS</td>
<td>AASHTO M 293</td>
<td></td>
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<tr>
<td>ANCHORAGE GALVANIZING</td>
<td>AASHTO M 232</td>
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<tr>
<td>ANCHOR PLATE</td>
<td>ASTM A 36</td>
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</tbody>
</table>

CASE THE EXCAVATION AND PLACE USING TREMIE METHOD WHEN WATER IS PRESENT

TABLE

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SPAN LENGTH</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>61' TO 90'</td>
<td>91' TO 120'</td>
</tr>
<tr>
<td>DIMENSION = D</td>
<td>4' - 0'</td>
<td>5' - 0'</td>
</tr>
<tr>
<td>BAR SPACES = N</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>SHAFT DEPTH = Z</td>
<td>11' - 0''</td>
<td>12' - 0''</td>
</tr>
<tr>
<td>2500 OR BETTER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BAR LIST

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>SPAN LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SHAFT - VERTICAL</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>SHAFT - SPIRAL</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>CAP - TOP AND BOTTOM</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>CAP - SIDES</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>CAP - HOOPS</td>
<td>6</td>
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</tbody>
</table>

BENDING DIAGRAM

<table>
<thead>
<tr>
<th>1</th>
<th>Z + Z - 8'</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>D + Z - 8'</td>
</tr>
<tr>
<td>3</td>
<td>Z - 8'</td>
</tr>
</tbody>
</table>

(ALL DIMENSIONS ARE OUT TO OUT 2'' (50 MM) RADIUS, UNLESS OTHERWISE NOTED)

DETERMINE LENGTH FROM PLANS

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

SIGN BRIDGE (TRUSS-TYPE) FOUNDATION TYPE 1

STANDARD PLAN G-70.20-04

SIGN BRIDGE (TRUSS-TYPE) FOUNDATION TYPE 1

ELEVATION

FOUNDATION TYPE 1

ISOMETRIC

CONSTRUCTION Joint W/ 9 1/2 (24) X 1 1/2 (40) X Z - 8'' SHEAR KEY

ANCHOR PLATE (TYPE) SEE DETAIL

ATTACH GROUNDING CONDUCTOR TO 1 - 3'' MIN. BELOW CONSTRUCTION JOINT

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

LEVEL

ANCHOR ROD = 1 (IN) DIAM. X Z - 8''

THREADED 8'' MIN. EACH END.

WITH TWO WASHERS AND SIX HEAVY HEX NUTS

ANCHOR PLATE (TYPE) - 5

SYM. ABOUT $\epsilon$ EXCEPT CONDUIT

N EQUAL 1 - 5

SPACES 1 - 5

FINISHED GROUND LINE

FINISHED GROUND LINE

COHORCE SHALL BE PLACED DIRECTLY AGAINST EARTH 3" BLANK SPACES 1 - 5, BELOW CONSTRUCTION JOINT.

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

LEVEL

ANCHOR PLATE (TYPE) - 5

SYM. ABOUT $\epsilon$ EXCEPT CONDUIT

N EQUAL 1 - 5

SPACES 1 - 5

FINISHED GROUND LINE

FINISHED GROUND LINE

COHORCE SHALL BE PLACED DIRECTLY AGAINST EARTH 3" BLANK SPACES 1 - 5, BELOW CONSTRUCTION JOINT.

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

LEVEL

ANCHOR PLATE (TYPE) - 5

SYM. ABOUT $\epsilon$ EXCEPT CONDUIT

N EQUAL 1 - 5

SPACES 1 - 5

FINISHED GROUND LINE

FINISHED GROUND LINE

COHORCE SHALL BE PLACED DIRECTLY AGAINST EARTH 3" BLANK SPACES 1 - 5, BELOW CONSTRUCTION JOINT.

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

LEVEL

ANCHOR PLATE (TYPE) - 5

SYM. ABOUT $\epsilon$ EXCEPT CONDUIT

N EQUAL 1 - 5

SPACES 1 - 5

FINISHED GROUND LINE

FINISHED GROUND LINE

COHORCE SHALL BE PLACED DIRECTLY AGAINST EARTH 3" BLANK SPACES 1 - 5, BELOW CONSTRUCTION JOINT.

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

LEVEL

ANCHOR PLATE (TYPE) - 5

SYM. ABOUT $\epsilon$ EXCEPT CONDUIT

N EQUAL 1 - 5

SPACES 1 - 5

FINISHED GROUND LINE

FINISHED GROUND LINE

COHORCE SHALL BE PLACED DIRECTLY AGAINST EARTH 3" BLANK SPACES 1 - 5, BELOW CONSTRUCTION JOINT.

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

LEVEL

ANCHOR PLATE (TYPE) - 5

SYM. ABOUT $\epsilon$ EXCEPT CONDUIT

N EQUAL 1 - 5

SPACES 1 - 5

FINISHED GROUND LINE

FINISHED GROUND LINE

COHORCE SHALL BE PLACED DIRECTLY AGAINST EARTH 3" BLANK SPACES 1 - 5, BELOW CONSTRUCTION JOINT.

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

LEVEL
Concrete below finished ground line shall be placed directly against undisturbed earth, or alternately, backfill placed around foundation shall be compacted in conformance with Standard Specification 2-09.31(1)e, method 1 or 4. All formwork shall be removed.

FOUNDATION TYPES 2 & 3

(ALL DIMENSIONS ARE OUT TO OUT 2" IN RADIUS, UNLESS OTHERWISE NOTED)
NOTES

1. Windbeam and 3" (IN) Z-Bar are aluminum. All nuts, bolts, washers, and other hardware shall be stainless steel per Standard Specification Section 9-28.11, except as noted. Galvanize all non-stainless steel parts.

2. See Standard Plan G-90.20 (Monotube), or G-90.30 (Truss) for additional Overhead Sign Mounting details.

3. For VMS mounting, the Contractor may substitute W6 × 12 steel or W8 × 13 steel sections for the Vertical Brace W4 × 13 steel.

ASSEMBLY NOTES
All parts shall be plum and square.
Bring all parts into full contact with each other.
Fasteners and associated hardware shall be in a snug tight condition when assembled.
Bolted parts shall fit solidly together.
NOTES

1. Install Sign Lighting Luminaires (and Brackets) only when required in the Contract.

2. All nuts, bolts, washers, and other hardware shall be stainless steel per Standard Specification Section 9-28.11, except as noted. Galvanize all non-stainless steel parts.

3. See Standard Plan G-90.20 (Monotube), or G-90.30 (Truss) for additional Overhead Sign Lighting details.
NOTES
1. Refer to Contract Plans for Monotube Beam Bracket element sizes, dimensions, and weld symbols.
5. Hand holes shall be installed at the time of fabrication. Only additional conduit for lighting accommodations to previously non-illuminated structures may be installed in field as long as the proper repairs are made to the structure. For details not shown, see Standard Plan J-75.40.
6. For VMS mounting, the Contractor may substitute W6 x 12 steel or V8 x 13 steel sections for the Vertical Brace W4 x 10 steel.
7. 3'-0" max. Vertical Brace and Monotube Beam Bracket spacing for walk-in cabinet Type VMS installation.
9. For all sign lighting bracing details not shown, see Standard Plan G-90.11.
NOTES
1. U-Bolts, Washers and Nuts shall be stainless steel, except as noted.
4. For VMS mounting, the contractor may substitute W6 x 12 Steel or W8 x 13 Steel sections for the Vertical Brace W4 x 13 Steel.
5. 3'-0" MAX. Vertical Brace spacing for Walk-In Cabinet Type VMS Installation.
7. For all sign lighting bracing details not shown, See Standard Plan G-90.11.

OVERHEAD SIGN MOUNTING
(TRUSS STRUCTURE)

STANDARD PLAN G-90.30-04

PERSPECTIVE VIEW
TRUSS STRUCTURE

VERTICAL BRACE (TYP.) — WHEN SHOWN IN THE CONTRACT, SEE STANDARD PLAN G-90.40

LUMINAIRE BRACKET (TYP.) — WHEN SIGN LIGHTING IS SHOWN IN CONTRACT

SIGN LIGHTING LUMINAIRE (TYP.) — WHEN SHOWN IN THE CONTRACT, SEE STANDARD PLAN G-90.40

HORIZONTAL 3" (IN) Z-BAR AT TOP OF SIGN

SIGN BRIDGE OR CANTILEVER TRUSSES

U-BOLT CONNECTION (TYP.)

V-BAR CONNECTION (TYP.)

WIND BEAM (TYP.)

SIGN PANEL

TOP TRUSS CHORD

SIDE VIEW

TRUSS CONNECTION

BOTTOM TRUSS CHORD

WIND BEAM AND POST CLIP (TYP.)

BOTTOM OF SIGN PANEL

3" (IN) Z-BAR

TOP TRUSS CHORD

SIGN PANEL

SIDE VIEW

TRUSS CONNECTION

BOTTOM TRUSS CHORD

WIND BEAM AND POST CLIP (TYP.)

BOTTOM OF SIGN PANEL
### Material Specifications

**PIPE**
- ASTM A 36 OR ASTM A 36 GRADE B, TYPE E OR S
- OR ASTM A 500 GRADE B

**Plates and Shapes**
- ASTM A 36

**Structural Tubing**
- ASTM A 500 GRADE B

**Galvanizing for Pipe Plates and Shapes**
- AASHTO M 111

**HSS Strength Bolts, Nuts, & Washers, Inc.**
- MOUNTING BEAM BOLTS
- STD SPEC. 9-06.9(2)

**All Other Bolts**
- STD SPEC. 9-06.9(1)

**Fasteners, Galvanizing**
- AASHTO M 232

**Steel Grating**
- ASTM A 36

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**NOTES**

1. **NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.**
2. **FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE SIGN BRIDGE. SEE STANDARD PLAN G-95.20.**
3. **FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE SIGN BRIDGE. SEE STANDARD PLAN G-95.30.**
4. **LOCATION OF RAILING SPUCES TO BE DETERMINED BY FABRICATOR. SEE "RAILING SPUCES DETAIL."**

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**End View A**

- W4 x 13 AND RAILING POST

**Plan**

- MAINTENANCE WALKWAY

**Elevation**

- MAINTENANCE WALKWAY

---

**Notes**

- INSTALL 2 HINGES W/ 5/8" S.S. SCREWS (TYP.)

**Gate Stop**

- ATTACH TO FRAME

**W4 x 13 AND RAILING POST**

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**Notes**

1. **EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**

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**Washington State Department of Transportation**

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**Approved for Public Use**

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**References**

- STANDARD PLAN G-95.10-01

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**Drawn by Bill Beeren**

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**5/10/11**
GRATING FASTENER (TYP.) SEE DETAIL

SPAN (DIRECTION OF BEARING BARS)

PANEL SPAN (TYP.)

1/4" MAX. (TYP.)

1" MAX. CLEAR (TYP.)

1/4" TOE PLATE

CROSS BAR, 1/8" MIN. THICKNESS (TYP.)

BEARING BAR, 3/16" MIN. THICKNESS (TYP.)

PLAN

STEEL GRATING DETAIL
(RAILING NOT SHOWN FOR CLARITY)

INSTALL AND ARRANGE THE GRATING FASTENERS ACCORDING TO THE GRATING MANUFACTURER'S RECOMMENDATIONS.

W4X13 (TYP.)

SECTION F

W4X13 (TYP.)

SECTION G

W4X13

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
MAINTENANCE WALKWAY INSTALLED ON MONOTUBE SIGN BRIDGE
(WALKWAYS MAY BE USED WITH OTHER LAYOUTS THAN THOSE SHOWN ABOVE)

NOTE:
1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE DETAILS, SEE STANDARD PLAN G-96.18.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. 3/8" DIAM. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.
5. HANDRÁIL, FIT-UP WITH VMS DOOR OPENING IS THE RESPONSIBILITY OF THE CONTRACTOR.
PROVIDE A 3/4" DRAIN HOLE FOR GALVANIZING, TOP & BOTTOM (TYP.)

STRUCTURAL LUGS (SIZE TO FIT ROPE SPLINTER SOCKET) (TYP.) SEE DETAIL "A"

MONOTUBE BEAM

MONOTUBE

FABRICATED FROM L4x4 x 3/8

FABRICATED FROM L4x4 x 3/8

1/4" COVER PLATE TOP & BOTTOM

STRUCTURAL LUG (INTERMEDIATE SUPPORT) SEE DETAIL "B" (SEE NOTE 3)

FIELD LOCATE 1 1/8" DIAM. HOLES @ FRONT & BACK OF MONOTUBE (TYP.)

MONOTUBE

STRUCTURAL LUGS SEE DETAIL "A"

3/4" H.S. BOLT W/ NUT & 2 WASHERS, GALV. (TYP.)

MONOTUBE

MONOTUBE

ELEVATION VIEW

ELEVATION VIEW

ELEVATION VIEW

FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN BRIDGE

FALL RESTRAINT BRACKET INSTALLATION ON EXISTING MONOTUBE SIGN BRIDGE

MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE SIGN BRIDGE STANDARD PLAN G-95.20-02 SHEET 2 OF 3 SHEETS

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VMS HOUSING

1" MAX. CLR. (TYP.)

STEEL GRATING (TYP.)

WALKWAY ENTRANCE
(INSIDE OPENING SWING GATE)

TOE PLATE
(ALL-AROUND)

MAINTENANCE WALKWAY
PARTIAL PLAN

W4 x 13 MOUNTING BEAM (TYP.)

W4 x 13 MOUNTING BEAM

FACE OF VMS

TRUSS-TYPE SIGN BRIDGE

W4 x 13 AND RAILING POST

MAINTENANCE WALKWAY
MOUNTING FOR
TRUSS-TYPE SIGN BRIDGE
STANDARD PLAN G-95.30-02

SECTION B

W4 x 13 MOUNTING BEAM

SECTION C

3/8" DIAM. U-BOLTS
W4 HEX LOCK NUTS & FLAT WASHERS

3/16" BOLT DIAM.
+ 1/16"
CD .5 " WHEN AN INTERMEDIATE SUPPORT IS USED

DETAIL "A"

HOLE DIAM. = BOLT DIAM. + 1/16"

DETAIL "B"

1 1/2" R

3/4" x 3" SLOTTED HOLE

TRUSS CHORD

1 1/8"

1 1/8"

5/8" PLATE

1 1/2" R

3" R

3/4" x 4" x 8" PLATE

6"
**SHRUB, TREE AND GROUND COVER PLANTING DETAIL**

- **MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT**
- **MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE**

**SECTION**

- **BULB PLANTING DETAIL**
  - **UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE**
  - **MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT**

**SLOPE PLANTING DETAIL**

- **(INCLUDES ALL PLANTS ON SLOPES)**
  - **PLANT RHIZOME WITH CROWN / GROWTH POINTS AT FINISHED GRADE**

**Tuber or Rhizome Planting Detail**

- **UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE**

**EMERGENT PLANTING DETAIL**

- **SPREAD ROOTS OUT OF PLANTING HOLE 3 TIMES THE ROOT SPREAD**

**STREET TREE PLANTING AND STAKING DETAIL**

- **MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT**
- **MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE**

**NOTE**

- Backfill with soil removed from hole
- See planting area soil preparation detail or Special Provisions.
NOTES

1. See Plant Material List for size and type of live stake.
2. Do not use axe or sledge for driving stakes.
3. In hard ground use an iron bar or star drill to prepare the holes for the stake.
4. Avoid stripping bark or bruising stakes during installation.
5. Fill void around cutting with soil.

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
1. All Angle Irons and Steel Straps shall be galvanized in accordance with AASHTO M 232.

2. Pipe, Caps, and T-Adapter shall be 1" I.D. white PVC or Primed Steel, except the water intake pipe shall be white PVC. Pipe shall be Sch. 40. All pipe joints shall be threaded.

3. Gage assembly pipe, fiberglass rod, and angle iron can be extended as needed to fit site requirements. Extra Pipe Clamps shall be added for security.

4. Score the water intake pipe 1/4" deep, 1/32" wide (width of saw blade), every 1/2", alternating cuts on top and bottom for drainage. Place at lowest water level.

5. Water level may vary, depending on season.

6. Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.
Automated Ground Water Monitoring Well
Standard Plan H-32.10-00
Sheet 1 of 1 SHEET
Approved for publication
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

Optical Reader

Weather Resistant Battery Compartment

Moisture-Proof (Potted) Internal Data Logger

Removable Adjuster Cap

"0" Calibration Point Marker

"0" Calibration Point (FWD=ISO Grade)

Bentonite Pellets

Well Screen Slots Begin (All Slots 0.01")

Well Screen

No. 1 Sand or Pea Gravel

Well Screen Slots End

End of Probe

2" Min. Annulus Around Well Screen

State of Washington
Registered Landscape Architect
Mark W. Mairer
Certificate No. 000568
9/6/07

Washington State Department of Transportation
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
CONCRETE FOOTING - COMMERCIAL CONCRETE

6" x 1/4" Diam. Steel Bar

FINISHED GRADE

SECTION A

CONCRETE FOOTING - COMMERCIAL CONCRETE

NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

POST

STEEL CAP PLATE

1/2" REFLECTIVE TAPE (TYP.)

STEEL PIPE - ASTM A 53, NPS 3 (6" NOM.), SCHEDULE 80

1/2" REFLECTIVE TAPE (TYP.)

5/16" DRILLED HOLE

PAINT ASSEMBLY WITH A "HIGHLY VISIBLE" COLOR
(SAFETY YELLOW IS ACCEPTABLE)

SECTION A

PLAN VIEW

ROUND FOOTING

SQUARE FOOTING

PLAN VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

BOLLARD TYPE 2

STANDARD PLAN H-60.20-01
WOOD POST FASTENERS

<table>
<thead>
<tr>
<th>SIZE / TYPE</th>
<th>QUANTITY</th>
<th>WASHERS</th>
<th>LOCKNUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; DIA. X 3/4&quot; BOLT</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; DIA. X 3/4&quot; BOLT</td>
<td>4</td>
<td>8</td>
<td>4</td>
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</tbody>
</table>

STEEL POST FASTENERS

<table>
<thead>
<tr>
<th>SIZE / TYPE</th>
<th>QUANTITY</th>
<th>WASHERS</th>
<th>LOCKNUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; DIA. X 2 3/4&quot; BOLT</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; DIA. X 2 3/4&quot; BOLT</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>3/16&quot; DIA. X 1&quot; SCREW</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

NOTES

1. A socket and wedge anchoring system that meets the NCHRP 350 crash test criteria may be substituted in lieu of the anti-twist plate designs shown. Anti-twist plates are not required for wood post installations.

2. The platform design shown on this plan features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this design, but it must fit the bracket design shown on this plan. Brackets are required for all single-post installations. Field drilling may be necessary.

3. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners (see ALIGNMENT DETAIL, Sheet 2). Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

4. Attach a newspaper box to a steel post with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Use two 1/2" lag bolts to attach newspaper boxes to wood posts. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

5. A Type 2 Support (Standard Plan H-70.20) is required when 2 or more mailboxes are to be installed on one support.
MAILBOX - SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" X 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
AS REQUIRED TO
FILL GAP (TYP.)

MAILBOX MOUNTING HOLE
(TYP.)

SPACE PROVIDED ON BOTH
ENDS TO ALLOW ACCESS TO
FASTENERS - SEE NOTE 4

MAILBOX, PLATFORM & SUPPORT

NOTE

1. The anchoring system shall meet NCHRP 350 crash test criteria. Use a socket
   and wedge system or the anchoring system supplied or recommended by
   the Type 2 Support manufacturer.

2. A maximum of five mailboxes may be installed on a Type 2 Support.

3. The Platform design shown in this plan is detailed in the PLATFORM DETAIL,
   Standard Plan H-70.10, Sheet 2. The design features slots that accommodate
   several types of mailbox supports; only those slots necessary for assembling the
   type being installed are required. An adjustable platform may be used in lieu of
   this platform design. Adjustable platforms must fit the 1 7/8" M-Clamp.

4. Center the mailbox on the platform to ensure space for the mailbox door to open
   and to allow space for installing the fasteners (see ALIGNMENT DETAIL).
   Spacing of mailbox mounting holes varies among manufacturers. Attachment of
   the mailbox to the platform may require drilling additional holes through
   the mailbox to fit the platform.

5. Attach a newspaper box to a Type 2 Support with two 1 7/8" Muffler Clamps
   spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Newspaper
   boxes must not extend beyond the front of the mailbox when the mailbox door
   is closed.
MAILBOX - SIZE 1 OR 1A (SIZE 1A SHOWN)
- SEE TABLE, STANDARD PLAN H-70.10, SHEET 1, FOR DIMENSIONS

3/16" x 1" PHILLIPS HEAD SCREW, 2 WASHERS, AND LOCKNUT WITH NYLON INSERT (TYP.) - 4 SETS MIN.

MAILBOX SUPPORT TYPE 3
STANDARD PLAN H-70.30-02

NOTES
1. The insert pipe is 1" nominal diameter, Schedule 40 steel pipe, as indicated; all other pipe shown on this plan is 1 1/4" nominal diameter, Schedule 40 steel pipe. All pipe, couplings, and elbows shall be galvanized in accordance with ASTM A 153.

2. The vertical support may be cast in a concrete foundation, or bolted to a U-channel post, (see PLACEMENT DETAIL, Sheet 2). Avoid placing the vertical support in the flow line of a ditch.

3. The pipe angles required in this design may be achieved by using pipe fittings or by bending the pipes. See DETAIL "A," Sheet 2.

4. Coat the 1" diam. pipe with grease (petroleum) before sliding the 1 1/4" diam. pipe (cantilever arm) onto it, to aid rotation and to guard against corrosion.

5. The Platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.10, Sheet 2. The design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required.

6. Match the edge of the mailbox platform to the end of the horizontal pipe mount. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners. Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform, (see ALIGNMENT DETAIL).

7. Attach a newspaper box to the pipe with two 1 3/4" muffler clamps spaced 4" apart. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

NEWSPAPER BOX ATACHMENT DETAIL

WASHINGTON, STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
2x2 WOOD POST

STAPLE TOP TIE

SELF-LOCKING TIE – NYLON 6/6 (MIN. GRADE), 50% MIN. TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST

SELF-LOCKING TIE – NYLON 6/6 (MIN. GRADE), 50% MIN. TENSILE STRENGTH, UV STABILIZED

ENVIRONMENTALLY SENSITIVE AREA BOUNDARY

HIGH DENSITY POLYETHYLENE OR POLYPROPYLENE MESH, AND SHALL BE UV RESISTANT, ORANGE COLOR

VERTICAL POST

ELEVATION

FENCE ON SLOPE

ELEVATION

TYPICAL SECTION

2x2 WOOD OR STEEL T-BAR POST

NOTE

1. Post shall have sufficient strength and durability to support the fence through the life of the project.

HIGH VISIBILITY FENCE

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
MARK W. MAUSER
CERTIFICATE NO. 000598
8/10/2009

WASHINGTON State Department of Transportation
HIGH VISIBILITY FENCE
STANDARD PLAN 1-10.10-01
SHEET 1 OF 1 SHEET

VERIFIED FOR PUBLICATION
NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

2. Perform maintenance in accordance with Standard Specifications 8-01.3(9) and 8-01.3(15).

3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.

4. Install silt fencing parallel to mapped contour lines.

TYPICAL INSTALLATION DETAIL

(STEEL POSTS SHOWN)

NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE. THE SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOODS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

POST - SEE STD. SPEC. 8-01.3(9)A
ATTACH IN A MANNER THAT ASSURES FABRIC IS FIRMLY HELD BY THE BACKUP SUPPORT IN A WAY THAT REDUCES THE POTENTIAL FOR FABRIC TEARING

BURY GEOTEXTILE IN TRENCH

FASTEN GEOTEXTILE TO POST EVERY 6" (IN.) O.C.

SELF-Locking TIE-NYLON 66 (MIN. GRADE)
120# MIN. TENSILE STRENGTH, UV STABILIZED

INSTALL BACKUP SUPPORT FOR THE GEOTEXTILE - SEE STANDARD SPECIFICATION SECTION 8-33.2(1), TABLE 6

GEOTEXTILE FOR SILT FENCE - SEE STANDARD SPECIFICATION SECTION 9-33.2(1), TABLE 6

SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

SPlice DETAIL

(STEEL POSTS SHOWN)
BACKFILLED & COMPACTED NATIVE SOIL

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

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(STEEL POSTS SHOWN)

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(STEEL POSTS SHOWN)

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TYPICAL INSTALLATION DETAIL
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TYPICAL INSTALLATION DETAIL
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TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

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TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

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TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

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TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

2. Perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(15).

3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.

4. Install silt fencing parallel to mapped contour lines.

NOTES:

1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

2. Perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(15).

3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.

4. Install silt fencing parallel to mapped contour lines.

TYPICAL INSTALLATION DETAIL

(Steel posts shown)

NOTE

During excavation, minimize disturbing the ground around trench as much as is feasible, and smooth surface following excavation to avoid concentrating flows. Compaction must be adequate to prevent undercutting flows.

INSTALL BACKUP SUPPORT FOR THE GEOTEXTILE

- See Standard Specification Section 8.01.3(9)A

GEOTEXTILE FOR HIGH VISIBILITY SILT FENCE
COLOR - ORANGE - See Standard Specification Section 9-33.2(1), Table 6

POST - WOOD OR STEEL
(TYPICAL)

BACKUP SUPPORT
(TYPICAL)

SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT-Laden WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

splice detail
(Steel posts shown)

TYPICAL HIGH VISIBILITY SILT FENCE WITH BACKUP SUPPORT
ISOMETRIC
(Steel posts shown)

STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
JANET R. HILDEBURG
CERTIFICATE NO. 003060
MARCH 11, 2013

HIGH VISIBILITY SILT FENCE WITH BACKUP SUPPORT
STANDARD PLAN I-30.16-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
MAY 13

Washington State Department of Transportation
NOTES
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(15).
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.
PLACE SAND BAGS AS REQUIRED AROUND CULVERT TO PROVIDE SUPPORT FOR SILT FENCE.

CULVERT, BOX CULVERT, OR PIPE ARCH - END TREATMENT VARIES

SILT FENCE DESIGN

COMPOST BERM - SEE STD. PLAN I-30.12

CULVERT, BOX CULVERT, OR PIPE ARCH - END TREATMENT VARIES

COMPOST BERM DESIGN

GEOTEXTILE FOR TEMPORARY SILT FENCE - SEE STD. SPEC. 9-33.2(1), TABLE 6

SILT FENCE - SEE STD. PLAN I-30.10

POST - SEE STD. SPEC. 8-01.3(B)

EMBED POSTS INTO BAGS AS REQUIRED

FLOW

EDGE OF GEOTEXTILE

SECTION A

NOTE
Perform maintenance in accordance with Standard Specification 8-01.3(9)A and 8-01.3(15).

SHEET 1 OF 1 SHEET

EROSION CONTROL
AT CULVERT ENDS
STANDARD PLAN I-30.20-00

WASHINGTON DEPARTMENT OF TRANSPORTATION
WSP No. 701

APPRAISED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
WATTLE INSTALLATION ON SLOPE

STANDARD PLAN I-30.30-01

SHEET 1 OF 1 SHEET

NOTES

1. Wattles shall be in accordance with Standard Specification 9-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification 8-01.3(10).

2. Securely knot each end of Wattle. Overlap adjacent Wattle ends 12" behind one another and securely tie together.

3. Compact excavated soil and trenches to prevent undercutting. Additional staking may be necessary to prevent undercutting.

4. Install Wattle perpendicular to flow along contours.

5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.

6. Perform maintenance in accordance with Standard Specification 8-01.3(15).

7. Refer to Standard Specification 8-01.3(16) for removal.
NOTES
2. Securely knot each end of Compost Sock. Overlap adjacent Compost Sock ends 12" behind one another and securely tie together.
3. Compost to be dispersed on site as determined by the Engineer, when vegetation covers the surface.
4. If Erosion Control Blanket is specified, place Compost Sock on top of blanket. See Standard Plan 1-60.10.
5. Install Compost Sock perpendicular to flow along contours.
6. Remove sediment from the up slope side of the Compost Sock, when accumulation has reached 1/2 of the effective height of the Compost Sock.
7. Perform maintenance in accordance with Standard Specification 8-01.3(15).
8. Refer to Standard Specification 8-01.3(16) for removal.

8" DIAMETER
COMPOST SOCK SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H : 1V</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>2H : 1V</td>
<td>20'-0&quot;</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>30'-0&quot;</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>40'-0&quot;</td>
</tr>
</tbody>
</table>

COMPOST SOCK DETAIL

ISOMETRIC VIEW
CATCH BASIN INSTALLATION

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

Date: 6 June 2018

COMPOST Sock
STANDARD PLAN 1-30.40-01
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
NOTES
1. Coir logs shall be installed starting at the bottom of the slope and working uphill.
2. Excavated material shall be spread evenly along the uphill slope and compacted by hand tamping or other methods approved by the Engineer.
3. Overlap Coir log ends by 12" to prevent water from moving between logs.
4. Always install Coir log perpendicular to slope along contour lines. Ends shall angle uphill to prevent flow around the Coir log.
5. Use an adequate number of stakes to ensure logs are secure.
7. Perform maintenance in accordance with Standard Specification 8-01.3(15).
NOTES

1. Prefabricated units may be used in lieu of the design shown on this plan upon approval of the Engineer.

2. Structure shall be constructed such that geotextile material shall be fastened to posts creating a seamless joint.

3. Ensure that ponding height of water does not cause flooding on adjacent roadways or private property.

4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
NOTES
1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
**GENERAL NOTES**

1. Check Dams shall meet the requirements of Standard Specifications 8-01.3(6) and 9-14.5(4).

2. In channels, install the sloped ends of the Check Dam a minimum of 8" higher than the spillway to ensure water flows over the dam and not around it.

3. Perform maintenance in accordance with Standard Specification 8-01.3(16).

4. Remove Check Dams in accordance with Standard Specification 8-01.3(16).

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**BIODEGRADABLE CHECK DAM**

1. Biodegradable Check Dams may need additional or modified staking to prevent undercutting or scouring.

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**NON-BIODEGRADABLE CHECK DAM**

1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer's recommendations and shall perform in accordance with Standard Specification 8-01.3(6).

2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.

3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.
1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket down the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.
7. Stake of staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

INSTALLATION STEPS:

NOTES
1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and slope steepness.
2. See Standard Specification 8-01.3(3) and 9-14.5(2).
3. Use manufacturer's requirements. When manufacturer's requirements are not provided, use installation requirements shown on Standard Plans.
4. Additional staples may be required on slopes greater than 3H:1V.
1. Prepare smooth slope.
2. Amend soil and seed as specified.
3. Dig anchor trench; set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket parallel to the slope in a controlled manner; tacking care to remove excess slack; and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

**NOTES**

1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.
2. Install Check Slots per manufacturer’s recommendations.
4. Use manufacturer’s requirements. When manufacturer’s requirements are not provided, use installation requirements shown on Standard Plan.
5. Additional staples may be required for high flow exposure.

**INSTALLATION STEPS:**

1. Prepare smooth slope.
2. Amend soil and seed as specified.
3. Dig anchor trench; set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket parallel to the slope in a controlled manner; tacking care to remove excess slack; and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

OUTFLOW CHANNEL IS
CONSTRUCTED BY EXCAVATION

1' (FT) DEPTH OVERFLOW

SEDIMENT TRAP BOTTOM

1' (FT) DEPTH OF 3/4" - 1 1/2"
COARSE AGGREGATE FOR
PORTLAND CEMENT CONCRETE
SEE STANDARD SPECIFICATION
SECTION 0-3.1(4)

COMPACTED NATIVE MATERIAL
CONSTRUCTED BY EXCAVATION
OR EMBANKMENT

QUARRY SPALLS ≤ 1' (FT) DEPTH
SEE STANDARD SPECIFICATION
SECTION 9-13.1(6)

PROVIDE GEOTEXTILE FOR SEPARATION
SEE STANDARD SPECIFICATION
SECTION 9-22

SECTION A

AS REQUIRED = 100' (FT) MIN. EXCEPT
MAY BE REDUCED TO 50' (FT) MIN. FOR
SITES WITH LESS THAN ONE ACRE
OF EXPOSED SOIL

PLACE CONSTRUCTION GEOTEXTILE FOR SOIL
STABILIZATION FROM THE EDGE OF THE EXISTING
ROADWAY TO THE CONSTRUCTION ENTRANCE,
OR AS DIRECTED BY THE ENGINEER

PERMEABLE BALLAST (TYP.) = SEE
STANDARD SPECIFICATION
SECTION 9-03.1(0)

provide full width of ingress / egress area
15' (FT) MINIMUM

COARSE COMPOST

TYPICAL SECTION
COMPOST BERM DETAIL

0'-6" MAX. HT =
BERM OR PARTIAL OR
COMPLETE EXCAVATION

NOTE
PLACE GEOTEXTILE UNDER THE SPOILWAY AND SLOPE SLOPES.
PROVIDE A CONTINUOUS LAYER BETWEEN THE GRAVEL/ROCK AND THE NATIVE EARTHEN MATERIAL.

TEMPORARY SEDIMENT TRAP

LONGITUDINAL SECTION

GROUND LINE

1' - 6" SEDIMENT STORAGE

2'-0" SETTLING DEPTH

4' - 0"
MIN

W - 0" MIN

COMPOST SOCK

TEMPORARY SILT FENCE

5' - 0" M.

X = 1' - 6" FOR SLOPES STEEPER THAN 4H:1V
X = 1' - 0" FOR SLOPES 4H:1V OR FLATTER

2X

SETTLING POND

PARTIAL PLAN VIEW OF BERM
SHOWN LARGER FOR QUANTITY

QUARRY SPALLS ≤ 1' (FT) DEPTH

DISCHARGE TO STABILIZED
CONVEYANCE, OUTLET, OR
LEVEL SPREADER

OVERFLOW CHANNEL

LIMITS OF QUARRY
SPALLS (TYP.)

ISOMETRIC VIEW
STABILIZED CONSTRUCTION ENTRANCE
STABILIZED CONSTRUCTION ENTRANCE SHALL MEET THE REQUIREMENTS
OF STANDARD SPECIFICATION SECTION 8-01.1(7).
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

**ELECTRICAL CONDUIT PLACEMENT**

**SECTION A-A**

Conduit reserve area

Conduit reserve area

Face of guardrail

Back of curb

Edge of shoulder

Conduit reserve area

Conduit

PLAN

Not Steeper than 2:1

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
CONSTRUCTION NOTES

1. Drive ground rods before placing concrete. Move rod(s) and drain tiles with cover(s) as required to achieve full ground penetration. Maintain a 6' (ft) minimum clearance between ground rods and 8" (in) from foundation edge as detailed on Standard Plan J-60.08.

2. GRS conduits penetrating all cabinets shall be terminated with grounding bushing and bonded to the cabinet grounding bus. All PVC conduits penetrating cabinet shall be terminated with end bell bushings.

3. Install conduit couplings on all conduits. Place coupling tops flush with top of conduit. If PVC conduits are specified, the conduit stub and end bell bushing shall be glued to the coupling.

4. 4" (in) diam. x 1 1/2" (in) deep sump. Slope foundation within cabinet footprint toward sump. Drain pipe shall be 4" (in) diameter polyethylene or copper tubing.

5. The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2" (in) or 9" (in) cabinet footing.

6. Cabinet power supply conduit.

7. Conduits for service grounding electrodes.

8. When distance detailed in Typical Foundation Plan is greater than 6' (ft), this conduit end conductor shall be deleted.

NOTES

1. The cabinets shown in these details are for illustrative purposes only. The Contractor shall verify the plans and substitute those cabinets in place of the cabinets shown in these details. The Contractor shall install each cabinet type in the locations and orientations shown in these details.

2. The Contractor shall install the conduits in the locations shown. Conduits shall extend 2" (in) min. above the coupling. The grounded end bushing on GRS conduit and the end bell bushing on PVC conduit shall extend 3" (in) max. above the coupling. The conduit containing unused utility conductors shall extend into the utility chase.

3. The ground rods, drain tile, occluded conduit, and #4 rod (90° with 30° in logo), may be omitted if no transformer or service cabinet is to be installed.

4. The cabinets shall be attached to the foundation with 4 each: 1/2" (in) x 10" (in) x 2" (in) x 4" (in) anchor bolts (see Detail on Sheet 4 of 6), washers, and nuts conforming to Standard Specification 9-06.8(1) and hot-dip galvanized after fabrication in accordance with AASSHTO M 232. Locate anchor bolts per manufacturer. Stainless steel tripod anchors may be used as an alternative, and shall be 1/2" (in) diameter x 6" (in), or 3/8" (in) diameter x 8" (in). All threaded rod (conforming to ASTM F953), washers (conforming to ASTM A240), and nuts (conforming to ASTM F964), shall be Type 304 stainless steel. Bolts shall extend 1 1/2" (in) to 2" (in) max. above the concrete pad, prior to placing.

5. All reinforcing steel shall be embedded 2" (in) below surface of concrete.

6. Place a 1/2" (in) bead of silicone between cabinets and foundation.

7. Two ground rods are required for foundations with a service cabinet or transformer cabinet. See Standard Plan J-60.05 for details.


9. Verify dead front locations from manufacturer prior to placing conduit in foundation.

10. Foundations installed in, or adjacent to, sidewalks shall be constructed with the top flush with the sidewalk surface and grade, not including concrete slabs on edge for cabinets. Omit chamfers where foundation abuts sidewalk.

11. If the slope is 3H:1V or steeper, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

12. For Type 333SD Control Cabinet, the cabinet vendor shall allow the Utility Transfer Switch to be installed on either side of the cabinet. The Utility Transfer Switch unit shall be shipped inside the cabinet for field installation by Region Maintenance personnel.

13. Height of cabinet riser shall be adjusted to serve environmental needs. Type D Service cabinet shall have no riser. NEMA P44, Type 333SD, and Type B Modified shall have a 9" (in) riser. All other cabinets shall have a 3 1/2" (in) riser. See Contract for alternative height. Adjust length of conduit and rebar accordingly.

14. Use (1) #4 hoop for a 3 1/2" (in) cabinet footing and (2) #4 hoops for a 9" (in) cabinet footing.

15. The Panel Location is set by industry standards on all Control Cabinets.

16. See Standard Plan J-10.20 for additional Foundation Construction and Conduit Routing for Type B Modified Service Cabinet with Controller Cabinet.

17. Verify panel size and location with Project Engineer.

18. Field bend #4 rebar around the Generator Anti-Theft Tie-Down Unit when required.

19. See Standard Plans J-10.21 and J-10.22 for additional details for Type D and Type E Service Cabinets.

20. As an alternate, #3 rebar spaced at 12" O.C. longitudinally and transversely may be used.
CONTROLLER CABINET FOUNDATION NOTES

1. Slope conduit reserve area floor 1/4" (in) per 1' (ft) to the sump in the center.
2. All other dimensions shall be approved by the Engineer.
3. Provide 2" (in) clearance between conduit and edge of foundation well for cable slack.
4. For the rest of the foundation, see Standard Plan J-10.20 for details.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES (CONTINUED)


4. Hinges shall have stainless steel or brass pins.

5. Cabinet shall be rated NEMA 3R.


12. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:
   Key Numbers 2, 3, 4, 6, 7, and 8.
   Key Number 4 name plate shall read as follows: "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF - AUTOMATIC."
   See service cabinet detail.

13. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

14. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.

15. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.

16. All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the Schedules. Approved PVC or polyolefin wire marking sleeves shall be used.

17. All nuts, bolts, screws, and washers used for mounting the photoelectric control enclosure, conduit body covers, and junction box cover shall be ASTM F593 or A193 Type 304 or Type 316 stainless steel.

18. A 1% tolerance is allowed for all dimensions.

19. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.

20. Install conduit couplings on all conduits.

21. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or solder in place. See Standard Plan J-10.20 for alternate door hinge details.

22. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded steel mesh with welded seams and mounting flanges and shall be hot-dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" (in) x 5/8" (in) expanded steel mesh may be used as an alternative material. See Standard Plan J-10.20 for enclosure mounting details.

23. See Contract for Breaker Schedule.
NOTES

1. Metering arrangements may vary with different serving utilities. The Contractor shall verify the requirements of the utility prior to installing the service equipment.

2. All service pole conduits shall be secured to the pole with two-hole conduit straps spaced at 5 (5) maximum centers. See Standard Plans J-60.13 and J-60.14 for steel channel support and mounting details. Where required by the Utility, an alternative-use hot-dip galvanized standoff bracket may be used. See Standard Plan J-10.16 for ALTernate Standoff Bracket detail.

3. All risers and service equipment shall be installed on side of pole that is away from traffic.

4. Where required by the serving utility, service breakers shall be installed above meter socket in a separate rain-tight enclosure. See Standard Plan J-60.05 for grounding details.

5. See Breaker Schedule in Contract for breaker and contactor sizes.


OTES (200 AMP TYPE 120/240 1e SERVICE CABINET)


Hinges shall have stainless steel or brass pins.

Cabinets shall be rated NEMA 3R and shall include two rain-tight vents.

Metering equipment door shall be pad-lockable. Each door shall be gasketed. Install Best CX Construction Core on right side door. See Door Hinge Detail.

The following equipment within the service enclosure shall be included:
- Phenolic name plate with screws or rivets.
- Key Numbers 2, 3, 4, 6, 7, 8, 9, & 16

Key Number 4 name plate shall read: "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF-AUTOMATIC. See Service Cabinet Detail.

Metering arrangements vary with different serving Utilities. The Utility may require meter base mounting in the enclosure, on the side, or on the back of the enclosure. The Utility may require the dimension between the door and the front of the safety socket box to be less than the 11" (in) shown in the Left Side - Safety Socket Box Mounting Detail. The Contractor shall verify the service requirements prior to fabrication and installation of the service equipment.

Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpering of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.

The photocell unit shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell without removal of the photocell unit or the photocell enclosure.

All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or polyolefin wire marking sleeves shall be used.

All nuts, bolts, and washers used for mounting the photocell enclosure shall be stainless steel.

A 1% tolerance is allowed for all dimensions.

Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dipped galvanized steel or stainless steel.

The meter base portion of this service was designed to meet metering portion of EUERC Drawing 309 requirements.

When using alternate door hinges:
- Remove hinge pin prior to welding hinge to cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with brass pin and solder in place.

Verify the service utility stand-off dimension. Adjust the removable panel to the measurement provided by the Utility Company. After adjustment, cut off all-thread bolts so that no less than two and no more than three full threads extend past the face of the nuts.

As an alternate to the bolted or field welded strut mount supports, 1 5/8" (in) x 3 1/4" (in) 12-gage continuous slotted steel channel or factory welded 1 5/8" (in) x 1 5/8" (in) 12-gage back to back continuous slotted steel channel may be used. Three pairs required.

DRAWN BY: COLBY FLETCHER

CABINET MAIN BONDING JUMPER ASSEMBLY DETAIL

12-GAGE - MATERIAL SHALL BE THE SAME AS CABINET MATERIAL
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

- DRIVE GROUND RODS BEFORE PLACING CONCRETE - MOVE ROD(S) AND DRAIN TILES(WITH COVERS) AS REQUIRED TO ACHIEVE FULL GROUND PENETRATION - MAINTAIN A 6' (FT) MINIMUM CLEARANCE BETWEEN GROUND RODS AS DETAILED ON STANDARD PLAN J-40.05
- ALL RMC CONDUIT PENETRATING CABINET SHALL BE TERMINATED WITH GROUNDING END BUSHING AND BONDED TO THE CABINET GROUNDING BUS
- 4" (IN) DIAM. X 1 1/2" (IN) DEEP SUMP - SLOPE FOUNDATION TOWARD SUMP - 3/8" (IN) DIAM. POLYETHYLENE OR COPPER DRAIN PIPE - SLOPE TO DRAIN OUTSIDE FOUNDATION - LOCATE DRAIN AWAY FROM ACCESS DOORS
- TO SERVICE GROUND - PER STANDARD PLAN J-40.05
- INSTALL CONDUIT COUPLINGS ON ALL CONDUIT - TOP OF CONDUIT COUPLINGS SHALL BE FLUSH WITH TOP OF CONCRETE - IF PVC COUPLINGS ARE SPECIFIED THE CONDUIT STUB AND END BELL BUSHING SHALL NOT BE GLUED TO THE COUPLING
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

POST MOUNTED SERVICE CABINET WITHIN RIGHT-OF-WAY FENCE
FOR CONDUITS NOT SHOWN, DRAIN TILE FOR GROUNDING, DRAIN TUBES, REINFORCING STEEL, ETC.
OMITTED FOR CLARITY, SEE SHEET 4 FOR ADDITIONAL DETAILS.

ELEVATION VIEW
SIDE VIEW

SERVICE CABINET IN VICINITY OF CHAIN LINK FENCE
POST MOUNTED SERVICE CABINET SHOWN, PAD MOUNTED SERVICE CABINET SIMILAR

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

PAD MOUNTED SERVICE CABINET WITHIN RIGHT-OF-WAY FENCE
FOR CONDUITS NOT SHOWN, DRAIN TILE FOR GROUNDING, DRAIN TUBES, REINFORCING STEEL, ETC.
OMITTED FOR CLARITY, SEE SHEET 4 FOR ADDITIONAL DETAILS.

ELEVATION VIEW
SIDE VIEW

SERVICE CABINET TYPE B
MODIFIED (0 - 200 AMP TYPE)
120/240 SINGLE PHASE
STANDARD PLAN J-10.20-0-
NOTES
1. Metering Arrangements vary with different serving utilities. The utility may require meter base mounting in the enclosure, on the side, or on the base of the enclosure. The utility may require the dimension between the door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting detail. See Standard Plan J-3b. The Contractor shall verify the serving utility’s requirements prior to fabrication of and installing the service equipment.
2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor shall verify the serving utilities requirements prior to fabrication and installing the service equipment.
4. Hinges shall have stainless steel or brass pins.
5. Cabinets shall be rated NEMA 3R and shall include two rain tight vents.
6. Metering equipment doors shall be pad lockable. Each door shall be gasketed. Install best construction core on bottom left and right doors. See door hinge detail. Standard Plan J-3b. Concocted heavy duty stainless steel lift off hinges are allowed as an alternative. Upper left door shall have 3 hinges, lower left door shall have 2 hinges, and right door shall have 3 hinges. All doors shall have a two position door stop assembly.
7. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key number 1, 2, 4, 5, 6, 7, 8, 9, 16, 21 and 24. Key number 4 name plates shall read: “Photocell Bypass Test On” and “Photocell Test Off-Automatic”. See Service Cabinet detail.
8. The dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
9. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.
10. The photocell unit shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell without removal of the photocell unit or the photocell enclosure.
11. All internal wire runs shall be identified with “To-From” coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or Polyolefin wire marking sleeves shall be used.
12. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.
13. A 1% tolerance is allowed for all dimensions.
14. See plans for breaker schedule.
15. Install conduit couplings on all conduits. Place couplings flush with top of concrete foundation.
16. Seal cabinet to foundation with a 1/2" bead of silicone. Apply silicone to dry surface only.
17. The meter base portion of this service was designed to meet metering portion of Euseco Drawing 309 requirements.

- **BRONZE GROUND CLAMP** - L-20.10
- **INSULATED STRANDED WIRING**
- **CONDUIT (TYP.)**
- **PLAN VIEW**
- **ELEVATION VIEW**
- **SIDE VIEW**
- **DETAIL**
- **SERVICE CABINET INSIDE RIGHT-OF-WAY**
- **INSTALL FOUNDATION AS SLAB SECTION UNLESS IDENTIFIED FOR CONSTRUCTION IN FENCE LINE N CONTRACT PLANS**
- **TYPE 3 CHAIN LINK FENCE** - SEE STANDARD PLAN L-30.10
- **SIDE VIEW**
- **END OR CORNER POST (TYP.) - SEE STANDARD PLAN L-20.10**
NOTES

1. Cabinet construction shall meet the requirements of Standard Specification 9-29.25. Aluminum cabinets shall have mill finish.

2. Busswork shall be rated for 100 Amps minimum.

3. Transformer size, input voltage, and output voltage shall be as shown in the Contract Plans.


5. Secondary branch breakers may be either single or double pole breakers. Only two double pole breakers may be used.

6. Cabinet anchor bolt pattern is determined by the cabinet manufacturer. All anchor bolts shall either be hot dip galvanized or stainless steel cinch bolts. Bolts shall extend a minimum of 1.5 inches above the concrete pad. See Standard Plan J-10.10 for Foundation details.

7. Transformers 7.5 KVA and larger shall be supplied with two full capacity taps, one at 5%, and one at 10% below normal capacity.

8. Engraved phenolic nameplate shall read “SUPPLIED FROM SERVICE CABINET S777???” See Contract Plans for service cabinet S number. Nameplate shall be attached with screws or rivets.

9. Cabinet shall be oriented such that it opens away from traffic.

10. Available fault current label shall meet the requirements of National Electrical Code Article 110.24.
DIGITALLY SIGNED BY
baileyte@wsdot.wa.gov
DN: cn=baileyte@wsdot.wa.gov
Date: 2014.05.12 13:31:25 -07'00'

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

KEY
1. GALVANIZED STEEL OR ALUMINUM MAST ARM – CONFIGURATIONS VARY WITH MANUFACTURER
2. TIMBER LUMINAIRE – SEE CONTRACT FOR TYPE AND NUMBER
3. MOUNTING HEIGHT – ROADWAY TO LUMINAIRE ELEVATION DIFFERENCE ± 2% – SEE CONTRACT
4. MAST ARM LENGTH – SEE CONTRACT
5. 8" (IN) GALVANIZED THIMBLE EYE BOLT (SINGLE OR DOUBLE) WITH WASHERS AND NUTS OR EYE NUT
6. BONDING JUMPER
7. POLE AND BRACKET CABLE
8. EQUIPMENT GROUNDING CONDUCTOR – SEE STANDARD PLAN J-60.05
9. FROM GROUND LINE TO 15' (FT) ABOVE GROUND, ENCLOUSE EQUIPMENT GROUNDING CONDUCTOR IN GALVANIZED STEEL, CONDUIT, CODE SIZED – ABOVE 15' (FT) FROM GROUND, STAPLE EQUIPMENT GROUNDING CONDUCTOR TO POLE – CONNECT TO SUPPLEMENTAL GROUND, PER STANDARD PLAN J-60.05
10. SERVICE HEDGE CLAMP
11. ACSR TRIPLEX OR FOURPLEX CONDUCTORS – SEE CONTRACT
12. CU OR AL SPLT BOLT CONNECTOR
13. MEASURING CABLE
14. INSULATING TAPE FOR WATERPROOF CONNECTION
15. FUSED QUICK DISCONNECT, PER STANDARD SPECIFICATION 9-29.7(2) – USE 30 AMP FUSES FOR HIGH MAST SUPPORTS
16. WEATHERHEAD – SIZE AS REQUIRED

TYPICAL LUMINAIRE MOUNTING CONFIGURATIONS

NOTE:
1. Timber luminaire supports are allowed only for temporary installations where breakaway or Slip Bases are not required.
2. When down guys are required, see Standard Plan J-15.15.

HIGH MAST TIMBER LUMINAIRE SUPPORT
SHOWN FOR 480 VAC POWER FEED – INCREASE CONDUCTOR AND FUSE SIZE AS REQUIRED FOR 240 VAC POWER FEED

STANDARD PLAN J-15.10-0

1. STEEL CONDUIT – STRAPS SPACED MAXIMUM 3' (FT) APART AND NEAR ALL CONDUIT ENDS
2. 8" (IN) x 6" (IN) x 4" (IN) NEMA 3R JUNCTION BOX WITH RAIN-TIGHT HUBS AND REMOVABLE COVER
3. GROUNDING LUG
4. 12-POLE TERMINAL BLOCK
5. DIRECT BURIAL CONDUCTORS OR GALVANIZED STEEL OR PVC CONDUITS WITH CONDUCTORS – SEE CONTRACT
6. GROUNDING END BUSHING
7. SUPPLEMENTAL GROUND – SEE STANDARD PLAN J-60.05
8. CLASS 5 TIMBER POLE – LENGTH SUFFICIENT FOR MOUNTING HEIGHT AND BURIAL DEPTH
9. CLASS 2 TIMBER POLE – LENGTH SUFFICIENT FOR MOUNTING HEIGHT AND BURIAL DEPTH
10. 1¼" (IN) 10" (IN) PLATE COLLAR BENT TO FIT POLE DIAMETER (8" (IN) - 10"(IN))
11. 3/8" (IN) x 4" (IN) MACHINE BOLTS (FOUR REQUIRED) WITH WASHERS AND NUTS
12. 1½" (IN) LAG BOLTS (SIX REQUIRED) – DRILL 9/16" (IN) HOLE IN PLATE
13. 2½" (IN) PIPE
14. 3/4" (IN) WIRE HOLE 2" (IN) FROM GUSSET PLATE, SMOOTH HOLE EDGES
15. 1" (IN) NONMETALLIC CONDUIT WITH 1" (IN) STRAPS SPACED MAXIMUM 5’ (FT) APART AND NEAR ALL CONDUIT ENDS
16. DISTANCE VARIES, 35’ (FT) MIN. TO 50’ (FT) MAX. DEPENDING ON LINE CLEARANCE REQUIREMENTS
17. CONDUIT GROUND CLAMP

WASHINGTON
State Department of Transportation
NOTES

2. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.
4. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.
FOUNDATION DETAILS

TYPE 1 SIGNAL POLE

REINFORCING STEEL QUANTITIES LIST

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6" (IN) DIAMETER HOLE (TYP.)
14" (IN) STEEL PLATE
1 1/2" STEEL BOLT CIRCLE
9" (IN) DIAMETER HOLE (TYP.)

BASE PLATE DETAIL

1 1/2" STEEL PLATE
6" (IN) DIAMETER BOLT CIRCLE
9" (IN) DIAMETER HOLLOW IN CENTER OF GROUT PAD

ANCHOR BOLT TEMPLATE

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 0-07.1(2) FOR BENDING DIAMETER

1 1/2" HOOK (TYP.)
1 1/2" HOOK (TYP.)
1 1/2" HOOK (TYP.)

ANCHOR BOLT TEMPLATE ASSEMBLY
ANCHOR BOLT TEMPLATE - TWO REQUIRED
3/4" (IN) + 3/8" (IN) FULL THREAD ANCHOR BOLT - FOUR REQUIRED
3/4" (IN) DIAM. STEEL HEAVY HEX NUTS - FOUR REQUIRED PER ANCHOR BOLT
FLAT WASHERS - FOUR REQUIRED PER ANCHOR BOLT

ELECTRICAL CONDUIT - SEE CONTRACT FOR DIAMETER

PREIMOLDED JOINT FILLER

PERSPECTIVE VIEW

ACCESSIBLE PEDESTRIAN SIGNAL (APS) ASSEMBLY

HOLE = POLE BASE + 1/6" (IN)

GROUNDING CONNECTION - SEE STANDARD PLAN J-20.20

SUPPLEMENTAL GROUNDING CONDUCTOR (SEE NOTE 5)
3/4" (IN) STEEL BASE PLATE - SEE DETAIL

GROUT PAD = INSTALL AFTER PLUMBING STANDARD
3/8" (IN) I.D. DRAIN TUBE IN GROUT PAD
3/4" (IN) CHAMFER IN CENTER OF GROUT PAD

LEVELING NUT (TYP.)

TOP OF FOUNDATION - FLUSH WITH SIDEWALK

LEVELING NUT (TYP.)

TOP OF FOUNDATION

TOP OF CURB

CONDUIT COUPLING - INSTALL FLUSH WITH TOP OF FOUNDATION. (DO NOT GLUE PVC STUBOUT)

EQUIPMENT GROUNDING CONDUCTOR
BASE PLATE ASSEMBLY - 3/4" (IN) DIAMETER STEEL HEAVY HEX NUT WITH FLAT WASHER, TWO EACH REG'D PER ANCHOR BOLT - MINIMUM OF TWO THREADS ABOVE TOP OF NUT OR 60" (IN) MAXIMUM (TYP.)

PREIMOLDED JOINT FILLER

ACCEESSIBLE PEDESTRIAN PUSHBUTTON WITH CURB BASE

STANDARD PLAN J-20.11-1

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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NOTES

2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11 gage, 4 1/2" (in) O.D. @ slipfitter weld. Taper shall be 0.14" (in) per foot.
3. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Hand holes shall include a removable, rain-tight cover and gasket, fastened with two stainless steel screws (ASTM 553).
7. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete. Provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
8. The junction box serving the standard shall preferably be located 5'-0" (10'-0" max.) from the standard.
9. Where shown in the plans, install plague (R10 - 32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" two inches above the Accessible Pedestrian Signal (APS) Assembly.

2. See Standard Specification 9-29.3 for Cable Conductor requirements.

3. Install heat shrink caps on all spare conductors not terminated on a terminal strip.

4. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: provide 3" - 0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with manufacturer's recommended crimp). 

5. Equipment grounding conductor shall attach to grounding stud with a full circle crimp-on connector (crimped with a manufacturer's recommended crimp).

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### PEDESTRIAN SIGNAL STANDARD (TYPE PS) ELECTRICAL DETAIL STANDARD PLAN J-20.20-02

**NOTES**

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* ASSOCIATED PHASE NUMBER

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**SC PEDESTRIAN HEAD TERMINATIONS**

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* ASSOCIATED PHASE NUMBER
ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) DETAILS

STANDARD PLAN J-20.26-01

ISOMETRIC VIEW

METAL POLE INSTALLATION

PPB-M

ATTACH SIGN TO ADAPTER - 1/4-20 x 3/8" STAINLESS STEEL SCREWS (TYP.)

ATTACH ADAPTER TO PUSH-BUTTON STATION - 1/4" DAM. COUNTERSUNK HOLE, 3/8" LONG FLAT HEAD SCREWS (TYP.)

PEDESTRIAN PUSHBUTTON FRAME ADAPTER

PEDESTRIAN PUSHBUTTON INSTRUCTIONAL SIGN

ATTACH SIGN TO ADAPTER - 1/4-20 x 3/8" STAINLESS STEEL SCREWS (TYP.)

PEDESTRIAN PUSHBUTTON INSTRUCTIONAL SIGN

PEDESTRIAN PUSHBUTTON INSTRUCTIONAL SIGN

KEY

1 FACE PLATE
2 1/4-20 x 3/4" LONG STAINLESS STEEL SCREW
3 1/4-20 STAINLESS STEEL SCREWS
4 PUSH BUTTON FRAME ADAPTER
5 1/4-20 STAINLESS STEEL BOLT W/WASHER AND LOCK WASHER
6 PUSH-BUTTON STATION
7 DRILL AND TAP SHAFT FOR 1/4" DAM. BOLT
8 DRILL AND TAP SHAFT FOR 5/8" WIRE GUIDE HOLE - ADD INSULINER
WOOD POLE INSTALLATION
ALTERNATIVE 1
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

INSTALL FITTING WITH NYLON WASHER ON OUTSIDE OF HOUSING
- SEAL WITH SILICONE AFTER UNIT IS FULLY ASSEMBLED

WOOD POLE INSTALLATION
ALTERNATIVE 3
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER POLE)

KEY
1 FACE PLATE
2 1/4-20 X 3/8" LONG STAINLESS STEEL SCREW
3 1/4-20 STAINLESS STEEL SCREWS
4 PUSHBUTTON FRAME ADAPTER
5 LAG BOLT WITH WASHER
6 PUSHBUTTON STATION
7 CONDUIT DIAMETER + 1/8" HOLE THRU POLE
8 CONDUIT
9 3/4" CONDUIT
10 LIQUID-TITE FLEX CONDUIT
11 ONE PIECE TWO HOLE CLAMP
12 LAG BOLT
13 INSULNER SLEEVE

PRE-DRILL (2) 1/4" WEEP HOLES IN BOTTOM RADIUS OF CONDUIT
DRIP LOOP - REAM HOLES WITH DRILL BIT TO ELIMINATE BURRS

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
WOOD POLE INSTALLATION
ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

TEMPORARY TIMBER POLE

WFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES
1. Clamping bolts shall be tightened to 50 ft-lbs max. torque. After state inspection, burr threads to prevent nut rotation. DO NOT OVERTIGHTEN.
2. The full height of the Anchor Bolts shall be below the top of the slip plate assembly to ensure proper function of the slip base.
3. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: Provide 3'-0" min. slack. Attach pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper)
4. Junction box serving the Foundation shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
5. Provide cable tie at wiring entering the junction box (for slip base installations only) = See Detail A, Standard Plan J-23.70.
6. Keeper Plate shall not extend beyond the edges of the pole base plate.
NOTES
2. Steel shaft shall be tapered either round or dodecagon (12 sided), 11 gauge, 4 1/2" O.D. at slipfitter. Taper shall be 0.14 inches per foot.
3. All poles shall be hot dip galvanized per AASHTO M111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Pedestrian signal displays mounted on the side of an octagonal (8 sided) traffic signal pole with a pole attachment angle other than 0°, 45°, 90°, 135°, 160°, 225°, 270°, or 315° shall utilize:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.
7. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
**NOTES**

2. All poles shall be hot dip galvanized per AASHTO M111.
3. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
4. Visor shall be 8" Polycarbonate, fully enclosed circle at bottom to reduce glare on sign. Display shall be of appropriate color needed.
6. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
NOTES

1. See Standard Specification 9-29.3 for Cable Conductor requirements.


3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3 - 0' min. slack. Clamp to vertical steel reinforcing bar with listed connector suitable for use embedded in concrete.


5. Provide Cable Tie at wiring entering the Junction Box (For Slip Base installations only) - See Detail A, Standard Plan J-28.70.

COLOR CODE | USE
---|---
B | POWER
W | NEUTRAL
R | FLASHER 1
Bu | FLASHER 2

INSTALL SIZE REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

FLASHING BEACON WIRING

DETAIL A

FLASHING BEACON WIRING
ALTERNATING FLASH WIRING SHOWN

DETAIL B

FLASHING BEACON WIRING
SINGLE FLASH WIRING SHOWN

DETAIL C

FOUNDATION WIRING
FIXED BASE SHOWN

PERSPECTIVE VIEW
FLASHING BEACON TYPE 1
SINGLE FLASH BEACON SHOWN

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. See Standard Specification 9-29.3 for Cable Conductor requirements.


3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.

4. Heat shrink cap all spare conductors not terminated on a terminal strip.

5. When a Pedestrian Push Button is specified in contract plans, see Standard Plan J-20.20 for details.

6. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) – See Detail A, Standard Plan J-28.70.
NOTES

2. Steel shall be tapered either round or dodecagon (12-sided), 11-gage, 4 1/2" (in) O.D. at slipfit taper shall be 0.14" (in) per foot.
3. All poles shall be hot-dip galvanized per AASHTO M111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Junction Box serving the Standard shall be located no more than 10' - 0" (5' - 0" preferred) from the Standard.
7. A backplate shall be installed on the Upper Traffic Signal Head. Install a backplate on the Lower Traffic Signal Head only when required by the contract. Do not install retro-reflective tape on backplates.
11. Standard shall use slip base if installed closer than 4' (ft) from the face of guardrail.
12. Treat surrounding pole with galvanizing repair paint meeting the requirements of Standard Specification 9-08(2). Apply two coats. Paint shall be dry before applying second coat.
13. Hand hole shall face toward roadway for Elbow Mount Barrier installations. For all other installations, hand hole shall face the opposite direction from the Upper Traffic Signal Head. Hand hole face shall remain accessible after pole and sign installation is complete.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES
3. Top of Leveling Nut height shall be 1" (in) max. above foundation.
4. Heat-shrink cap for all spare conductors not terminated on a terminal strip.
5. Provide Cable Tie at wiring entering the Junction Box (Slip Base installations only).


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1. All material and workmanship shall be in accordance with the requirements of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.

2. The analysis and design for Adaptors 1 and 2 have been done in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals - Fifth Edition - Dated 2009, and Interims, using basic wind speed of 90 MPH and 50 years of design life.

3. Adaptors' parameters are based on field data and existing signal standard anchor bolts and bolt circles. Adaptor 1 shall be used for 15' (ft) thru 45' (ft) mast arm signal standards and Adaptor 2 for 46' (ft) thru 65' (ft).

4. Adaptors shall only be used for temporary installation of knocked down signal standards.

5. Materials specifications:
   - All structural steel, except as otherwise noted
   - ASTM A572 GR. 50 OR A588
   - Pipes: ASTM A65 GR. B OR A690 GR. B
   - Connecting/clamping bolts: AASHTO M 164 (ASTM A325)
   - Nuts: AASHTO M 291 (ASTM A263) GRADE DH
   - Washers: AASHTO M 293 (ASTM F436)

6. All bolts, rods, and related hardware shall be galvanized after fabrication per ASTM F2329.

7. Steel surfaces shall be galvanized after fabrication in accordance with AASHTO M 111.

8. Install and secure adaptor to existing support anchor bolts. Then install signal standard on adaptor top plate. Rake to be plumb after all load has been placed.

9. All holes in top and bottom plates of Adaptor 1 and Adaptor 2 are thru holes. See engraved or stamped text for bolt hole diameter.
**ALTERNATE #1 - DRILLED SHAFT-TYPE CONSTRUCTION - DEPTH "D"**

**FOR LATERAL BEARING PRESSURE = 2500 PSF & \( \theta = 23^\circ \), 1500 PSF & \( \theta = 28^\circ \), 1000 PSF & \( \theta = 36^\circ \)**

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</tbody>
</table>

**ALTERNATE #2 - CORRUGATED METAL PIPE TYPE CONSTRUCTION - DEPTH "D"**

**FOR LATERAL BEARING PRESSURE = 2500 PSF & \( \theta = 23^\circ \), 1500 PSF & \( \theta = 28^\circ \), 1000 PSF & \( \theta = 36^\circ \)**

<table>
<thead>
<tr>
<th>Ground Slope</th>
<th>Pole Class - Resultant Horizontal Tension (LBS)</th>
<th>Allowable Lateral Bearing Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:3</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td>1000 PSF 3'-0&quot; ROUND SPECIAL FOUNDATION TYPE</td>
</tr>
<tr>
<td>1:4</td>
<td>1000 PSF 3'-0&quot; ROUND SPECIAL FOUNDATION TYPE</td>
<td></td>
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</tbody>
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<tr>
<th>Ground Slope</th>
<th>Pole Class - Resultant Horizontal Tension (LBS)</th>
<th>Allowable Lateral Bearing Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:5</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td>1500 PSF 3'-0&quot; ROUND SPECIAL FOUNDATION TYPE</td>
</tr>
<tr>
<td>1:6</td>
<td>1000 PSF 3'-0&quot; ROUND SPECIAL FOUNDATION TYPE</td>
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</tbody>
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<table>
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<tr>
<th>Ground Slope</th>
<th>Pole Class - Resultant Horizontal Tension (LBS)</th>
<th>Allowable Lateral Bearing Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:7</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td>2500 PSF OR GREATER SPECIAL FOUNDATION TYPE</td>
</tr>
<tr>
<td>1:8</td>
<td>1000 PSF 3'-0&quot; ROUND SPECIAL FOUNDATION TYPE</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals. Basic wind velocity 60 mph. Design Life/Recremance Interval 50 years, and Fatigue Category III.

2. Foundations are designed for Type IV and V Strain Pole Standards with a maximum mast arm length of 16' - 0".

3. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office for Special Foundation Design.

4. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.

5. The top 2 feet of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this form shall be removed.


**ALTERNATE #2 - CONSTRUCTION METHOD METAL (SUBSURFACE) FORM REQUIRED**

When the existing soil will not retain a vertical face, over-exavate the foundation area and install a 36" or 48" (in) diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

Place the concrete foundation.

After concrete has cured, remove the entire paper or cardboard form portion.

Shoring or Extra Excavation as required. Excavated area shall be backfilled with Controlled-Density Fill (CDF), or with soil in accordance with Standard Specification Section 8-20.3(2) and Compaction Method 1 of Standard Specification Section 2-09.3(1E).

**TYPE IV AND V STRAIN POLE TRAFFIC SIGNAL FOUNDATION STANDARD PLAN J-27.10-0**
1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50’ (H1).

3. Slip Bases shall not be installed on 50’ (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire fixed is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

**Botom of Pole**

**Light Standard Base**

**Mounted on Bridge** - See Std. Plan J-28.45

**Bridge-mounted Luminaire**

*(Type 1 Mast Arm Shown)*

**Median Barrier-mounted Luminaire**

*(Type 1 Mast Arm Shown)*

**Post Top-mounted Luminaire**

*(Slip Base Shown)*

**Steel Light Standard**

**Standard Plan J-28.10-01**

*Sheet 2 of 2 Sheets*

*Approved for Publication*

*Washington State Department of Transportation*

*Effective: August 7, 2017 to August 5, 2018*
NOTES
1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer.

TAPER NOTE
End Taper (on approach from opposing traffic):
20' (longitudinal) = use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.

BASED ON FIELD CONDITIONS, STEEL LIGHT STANDARD PLACEMENT CAN BE ADJUSTED ± 4.0', WHEN APPROVED BY THE PROJECT ENGINEER.

STEEL LIGHT STANDARD PLACEMENT (SLIP BASE)
STANDARD PLAN J-28.22-00
SHEET 1 OF 2 SHEETS
APPROVED FOR PUBLICATION
Washington State Department of Transportation
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES


NOTES


2. The Strap Templates shall be held in place by nuts, 6" (in) from the top of the foundation and 3" (in) from the bottom of the anchor bolts. Eighteen heavy duty hex nuts and six round washers are required for a slip base assembly. Eighteen heavy duty hex nuts and six plate washers are required for a fixed base assembly.

3. Use Steel Light Standard Foundation Type A on level ground or slopes not exceeding 4H : 1V. Use Type B for slopes steeper than 4H : 1V, but not exceeding 2H : 1V. Slopes steeper than 2H : 1V shall require a special design.

4. These foundations are designed for a minimum of 2000 PSF (TYPE A) or 1500 PSF (TYPE B) allowable lateral bearing pressure for the soil. A special foundation shall be required for soil with allowable lateral bearing pressure lower than 1500 PSF.

5. The Luminaire Pole height shall not exceed 50' (ft) (H1).

6. Slip bases shall not be installed on 50' (ft) (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

7. Six slip bases are required for poles installed inside the Design Clear Zone, and on poles installed behind traffic barrier that are within the traffic barrier deflection zone.

8. Foundations constructed within Media Filter Drains shall be increased in depth by the depth of the Media Filter Drain.

9. Exposed portions of the foundation shall be formed to create a Class 2 surface finish. All forming shall be removed upon completion of foundation construction.

10. For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheet 2 of 2.

11. The anchor bolts shall be high-strength steel, manufactured from ASTM F1554 Grade 105, with heavy hex nuts and hardened washers. Galvanize the anchor bolts according to ASTM F2329.

12. The foundation shall be grounded in accordance with the requirements of Standard Specification 8-20.3(4).


The Strap Templates shall be held in place by nuts, 6" (in) from the top of the foundation and 3" (in) from the bottom of the anchor bolts. Eighteen heavy duty hex nuts and six round washers are required for a slip base assembly. Eighteen heavy duty hex nuts and six plate washers are required for a fixed base assembly.

Use Steel Light Standard Foundation Type A on level ground or slopes not exceeding 4H : 1V. Use Type B for slopes steeper than 4H : 1V, but not exceeding 2H : 1V. Slopes steeper than 2H : 1V shall require a special design.

These foundations are designed for a minimum of 2000 PSF (TYPE A) or 1500 PSF (TYPE B) allowable lateral bearing pressure for the soil. A special foundation shall be required for soil with allowable lateral bearing pressure lower than 1500 PSF.

The Luminaire Pole height shall not exceed 50' (ft) (H1).

Slip bases shall not be installed on 50' (ft) (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

Six slip bases are required for poles installed inside the Design Clear Zone, and on poles installed behind traffic barrier that are within the traffic barrier deflection zone.

Foundations constructed within Media Filter Drains shall be increased in depth by the depth of the Media Filter Drain.

Exposed portions of the foundation shall be formed to create a Class 2 surface finish. All forming shall be removed upon completion of foundation construction.

For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheet 2 of 2.

The anchor bolts shall be high-strength steel, manufactured from ASTM F1554 Grade 105, with heavy hex nuts and hardened washers. Galvanize the anchor bolts according to ASTM F2329.

The foundation shall be grounded in accordance with the requirements of Standard Specification 8-20.3(4).

See Standard Plans C-8b and C-85.14 for steel light standards on traffic barrier.
CONSTRUCTION METHODS

METHOD 1  
NO SUBSURFACE FORM

This option is used only when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use a paper or cardboard form to achieve a smooth finish on the final exposed concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

METHOD 2  
METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal (pipe) form. The corrugated metal form shall not extend more than 5" (in) +/- 1" (in) below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fills or compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
1. 50' (H) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.

2. Galvanizing shall be in accordance with AASHTO M 111.

3. See Standard Plans C-8b, C-85.15, and J-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.

4. See Standard Specification Sections 6-03.3(33) and 8-20.3(4) for the torque requirements for all of the anchor bolt installations. Install 1" (in) diameter clamping bolts in all slip bases to a torque of 95 Foot-Pounds - See Standard Specification Section 8-20.3(13A). DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

STEEL LIGHT STANDARD ELBOW DETAIL

FOR LUMINAIRE POLES WITH SINGLE MAST ARM 12'-0" OR LESS AND DOUBLE MAST ARMS 8'-0" OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.

NOTES
1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111. All bolts, nuts, and related hardware shall be galvanized after fabrication per ASTM F2329.
3. The presence of pedestrian railing shall be verified prior to light standard fabrication. When pedestrian railing is present or to be installed, locate hand hole as detailed in the Bridge Pedestrian Barrier details.

Zitomer, Richard
Jul 20 2016 6:28 AM
STATE DESIGN ENGINEER

STEEL LIGHT STANDARD ELBOW MOUNTING ON BRIDGE & RETAINING WALL
STANDARD PLAN J-28.45-0

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Washington State Department of Transportation

DRAFT: 2016-07-20 06:28:54

0 x 0
POLE AND BRACKET CABLE - TO LUMINARE HEADS
FOR GROUNDING DETAILS SEE STANDARD PLAN J-78-41 - NOTE 7
LUMINARE POLE
BANDS NOT SHOWN FOR CLARITY
ELBOW - SEE DETAIL
1" (IN) CONDUIT - SEE BRIDGE PLANS AND DETAIL BELOW
1" (IN) DIAM. H. S. BOLT W/ HARDENED LOCK WASHER AND HEAVY HEX NUT (TYYP.) (ASTM A449 OR F1154 GR.105)
SEE BRIDGE PLANS FOR LUMINARE ANCHORAGE DETAIL

BRIDGE PEDESTRIAN BARRIER

ATTACHMENT BRACKET AND CLAMP
LEAVE 2" (IN) OF OUTER JACKET OF POLE AND BRACKET CABLE AT BOTTOM OF CLAMP (TYYP.)
GROUNDING NUT
STRIP OUTER SHEATH OFF POLE AND BRACKET CABLE - (TYYP.)
SEE NOTE 4
LUMINARE POLE
HAND HOLE (SEE NOTE 2)
SINGLE QUICK DISCONNECTS (SHOWN UP FOR CLARITY)
EQUIPMENT GROUNDING CONDUCTOR
EQUIPMENT BONDING JUMPER
EQUIPMENT GROUNDING CONDUCTOR

DETAIL C
(TYPICAL FOR ALL VIEWS)

WHEN TRAFFIC BARRIER HEIGHT IS 42" (IN), MAINTAIN APPROXIMATE HEIGHT FROM TOP OF BARRIER TO HAND HOLE SHOWN.

SINGLE-SLOPE BRIDGE TRAFFIC BARRIER TYPICAL SECTIONS

F-SHAPE BRIDGE TRAFFIC BARRIER

POLE AND BRACKET CABLE - TO LUMINARE HEADS
FOR GROUNDING DETAILS SEE STANDARD PLAN J-78-41 - NOTE 7
LUMINARE POLE
BANDS NOT SHOWN FOR CLARITY
ELBOW - SEE DETAIL
1" (IN) CONDUIT - SEE BRIDGE PLANS AND DETAIL BELOW
1" (IN) DIAM. H. S. BOLT W/ HARDENED LOCK WASHER AND HEAVY HEX NUT (TYYP.) (ASTM A449 OR F1154 GR.105)
SEE BRIDGE PLANS FOR LUMINARE ANCHORAGE DETAIL

POLE AND BRACKET CABLE - TO LUMINARE HEADS
FOR GROUNDING DETAILS SEE STANDARD PLAN J-78-41 - NOTE 7
LUMINARE POLE
BANDS NOT SHOWN FOR CLARITY
ELBOW - SEE DETAIL
1" (IN) CONDUIT - SEE BRIDGE PLANS AND DETAIL BELOW
1" (IN) DIAM. H. S. BOLT W/ HARDENED LOCK WASHER AND HEAVY HEX NUT (TYYP.) (ASTM A449 OR F1154 GR.105)
SEE BRIDGE PLANS FOR LUMINARE ANCHORAGE DETAIL

CONDUCTOR DETAIL
ROUTE CONDUCTORS TO LUMINARES AND BONDING CONNECTION AT HAND HOLE - SEE CONTRACT FOR QUANTITY (TYPICAL FOR ALL VIEWS)
NOTES

1. Pole Base Plate for a Slip Base design shall be 1 1/4" (in) steel manufactured from ASTM A572 GR.50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" (in) steel manufactured from ASTM A572 GR.50, ASTM A588, or 1 1/2" (in) manufactured from ASTM A36. All Pole Base Plate notched surfaces shall be finished smooth.


3. Galvanizing shall be in accordance with AASHTO M 111.

4. See Standard Plans C-8b, C-85.14, and J-28.60 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barrier.


ELEVATION VIEW

- Configuration and location of the hand hole varies among manufacturers - minimum size opening shown.
- For details not shown, see View A above.

TYPICAL HAND HOLE ORIENTATION

- Orientation for installation on bridge or retaining wall - see Standard Plan J-28.45.

SECTION D

- 1 1/4" (in) thick, or no thinner than pole wall thickness. Tack weld in root or continuous seal welded to base plate or pole wall.
- T = size of fillet weld by luminaire pole fabricator.

VIEW C

- 6" Diam. hole.

VIEW A

- Typical hand hole orientation.

VIEW B

- For details not shown, see View A above.

VIEW D

- Continuous back-up ring.

FOR PLATE THICKNESS, REFER TO NOTE 1

POLE BASE PLATE DETAIL

- Flexible base: radius = (D/2 + 1/16") (typ.) - for D, see Table on Standard Plan J-28.30

SLIP BASE: radius = 6/8" (typ.) - match slip plate, Standard Plan J-28.42

STEEL LIGHT STANDARD POLE BASE AND HAND HOLE DETAILS STANDARD PLAN J-28.50-0
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTES

2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.
4. Install grout after plumbing the pole.

STEEL LIGHT STANDARD BARRIER MOUNTED BASE
STANDARD PLAN J-28.60-0X
TYPICAL LOCATION OF JUNCTION BOX AND FOUNDATION

CONCRETE FOUNDATION - SEE STANDARD PLAN J-28.30
JUNCTION BOX - SEE JUNCTION BOX WIRING DETAIL SHEET 2
FINISHED GROUND LINE
LIGHT STANDARD BASE (SLIP BASE SHOWN - FIXED BASE SIMILAR)
POLE AND BRACKET CABLE
12' - 0" MAX.
5' - 0" MIN. (PREFERRED)

BASE WIRING DETAIL FOR SINGLE MAST ARM
(SLIP BASE SHOWN - FIXED BASE SIMILAR)
SEE DETAIL "C" OR "D" PER CONDUIT TYPE

BASE WIRING DETAIL FOR DOUBLE MAST ARMS
(SLIP BASE SHOWN FIXED BASE SIMILAR)
SEE DETAIL "C" OR "D" PER CONDUIT TYPE

POLE AND BRACKET CABLE - TO LUMINAIRE HEAD
CONDUCTOR ATTACHMENT BRACKET
GROUNDING NUT
ELIMINATE ALL SLACK
HAND HOLE
LUMINAIRE POLE

POLE AND BRACKET CABLE - TO LUMINAIRE HEAD
CONDUCTOR ATTACHMENT BRACKET
GROUNDING NUT
ELIMINATE ALL SLACK
HAND HOLE
LUMINAIRE POLE

LEAVE 2" (MIN) (MAX.) OF OUTER JACKET OF POLE AND BRACKET CABLE AT BOTTOM OF CLAMP (TYP.)
GROUNDING NUT
STIP OUTER JACKET OFF POLE AND BRACKET CABLE - (TYP.)
HAND HOLE
SINGLE QUICK DISCONNECTS

TO GROUNDING NUT
CONDUCTOR DISCONNECTS

CONTACT JUMPER - FROM RMC CONDUIT
EQUIPMENT GROUNDING CONDUCTOR
NOTE: AND MAY BE SAME WIRE
EQUIPMENT BONDING JUMPER - FROM FOUNDATION
DOUBLE QUICK DISCONNECTS - PULL DOWN TIGHT TO CONDUIT (SHOWN LEFT UP FOR CLARITY)

1" MAX.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

GROUNDING NUT/TANGLE 2" (IN) COUPLINGS HAND HOLE (1" (FT) FROM TOP)

180°

270°

LOWER HAND HOLE J-HOOK (1" (FT) FROM TOP)

RADIAL INDEX LOAD CASE #2

1/4" (IN) DRAIN HOLE = DRILL FROM INSIDE

NEMA BOX ATTACHMENT DETAIL

KEY
① CAMERA/TDA POLE MOUNTS
② NEMA 4X (STAINLESS STEEL) = SIZE 16" H x 12" W x 6" D
③ CAMERA MOUNT PLATE
④ CAMERA UPPER HANDHOLE
⑤ 2" COUPLING
⑥ 2" SHORT NIPPLE
⑦ CHANNEL DRILLED 1/8" OVERSIZE OF NIPPLE
⑧ STEEL WASHER
⑨ CONDUIT WATERPROOF LOCKNUT
⑩ END BUSHING
⑪ BACK PLATE = DRILL OVER SIZE FOR CONDUIT, SEAL WASHER, AND LOCKNUT
⑫ TERMINAL BLOCK
⑬ HINGED DOOR WITH TWO PAD-LOCKABLE FLIP LATCHES (TYP.)
⑭ J-HOOK FOR WIRING

SEE POLE TOP DETAIL AND CAMERA POLE DATA TABLE

LOWER HAND HOLE SHALL BE PLACED 90° TO ROADWAY

RADIO EQUIPMENT REINFORCING PLATE

NEMA BOX ATTACHMENT - SEE DETAIL

HAND HOLE (3" (FT) FROM TOP) RADIO ATTACHMENT HOLE

24 LUG TERMINAL STRIP WITH 6 JUMPERS

GROUNDING BUS

NEMA 4X TERMINAL CABINET (STAINLESS STEEL WITH HINGED DOOR)

SEAL WITH SILICONE (TYP.)

GROUNDED RECEPTACLE = GFCI 20 AMP-125 VOLT

RADIO EQUIPMENT REINFORCING PLATE

LOCATE HOOK OVER 0.25" x 1.00" LONG SLOT IN POLE WALL

0.50" (IN) DIA. J-HOOK FOR WIRING WELDED TO INTERIOR OF POLE 3" - 0" FROM TOP OF POLE AND 180° FROM UPPER HANDHOLE

3/16" (IN) THICK REINFORCING PLATE TO INSTALL RADIO EQUIPMENT

2" (IN) NPT HOLE AND TAP

PLATE CENTERED OVER 2.50" (IN) DIAM HOLE IN POLE WALL

TOP OF FOUNDATION OR TOP OF MOUNT (SEE CONTRACT FOR TYPE REQUIRED - SEE STANDARD PLAN J-29.15-0 OR J-29.16 FOR DETAILS)

CAMERA POLE FOR LOADING LOAD CASE #2
(TOP MOUNT CAMERA, 2 SIDEMOUNT CAMERAS, 2 NEMA CABINETS & 2 RADIO EQUIPMENTS)

NEMA BOX DETAIL

POLE TOP PLATE

3.00

1/4"
NOTES

1. For information not shown, see Steel Light Standard Elbow detail, Standard Plan J-28.45. For Camera Pole Details, see Standard Plan J-29.15.

2. Round and smooth all edges along wire-way to protect conductors.

3. The manufacturer shall verify that the Elbow Top Plate matches the Camera Pole Base, and shall submit the shop drawings for approval.

4. Galvanize after fabrication according to AASHTO M111.

5. Install galvanized steel protective band (3/16" thick x 4" high (ASTM A36) on all four sides, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

SECTION (B)

4" (IN) THICK MAINTENANCE PAD IS SHOWN IN THIS VIEW ~ 12" (IN) THICK MAINTENANCE PAD DETAIL IS SIMILAR
(REINFORCING, ANCHOR BOLTS, AND GUIDEPOSTS NOT SHOWN IN THIS VIEW FOR CLARITY)

SECTION (D)

HIGH MAST LUMINARIAE MAINTENANCE PAD

STANDARD PLAN J-30.10-00

SHEET 2 OF 2 SHEETS

Zeldenrust, Richard
2015.06.11 15:07:28 -07'00'

BOLTS, NUTS, AND WASHERS ~ ASTM F959 OR A193
TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)

PLAN VIEW

HIGH MAST POLE MAINTENANCE PAD AND GROUNDING DETAILS

4" (IN) THICK MAINTENANCE PAD IS SHOWN IN THIS VIEW ~ 12" (IN) THICK MAINTENANCE PAD DETAIL IS SIMILAR
(REINFORCING NOT SHOWN FOR CLARITY)
1. **3/8" (in) x 2" (in) x 2" (in)** Frame Bonding Stud Plate with 1/4 NC x 1" Stainless Steel Bonding Stud.
   - Weld Bonding Stud to Frame Bonding Plate.
   - Weld to lid support frame.
   - 1/4" (in) weld = 3 sides.
   - Grind lid bearing surface flat after welding.
   - All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (in) chamfer or rounding.
   - Protect conductors with fireproof cloth prior to welding.
   - Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

2. Weld all around lid bonding stud ~ 1/4 NC x 1" stainless steel ~ liberally coat entire assembly w/ anti-seize compound.

**KEY**

1. BONDING JUMPER
2. EQUIPMENT GROUNDING CONDUCTOR
3. BONDING JUMPER ATTACHED TO BOX WALL COUPLING NUT
4. BONDING JUMPER ATTACHED TO BOX LID(S) GROUND STUD. #8 AWG (MIN.) x 4" (FT) TINNED BRAIDED COPPER.

**FRAME BONDING DETAIL**

- **STAINLESS STEEL FLAT WASHER - FENDER**
- **TO EQUIPMENT GROUNDING CONDUCTOR WITH FULL CIRCLE CONNECTOR**
- **ROUTE LID BONDING JUMPER TO LID BONDING STUD WITH FULL CIRCLE CONNECTOR**
- **FRAME BONDING STUD = 1/4 NC x 1" STAINLESS STEEL WELD TO FRAME BONDING STUD PLATE ~ LIBERALLY COAT THIS ASSEMBLY WITH ANTI-SEIZE COMPOUND**

**LID BONDING DETAIL**

- **ATTACH TO FRAME BONDING BOLT**
- **BOND TINNED BRAIDED COPPER BONDING JUMPER ~ #8 MINIMUM + 4" TO FRAME BONDING STUD LOCATION**
- **STAINLESS STEEL FLAT WASHER**
- **STAINLESS STEEL NUT = 2 EACH**

**EXISTING JUNCTION BOX RETROFIT GROUNDING DETAILS**

**STANDARD PLAN J-40.05-00**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018**
NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. Minimum lid thickness shown. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lip cover plate, and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" in line thickness formed with a mild steel weld bead and shall be placed prior to hot-dip galvanizing.

3. Lid support members shall be 3/16" minimum thick steel C, L, or T shape welded to the frame of the junction box. Lid will be held in place by 2" x 1/4" x 1/2" Lag Screw (TYP.) (See Note 3).

4. A 1/4-20 NC x 3/4" (in) stainless steel ground stud shall be welded to the bottom of the lid, including (2) stainless steel nuts and (2) stainless steel flat washers.

5. Bolts and nuts shall be liberally coated with anti-seize compound.

6. Equipment Bonding Jumper shall be #8 AWG min. x 4" (t) of tinned braided copper wire.


8. When required in the Contract, provide a 10" (in) x 27 1/2" (in), 10 gage dverter plate, complete, with fasteners, in each Type 2 Junction Box where specified.

9. When required in Contract, provide a 12" (in) deep extension for each Type 2 Junction Box where specified.

10. See the Standard Specifications for alternative reinforcement and class of concrete.

11. Headed Anchor Shear Studs must be welded to the Steel Cover Lip Plate and wire tied in two places to the vertical Welded Wire Fabric when in contact with each other. Wire to be all other Headed Anchor Shear Studs to the horizontal Welded Wire Fabric.

12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement, actual configurations of assembly will vary among manufacturers. See approved manufacturers’ shop drawings for specifics.

13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the sidewalks, walkways, shared use paths, traveled ways or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.

14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" (in) min. to 8" (in) max. for final grade of new construction only. See Standard Specification 9-20.3(6).
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

DETAIL C

FRAME = L 1 3/4" (IN) + 1/2" (IN) + 3/16" (IN)
3/8" (IN) x 3" (IN) HEADED ANCHOR SHEAR STUD - WELDED TO UP PLATE
GROUNDS STUD WITH 2 NUTS AND 2 WASHERS (TYYP) (SEE NOTE 10)
HEX COUPLING NUT = S. S. 5/16 NC x 7/8" (IN)
WITH S. S. 5/16 NC x 3/4" (IN) BOLT AND 4 EACH S. S. WASHERS (TYYP)

BOLT PLATE CHANNEL
3/16" / 1 1/2
3/16" / 1 3/8
1 1/2" 2 1/4"
1" 1 3/8" 2 1/4"
2 1/4"
1 1/2"
2 1/4" 1/4"
1/4"
3/16" / 1 1/2
1/4" 1/4"
3/16" / 1 3/8

DETAIL D

FRAME = L 1 3/4" (IN) + 1/2" (IN) + 3/16" (IN)
3/8" (IN) x 3" (IN) HEADED ANCHOR SHEAR STUD - WELDED TO UP PLATE (SEE NOTE 10)
SLOTTED S. S. CHANNEL WITH S. S. CHANNEL NUT AND SPRING

BOLT PLATE CHANNEL - WELD TO STEEL COVER PLATE
5/8" (IN) x 1" (IN) HORIZONTAL SLOT
SLOTTED S. S. CHANNEL WITH S. S. CHANNEL NUT AND SPRING

BOLT PLATE CHANNEL
1/2" (IN) STEEL COVER PLATE

LAYING PD TYP

1/2" (IN) STEEL COVER PLATE - SHOWN CUT AWAY FOR CLARITY
5/8" (IN) x 1" (IN) VERTICAL SLOT
1/2" (IN) STEEL COVER PLATE - SHOWN CUT AWAY FOR CLARITY
1/2" (IN) STEEL COVER PLATE

ALTERNATE LOCATION FOR ATTACHMENT OF EQUIPMENT BONDING JUMPER (SEE NOTE 7)
S. S. PIN WITH SNAP RING GROOVE (TYYP)
S. S. FLAT WASHER (TYYP)
S. S. SNAP RING (TYYP)

Hinge detail
5/8" (IN) x 1" (IN) VERTICAL SLOT

HANDLE DETAIL
HANDLE STOP = 6" (IN) + 3" (IN) x 1/4" (IN)
1/2" (IN) STEEL COVER PLATE

TOP VIEW
HANDLE = BENT 1/2" (IN) STEEL ROD, FLUSH WITH LID

F RONT VIEW
1" (IN) x 1" (IN) x 1/4" (IN)

L S U C K I N G LID S T A N D A R D DUTY J U N C T I O N B O X
TYPE 8
STANDARD PLAN J-40.30-04
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION
R E D M O N D, W A
M A R C H 1 3, 2 0 1 8

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

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EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES

1. Junction Box shall be constructed of 12-gage, Type 304 stainless with steel welded seam construction. Finish shall be #2B for backbox and #4 for the cover. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 9-28.2(4) for details.

3. Conduit Capacity = 8" (4" per end).
NOTES

1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with steel welded seam construction. Finish shall be #4 for barrier box and #1 for the cover. Support anchor shall be constructed of 12-gage, Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification S-29.2(4) for details.

3. Conduit capacity = 8" (4" per end).

4. Box shall include # 8 AWG (min.) x 1 foot tinned, braided copper Bonding Junper for bonding Box and Telescoping Top.
NOTES
1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 8-03.3(20).
2. Mount the stainless steel support using an approved resin-bonded anchor system installed per manufacturer’s recommendation. Anchor bolt embedment shall be 4 1/2" minimum. Resin-bonded anchors shall be stainless steel and shall be 3/8" diameter. Expansion Anchors are not allowed.
3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in the concrete.
5. The System Identification letters on the box lid shall be 1/8" in height. Lettering formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specifications 9-29.2(4).
6. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimensions.
7. Equipment Bonding Jumper shall be # 8 AWG (min.) = 1 foot of tinned, braided copper.
8. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit connection. An insulated grounded end bushing shall be used to terminate Rapid Metal Conduit.
9. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.
NOTES

1. Junction Box shall be constructed of 12-gauge, Type 304 stainless steel with welded seam construction. Mounting Tabs shall be constructed of 12-gauge, Type 304 stainless steel. Cover shall be constructed of ASTM A36 steel with slip-resistant surfacing.

2. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box connection. Use an insulated, grounding and bushing on the inside for Rigid Metal Conduit.

3. Equipment Bonding Jumper shall be #8 AWG (min.) x 3 feet minimum of tinned, braided copper.


5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the B times multiplier for length and width dimension:
   - Maximum Height = Sidewalk Depth
   - Maximum Interior Length = 29" (in)
   - Maximum Interior Width = 16" (in)


7. Field drill 1/2" (in) diameter hole for Drain Tube from the inside to the outside of Junction Box. One place, on the lowest side only. Seal with bead of silicone. See StandardSpecification 9-22.23. For drain tube routing, see Standard Plan J-40.16.

8. Condut capacity is 12" (in) x 4" (in) per side.

9. Conduits shall enter through the sides as shown. Conduits shall not enter through the bottom of Junction Box.

10. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.
NOTES
1. This Junction Box type shall not be surface mounted. For Surface-Mounted Junction Boxes, see Standard Plans J-40.38 and J-40.39.
2. Nema 4X Non-Adjustable Junction Boxes must be used in barriers with stationary forms. Nema 3R Adjustable Junction Boxes must be used in barriers with slip forms.
3. Conduits shall enter the Junction Box from the ends as shown.
4. Conduit capacity = 8”.
5. Holes for conduit(s) shall be field drilled or punched in box ends. See END VIEW.
6. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box conduit connection. A sealing locknut must be used on the inside of the junction box. GRS conduit shall be terminated with an insulated Grounded End Bushing. PVC conduit shall be terminated with a rigid PVC Conduit End Bushing.
7. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.
8. When converting RMC to PVC in Stationary-Form Barriers, route a # 8 Stranded, Non-Insulated Grounding Conductor along Conduit, secure Conductor to Conduit with clamp as shown on Conduit Deflection Fitting “B” detail, convert RMC to PVC in Stationary-Form Barrier (per Standard Plan J-60.11); omit Conductor when this detail is not used.
9. When additional Conduits are required, Bonding and Grounding wiring shall match configuration as shown in the perspective view. See Contract for number and size of additional Conduits.
10. Adjustable Box Equipment Bonding Jumper shall be # 8 AWG (min.) x 1 foot of tinned, braided copper. For Nema 3R Adjustable Boxes Only.
11. Apply a 3/16” bead of silicone caulk around Junction Box body and Adjustable Face to provide a proper seal prior to installation. For Nema 3R Adjustable Boxes Only.

- Equipment Grounding Conductor
- Copper Solderless Crimp Connector
- Equipment Bonding Jumper ~ See note 10
- Equipment Bonding Jumper ~ See Contract for conduit size and number
- # 8 AWG Stranded, Non-insulated Grounding Conductor ~ See Note 8

NEMA 3R AND 4X FLUSH-MOUNT JUNCTION BOX - GROUNDING STANDARD PLAN J-45.36-00

Sheets 1 of 1 SHEET

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State of Washington
Department of Transportation

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
SEE ENTRANCE SAWCUT DETAIL THIS SHEET

SEE CORNER SAWCUT DETAIL (TYP.)

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT (TYP.)

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT

LEAD-IN SAWCUTS (TYP.)

STOP LINE

A

LEAD-IN SAWCUT

S = START
F = FINISH

LOOP SERIES START OR FINISH MARKING SLEEVE

2G(SH)CABLE

JUNCTION BOX

LOOP WIRING DIAGRAM

TYPE 1 STOP LINE LOOP WIRING DIAGRAM

NOTES

1. For Installation Notes and Details see Standard Plan J-50.15.

TYPE 2 STOP LINE LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

TYPE 2 SAMPLING LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

TYPE 2 INDUCTION LOOP
STANDARD PLAN J-50.11-01
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION
WA DEP'T OF TRANSPORTATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Bailey, Ted
Jul 18 2017 9:56 AM

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES
1. For Installation Notes and Details see Standard Plan J-50.15.
3. All of the loop lead-in wires shall return to the Junction Box.
4. For Splice Detail, see Standard Plan J-50.05.
5. For Loop numbering Layout Details, see sheet 3.
6. For additional Induction Loop Details see Standard Plan J-50.15.

TYPE 3 STOP LINE LOOPS

TYPE 3 ADVANCE LOOPS

TYPE 3 SAMPLING LOOPS

ENTRANCE SAWCUT DETAIL

STANDARD PLAN J-50.12-01

Bailey, Ted
Jul 18 2017 9:56 AM

DESIGNER: THOMAS J. BAILEY, P.E.
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PRINTED BY: WC/2/28/17

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

STATE ENGINEER
WILLIAM J. WING
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Type 3 Stop Line Loop Wiring Diagram
Series Splice Shown

Type 3 Advance Loop Wiring Diagram

Type 3 Sampling Loop Wiring Diagram
Series Splice Shown

Notes
Loop numbering layout will be similar to Loop Numbering Layout Detail, Sheet 3.
NOTES

1. Fill the conduit trench to the bottom of the existing or new surfacing with CSTC, sand or controlled density fill. See Standard Specifications Section 2-09.31(1).  

2. Minor Regional variations are allowed in the soft pocket closure. Consult with the Engineer or see the Contract for additional requirements.  

3. Conductors shall be snug to the bottom of the sawcut. High temperature backer rod shall be snug to the conductors and sides of cut.  

4. Fill the Sawcut to within 1/8" (in) to 3/16" (in) from top of saw cut.  

5. See Standard Plan J-40.10 for additional Junction Box details.  

LOOPS INSTALLATION NOTES

1. Install the Junction Box and the stub-out conduit with Sch. 80 PVC stub-out sleeve. Conduit for the loop stub-out shall be as required in the conduit size table shown on sheet 1 of this set.

2. Lay out loops and loop lead-ins to miss cracks/joints in road, when possible. Maintain 18” (in) minimum clearance from manholes and valve boxes.

3. The opening around the loop stub shall be patched with matching paving material if opened larger than PVC sleeve + 2” (in).

4. Sawcut the loop slots and the lead-in slots. Washidy cuts. File edges to remove burr of all saw-cuts into stub out sleeve.

5. Lay out the loop wire starting at the Junction Box, allowing 5’ (ft) minimum slack.

6. Install the wire in the loop slot as shown.

7. Finish laying out the wire at the Junction Box and identify the leads with the loop number, the “S” for start and the “F” for the finish, the loop series number, and the loop lead-in conductor number.

8. Twist each pair of the lead-in wires a minimum of two times per foot each foot, from the loop to the Junction Box. Reverse the direction of the twist for each successive pair installed. Seal loops/sawcuts.

9. Construct a supplemental splice containing any series loop connections in the adjacent junction box as required in the plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice.

10. Splice the loop lead-ins to the shielded cable as noted in the Contract. See Standard Plan J-50.05 for Loop Splice details.

11. All loop circuits shall be tested per Standard Specification Section 8-20.3.14D once installation is complete.

12. Existing stub-out shall be upgraded as necessary to conform to the conduit size table shown on sheet 1.

13. All loop lead-in sawcuts parallel to lane edge shall be at least 12” (in) from edge of pavement and within six inches outside of lane or fog line when possible. Maintain 12” (in) separation between parallel cuts or joints.

14. The loop stub-out sleeve shall have an inside diameter 1” (in) larger than the outside diameter of the End Bell Bushing. Sleeve shall be notched 5/8” (in) to 3/4” (in) to accommodate loop wires. Plug conduit and fill sleeve with sand until loops are installed to keep out Hot Asphalt during paving operations.

INDUCTION LOOP DETAILS

STANDARD PLAN J-50.15-01

SHEET 2 OF 3 SHEETS

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Washington State Department of Transportation

Bailey Ted
Jul 18 2017 9:57 AM

STATE DESIGN ENGINEER
STUB-OUT DETAIL
WITH CEMENT CONCRETE CURB OR GUTTER

STUB-OUT DETAIL WITH ROADWAY

STUB-OUT DETAIL WITH GUARDRAIL AND CURB

CEMENT CONCRETE CURB OR GUTTER
SEE STANDARD PLAN F-10.12

LOOP STUB-OUT SLEEVE 1¼" (IN) TO 1/2" (IN)
BELOW TOP OF PAVEMENT

CEMENT CONCRETE BARRIER - SINGLE SLOPE BARRIER SHOWN
SEE CONTRACT PLANS FOR SIZE AND TYPE

LOOP STUB-OUT SLEEVE 1¼" (IN) TO 1/2" (IN)
BELOW TOP OF PAVEMENT

LEAD-IN CONDUIT SHALL EXTEND A
MINIMUM OF 3/4" (IN) INTO PAVEMENT
(PAVEMENT DEPTH VARIES)

CONDUIT SECURED INTO ROAD SURFACE (TYP.)

TO JUNCTION BOX

STUB-OUT CONDUIT PLACEMENT DETAILS

INDUCTION LOOP DETAILS

STANDARD PLAN J-50.15-01

Sheets 3 of 3 SHEETS

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Drawn: Jul 18 2017 9:37 AM

Washington State Department of Transportation

Effective: August 7, 2017 to August 5, 2018
NOTES

1. Installation of signal detection loops in the bridge deck shall be cast-in-place and installation by saw cutting an existing bridge deck shall not be allowed. This plan is intended for new construction only (not allowed for existing structures).

2. For Supplemental Splice in adjacent junction box, see Splice Detail, per Standard Plan J-50.15.

3. Preformed loops shall conform to the layouts, numbering details, marking requirements, and wiring diagrams of Standard Plan J-50.12 for the number and types of loops shown in the Contract Plans.

4. Loops shall be tested immediately prior to pouring concrete, per Standard Specification 8-20.3(14)D.

5. Layout Preformed loops and loop lead-ins to maintain 1' (ft.) clearance from joints.

6. Construct a supplemental splice containing any series loop connections in adjacent Junction Box as required in the Plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice, as shown in Standard Plan J-50.12.

7. Barrier Junction Box - 8" x 8" x 18" NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slip-form barrier. (Junction Box can be recessed up to 1/8") See Standard Plan J-40.36 or J-40.37.

8. For installation of Junction Box in the sidewalk, see Standard Plan J-49.40.
NOTES

1. See Standard Plan J-60.30 for Piezo axle sensor General Installation instructions, and Modified Type 2 Loop wiring details.

2. The contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo ohms readings shall be O\(\Omega\) from shield to center conductor. See piezo specifications for piezo capacitance readings.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @16 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splines in the concrete lane. Also, for concrete lanes, install the loops 4" and 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in the contract.

8. Use Schedule 40 PVC conduit from the Junction box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction. Where there are 5 lanes in either direction of travel, use one 2" min. conduit in each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation see Standard Specification B-20.3(S).

10. Junction boxes installed in the paved shoulder or median shall be a Heavy Duty Junction box. If box is installed in unpaved shoulder, use type 1 or 2. See Standard Plan J-60.10 for size and type. See Standard Specification 9.23.2(H), for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets, according to the Color Code Identification Chart. For Wire Color Code Detail see Standard Plan J-60.30.

12. Cabinet can be placed on either side of road depending on terrain/slope, etc. It does not have to be placed on increasing milepost side of the roadway.

13. For 6 - lane layouts and above, see Contract.
INDUCTION LOOP / PIEZO AXLE SENSOR
NUMBER IDENTIFICATION

Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 4 - (pass lane) - Loop L3, Piezo P2, Loop L4

PLAN VIEW
TYPICAL 4 LANE PTE LAYOUT WITH MEDIAN

PERMANENT TRAFFIC RECORDER INSTALLATIONS
STANDARD PLAN J-50.20-00
SHEET 2 OF 3 SHEETS

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L6
Lane 2 - (center lane) - Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) - Loop L1, Piezo P1, Loop L6
WEIGH-IN-MOTION 
SITE INSTALLATION
DETAILS
STANDARD PLAN J-50.25-00

INCREASING DIRECTION
Lane 1 - (drive lane) - Loop L1, Piezo P1, Piezo P2, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P3, Piezo P4, Loop L4

DECREASING DIRECTION
Lane 3 - (drive lane) - Loop L1, Piezo P1, Piezo P2, Loop L2
Lane 4 - (drive lane) - Loop L3, Piezo P3, Piezo P4, Loop L4
These are general installation instructions
See specific manufacturer's installation instructions
in the special provisions of the contract

1. Using paint and a straight edge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 8 ft. of cable inside the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" blade width, cut the piezo slot approximately 4 to 6 inches longer than the piezo length. The piezo slot depth must be a minimum of 1" to a maximum of 1 1/2".

3. Lead-in cuts for the piezo coax should be 1/4" minimum wide, at a depth of 1 1/2" to 2".

4. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor. Use a belt sander with a coarse grit paper to get an even surface finish.

5. Completely dry piezo slot. No moisture or oily residue shall be allowed in piezo slot.

6. After piezo cut is dry, wire brush sides and bottom of entire piezo slot. Blow out loose debris.

7. Install the piezo according to manufacturer's recommendations. Class 2 piezo sensors shall be placed at bottom of piezo slot. Class 1 sensors must be installed at a specific depth particular to each site location. This depth will be measured and set by Statewide Travel and Collision Data Office (formerly TDO) inspector on site.

8. Place two pieces of 2" duct tape along the length of the sensor slot. Tape should be about 1/16" from slot edge.

9. Mix epoxy according to manufacturer's recommendations and pour in slot into all holes that are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 8 ft. of cable inside the cabinet.

10. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor. Use a belt sander with a coarse grit paper to get an even surface finish.

11. Remove tape.

12. Class 2 sensor installation is complete after epoxy has cured. Class 1 WIM sensors shall be sanded flush with the pavement surface the entire length of the piezo sensor. Use a belt sander with a coarse grit paper to get an even surface finish.

13. Lead-in placement and saw-cut methods vary depending on Regional preference and location.

14. Place the installation brackets on the sensor every 12" for class 2 sensor, and every 5" for class 1 sensor, for the length of the sensor. Use the 3/4" brackets.
INSTALLATION BRACKET (TYP.)

PIEZO AXLE SENSOR CLASS 1 OR 2
- SEE NOTES

TOP OF ROADWAY

LEVEL

SECTION D

FILL SENSOR SLOT WITH GROUT
- SEE NOTE 9

PIEZO AXLE SENSOR CLASS 1 OR 2
- SEE NOTES

TOP OF ROADWAY

PLANE VIEW

SECTION E

FILL SENSOR SLOT WITH GROUT
- SEE NOTE 9

PIEZO AXLE SENSOR CLASS 1 OR 2

SENSOR LEAD ATTACHMENT END

HOME RUN SLOT

INSTALLATION BRACKET (TYP.)

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PERMANENT TRAFFIC RECORDER AND
WEIGH-IN-MOTION DETAILS
STANDARD PLAN J-50.30-00

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

6/12/17
**NOTES**

1. The Loop and Piezo leads in all Junction Boxes and Cabinets are to be color-coded. Use colored tape on each specific wire, see table. Wrap the tape on the wires approximately 6" beyond conduit in all Junction Boxes.

2. The maximum load in the cabinet is 5 Amps.

3. The cabinet may be pedestal or pad mount. See Standard Plan J-10.10 for details.


5. For Grounding Details, See Standard Plan J-60.06. See Standard Specification 8-20.3(9) for other requirements.

---

**COLOR CODE IDENTIFICATION**

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WHITE is also used for Designating Increasing Mile Posts.

---

**COLOR CODE WIRE DETAIL**

- **SINGLE PAIR LOOP LEAD CABLE**
- **WHITE BAND = INCREASING MILE POST DIRECTION**
- **YELLOW BAND = 4**

---

**PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS**

**STANDARD PLAN J-50.30-00**

**EFFECTIVE:** AUGUST 7, 2017 TO August 5, 2018
Required to supplement equipment grounding for luminaires standards with direct burial aerial feeds, or where required in the plans

Required at all service and separately derived systems

Type D service cabinet shown. Use this concept for Type B cabinet or transformer. Type D service cabinet shall be installed on lower surface of foundation only. Type B service cabinet and transformer cabinet shall be installed on raised surface of foundation only.

Type B modified service cabinet

Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing.

RIGID PVC CONDUIT (PVC) APPLICATION

GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION
NOTES

1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A".
   PVC Conduit may be used only in stationery-form barriers. Connect to RMC using a PVC adapter.
   RMC Conduit may be used in stationery-form barriers, but it shall be used in slip-form barriers.

2. See Standard Plan D-15.10 for additional information on F-Shape barrier, or see Standard Plan D-15.20
   for Single-Slope Barrier.

3. Pipe wrap tape shall be 2" wide, 20 ml thick, and installed with 1" minimum overlap.

KEY NOTES

- Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 1/8" recessed). Use NEMA 4X Junction Box with stationery-forms ~ See Standard Plan J-40.36, Use NEMA 3R Junction Box with slip-forms ~ See Standard Plan J-40.37.

- Type DX Deflection (DX) Fitting with Internal Bonding Jumper.

- Wrap Conduit Pipe from Conduit Deflection Fitting to 1'-0" beyond (inside) barrier surface.

- 1'-0" long, 3/4" thick extended closed-call foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.

- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1'-0" on each side of the joint.

- 10'-0" long section of RMC conduit.

- Deflection Fitting shall be in neutral state after installation.
CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT DEFLECTION FITTING "B" DETAIL
CONVERT RMC TO PVC IN STATIONARY-FORM BARRIER

CONDUIT DEFLECTION FITTING "B" DETAIL
CONDUIT FITTING - TYPE DX - FOR DEFLECTION OF 30° AND 3/4" MOVEMENT
CONDUIT FITTING - TYPE DX FOR DEFLECTION OF 30° AND 3/4" MOVEMENT. CONDUIT PIPES PLACED THROUGH RETAINING WALL TRAFFIC BARRIER SHALL BE FITTED WITH DEFLECTION FITTINGS AT MAXIMUM SPACING OF 120°. THE DEFLECTION FITTINGS SHALL BE PLACED AT THE TRAFFIC BARRIER OPEN JOINT THAT COINCIDES WITH THE RETAINING WALL STEM EXPANSION JOINT NEAREST TO THE TRANSVERSE CONSTRUCTION JOINT IN THE WALL FOOTING.
NOTES

1. Install a Conduit Deflection (DX) Fitting "A" at the exit from the barrier. Install a Conduit Deflection (DX) Fitting "B" to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-60.11 for Conduit Deflection Fitting details.

2. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A." RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adapter in the barrier.

PVC conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adapter. RMC conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.

3. See Standard Plan C-80.10 for additional details on Single-Slope Concrete Barrier.


5. Pipe-wrap tape shall be 2” wide, 20 mil thick, and installed with 1” minimum overlap.

KEY NOTES

1. Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 1/8" recessed). Use NEMA 4X Junction Box with stationary-forms. See Standard Plan J-40.36. Use NEMA 3R Junction Box with slip-forms. See Standard Plan J-40.37.

2. Where conduit in a structure is routed across a cold joint with continuous reinforcing steel, install premolded joint filler and wrap the conduit pipe for 1" - 0" on each side of the joint. Omit pipe-wrap tape on PVC conduit.

3. Where conduit exits a structure, wrap the conduit pipe for 1" - 0" on each side from the exiting point.

4. 10" - 0" long section of RMC conduit.

5. Conduit Deflection Fitting shall be in neutral state after installation.

6. Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1" - 0" on each side of the joint.
NOTES

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6-02.3(20). There shall be a minimum of a 3" edge distance to the centerline of anchor holes in concrete. Mount the stainless steel support using an approved resin bonded anchor system. Anchors shall be stainless steel and shall be of 3/8" diameter (expansion anchors are not allowed). Anchor Bolt embedment of 4 1/2" minimum.

2. Number of clamps shall be determined by number of conduits to be attached to the Stainless Steel Channel Support. See Conduit Plans for conduit routing.

3. Add additional Attachment Bolts when required to maintain 8" maximum spacing between adjacent Attachment Bolts.

4. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line. When barrier is not plumb, size spacer to maintain back of barrier line.


CONCRETE SLAB BRIDGE
(AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONSTRAINED)

HORIZONTAL CHANNEL MOUNT
(F-SHAPE BARRIER SHOWN, APPLY TO ALL BARRIER TYPES)

CONDUIT DIMENSIONS

<table>
<thead>
<tr>
<th>NOMINAL TRADE SIZE (IN.)</th>
<th>OUTSIDE DIAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>0.840</td>
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<tr>
<td>3/4</td>
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<tr>
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<td>5</td>
<td>5.563</td>
</tr>
<tr>
<td>6</td>
<td>6.625</td>
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</tbody>
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CONDUIT DIAMETERS REFLECT THE DIMENSIONS FOR 800 Galvanized Steel, Schedule 40 PVC and Schedule 80 PVC (3 1/2" Schedule 80 PVC IS NOT AVAILABLE)

STAINLESS STEEL CHANNEL SUPPORT DETAIL

STAINLESS STEEL CHANNEL SUPPORT DETAIL

CONNECTOR BOLT WITH LOCK WASHER AND FLAT WASHER (TYP.)

CLAMP SHALL FULLY SPAN THE ENTIRE WIDTH OF THE CHANNEL HARDWARE - SEE STRAP THICKNESS CHART (SEE NOTE 2)

HOT DIP GALVANIZED STEEL OR STAINLESS STEEL SPACERS, 1/4" MIN. (TYP.)
- INSTALL AND SIZE AS REQUIRED

ATTACHMENT BOLT (TYP.) - SEE NOTE 3

CHANNEL STOP ASSEMBLY - 5/32" DIA. x 2 3/4" LONG
BOLT WITH LOCK WASHER, FLAT WASHER AND NUT (TYP.)

STAINLESS STEEL CHANNEL

STANDARD PLAN J-60.13-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
NOTES

1. Type M mounting shall have an "O" ring groove and seal on top and bottom of signal attachment.
2. Type M mounting for conventional heads shall have a 2" (in) diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2" (in) diameter opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 14" (in) nominal arms.
5. See Standard Plan J-75.30 for tether wire and backplate requirements.
6. Apply bead of silicone around the perimeter of all top and end cap openings prior to installation of the end cap assembly.
7. See Standard Specification S-29.16 for backplate requirements. Where required, prismatic sheeting shall be applied in accordance with the manufacturer's recommendations. The application surface of the backplate shall be cleaned, degreased with isopropyl alcohol, and dried prior to application of the sheeting.
8. Drill a 1/4" (in) drain hole in the bottom of each signal assembly. When signal display assembly is mounted horizontally, drill a 1/4" (in) drain hole at the lowest point of each section of the signal assembly.

NOTE: BACKPLATES NOT SHOWN FOR CLARITY
SIGN MOUNTING NOTES
2. Hot dip galvanize all non-stainless parts.
3. For sign lighting details, See Standard Plans J-75.40 (for Monotube) and J-75.45 (for Round or Multi-sided) structures.
4. Each sign shall be supported by a minimum of two support structures.
5. This details conceptual sign support and bracing. Engineer of Record shall design and analyze sign support in accordance with AASHO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signal - Latest edition.
NOTES
1. Typical view shown. Verify power source location, quantities, and location of signs and sign structure fixtures in Contract Plans.
2. Route separate IMSA 20-1 3C #14 cables from load side of terminal strip to each additional Sign-Lighting Luminaire (where applicable) and provide sufficient slack wire per Standard Specification 8-20.3(R).
3. Label all conductors with sign light and circuit number at isolation switch, hand hole, and ballast enclosure. Label shall be a PVC or Polyolefin wire marking sleeve per Standard Specification 9-29.
4. Install quick-disconnect fuse kits between the power supply wires and pole and bracket cable per Standard Specification 9-29.7. Pull down light to center. Fuse size shall be 200% larger than load size. (Disconnect shown left up for clarity.)
5. The conductors in the IMSA 20-1 3C #14 cable shall be black, red, and white. The white conductor shall be permanently identified as an equipment grounding conductor per the NEC.
6. All RMC conduits embedded in foundation shall be terminated with grounding end bushing and bonded to the ground terminal in the base of pole. All PVC conduits embedded in foundations shall be terminated with end bell bushing. See Standard Plan J-10.10 note 3.
7. Hand holes shall be installed at the time of fabrication. Hand Hole may be installed in field only when additional conduits for lighting accommodations to previously non-illuminated structures is needed, and as long as the proper repairs are made to structure. Contact Bridge and Structures office through PE for installation/repair procedures.
8. For details not shown, see Standard Plan G-90.40.
9. All holes shall be drilled and tapped.
10. Use the Retrofit details only when the following conditions apply:
    A. Existing W4 + 13 Steel Beam sign brackets are to be reused for a new Sign-Lighting Luminaire.
    B. The span between the existing Luminaire Brackets is too wide to attach the new Sign-Lighting Luminaire and Luminaire Mounting Plate.
11. If the sign structure includes a maintenance walkway, the Luminaire Mounting Plate shall be bolted to the walkway grating.
NOTES
1. The Small Cable Vault shall not be used within the traveled way or paved shoulder. The Small Cable Vault may be installed in walkways, sidewalks, and shared use paths.
2. The diamond pattern shall be a minimum of 3/32" (in) thick.
3. Small Cable Vaults installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" (in) line thickness formed with a weld bead and shall be placed prior to hot-dip galvanizing.
4. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and two flat washers shall be welded to each lid and coated with anti-seize compound. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and four washers shall be welded to the frame and coated with anti-seize compound.
5. Connect a bonding jumper to the grounded end bushing for RMC conduit and connect the RMC conduit bushing jumper to the equipment grounding conductor at the hex coupling nut welded to the stainless steel channel. Connect the equipment grounding conductors in the PVC and HDPE conduits to the hex coupling nut. The bonding jumper shall be #8 min. x 1" (ft) of tinned braided copper between the lid and the frame and shall be #8 AWG min. from the frame to the hex coupling nut. See Contract Plans and Standard Plan J-60.05 for bonding jumper requirements.
6. The system identification letters shall be 1/8" (in) line thickness formed with a mild steel weld bead. See COVER MARKING DETAIL, Standard Specification 8-28.2(4).
7. Cement concrete shall be Class 4000.
8. Capacity - conduit diameter = 40" (in).
9. Vault shall be installed on 6" (in) crushed surfacing pad in accordance with Standard Specification 8-20.3(6).
10. Typical Small Cable Vault features and arrangement shown. Reinforcing not shown. Dimensions and arrangements will vary slightly by manufacturer. See Approved shop drawings.
11. Small Cable Vaults for WSDOT Projects shall only be installed with the lid frame bearing on the concrete portion of cable vault.
**NOTE**

1. For Hot Mix Asphalt Paving projects ~ "DO NOT PASS" and "PASS WITH CARE" signs shall be included for passing zones.
NOTES
1. For sign installation details, see Standard Plan G-series
2. Where it is impractical to locate a sign with the lateral offset, a minimum of 2' (60 cm) lateral offset may be used. A 1' (30 cm) lateral offset may be used in business, commercial or residential areas.
3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

<table>
<thead>
<tr>
<th>HEIGHT V</th>
<th>TO BOTTOM OF SIGN (NO SUPPLEMENTAL PLAQUE)</th>
<th>TO BOTTOM OF SUPPLEMENTAL PLAQUE (WHEN REQUIRED)</th>
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</thead>
<tbody>
<tr>
<td>RURAL</td>
<td>5' MINIMUM</td>
<td>4' MINIMUM</td>
</tr>
<tr>
<td>URBAN</td>
<td>7' MINIMUM</td>
<td>6' MINIMUM</td>
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</tbody>
</table>

CLASS A CONSTRUCTION SIGNING INSTALLATION
STANDARD PLAN K-80.10-0

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Washington State Department of Transportation
WARNING LIGHT ATTACHMENT DETAIL

USE ATTACHMENT DETAIL A
OR
ATTACHMENT DETAIL B

TOP OF BARRICADE SUPPORT ANGLE

ELEVATION

SIDE

ATTACHMENT DETAIL A

WARNING LIGHT ATTACHMENT

6" x 1 1/2" x 1 1/2" x 1/8" STEEL ANGLE

DRILL THREE 1/2" DIAM. HOLES THROUGH BARRICADE SUPPORT ANGLE

1/2" STEEL HEX BOLT
1/2" LOCK WASHER
1/2" STEEL HEX NUT

ATTACHMENT DETAIL B

WARNING LIGHT ATTACHMENT

6" x 2" x 2" x 1/8" TUBULAR STEEL WITH PRE-DRILLED HOLES

TOP OF BARRICADE SUPPORT ANGLE

DRILL TWO 1/2" DIAM. HOLES THROUGH BARRICADE SUPPORT ANGLE

1/2" STEEL HEX BOLT
1/2" LOCK WASHER
1/2" STEEL HEX NUT

3/4" ACX PLYWOOD PANEL

SANDBAGS AS REQUIRED TO STABILIZE BASE - ALL LEGS

34" X 23" X 23" X 1/8" TUBULAR STEEL

ISOMETRIC VIEW

TYPE 3 BARRICADE

NOTE 1.
1. All fasteners may be zinc plated, galvanized or stainless steel. All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.

NOTE 2.
2. Install one lightweight Type A Low-Intensity flashing warning light on the traffic side of the barricade. Install two Type A Low-Intensity flashing warning lights per barricade when the barricades are used to close a roadway. Attach the light to the barricade according to the light manufacturer’s recommendations or use the details shown on this plan.

NOTE 3.
3. Stripes on barricade rails shall be alternating orange and white retroreflective stripes (sloping downward at an angle of 45 degrees in the direction traffic is to pass).

NOTE 4.
4. The Type 3 barricade design shown on this plan meets the crash test requirements of NCHRP 350. Alternative designs may be approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.

NOTE 5.
5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.

NOTE 6.
6. When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.

TYPE 3 BARRICADE

STANDARD PLAN K-80.20-00

[Diagram of Type 3 Barricade]

EXPRESS AUGUST 5, 2018

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
USEABLE TRAFFIC LANE

AREA CLOSED TO TRAFFIC

2 MIN

TYPE 3L BARRICADE

STRIPE ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

ROAD CLOSURE AT INTERSECTION

AREA CLOSED TO TRAFFIC

2 MIN

USEABLE TRAFFIC LANE

TYPE 3R BARRICADE

ROAD CLOSURE AT OTHER LOCATIONS

TYPE 3L BARRICADE

WORK AREA

TYPE 3R BARRICADE

WORK AREA

TYPE 3R BARRICADE

TYPE 3L BARRICADE

BARRICADE PLACEMENT

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

STANDARD PLAN K-80.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPEDITED: AUGUST 9, 2017

1 SHEET OF 2 SHEETS PROOF FOR PUBLICATION

DRAWN BY: LISA CRYDER

STATE OF WASHINGTON
1. The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2' wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

2. The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.
NOTES

1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2' wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrow base barrier.

2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

5. Remove the Type 3 Anchors by first driving the steel pins down through the barrier further into the pavement to allow lifting the barrier without interference, then remove the pins from the pavement.

6. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
NOTES
1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.
2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.
3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.
4. Use shims to properly fit the anchors to the barrier and roadway surfaces.
5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.

Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

Use shims to properly fit the anchors to the barrier and roadway surfaces.

Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
NOTES

1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.
2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts that mark the angle point of any sudden change in topography.
3. See Standard Specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2 x 4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
1. Materials shall meet the requirements of Standard Specification 9-16.
NOTES
1. All glare screen posts shall be 2 1/2" I.D. galvanized steel.
2. Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toe-nailed to post with 16d galvanized nails to prevent block rotation. See Standard Specification 9-16.3(2).
3. Attach blocks to steel posts using bolt holes on approaching traffic side of post web.

**ELEVATION VIEW**

- **Wood Block** (TYP.) - SEE NOTE 4
- **Steel Post** - SEE NOTE 1
- **Steel Post** - SEE NOTE 1
- **Nail Driven Into Wooden Post For Steel Post Support**
- **Steel Post** - SEE NOTE 1
- **1/2" Anti-Rotation Nail (TYP.) - SEE NOTE 2**
- **Wood Block (TYP.) - SEE NOTE 4**
- **Wood Block (TYP.) - SEE NOTE 4**
- **Steel Post** - SEE NOTE 1
- **Steel Body Plate** - SEE DETAIL
- **1 1/2" Heavy Hex Nut**
- **1/2" Eye Nut**
- **1/2" Diameter U-Bolt**
- **1/2" Eye Bolt**
- **Turnbuckle**
- **Tension Wire (TYP.)**
- **Stretcher Bar (TYP.)**
- **Detail C**
- **Pull Post (Within Run)**

**DETAIL A**

- **End or Corner (Brace) Post With Steel Post**
- **End or Corner (Brace) Post With Existing Wood Post**

**DRAWN BY:** Lisa Cyford

**EFF ECTIVE:** AUGUST 7, 2017 TO August 5, 2018
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP
- 48" x 12" (TYP.)

SEE MOUNTING DETAIL

YELLOW REFLECTIVE TAPE - 3" (TYP.)

ELEVATION

WOOD SPACER
- 3" x 2 1/2" x 10"

PLASTIC PIPE - 12" (NOM.) x 2" - 7' LONG
COLOR SHALL BE HIGHLY VISIBLE
(SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW - 5/8" x 6"
WITH 2" FLAT WASHER

HEX LAG BOLT - 3/8-7UNC x 5"
WITH 1" DIAM. FLAT WASHER
(4 SETS TOTAL)

1 1/2" DIAM. HOLE (TYP.)

TOP OF TIMBER POST

EYE STRAP - FASTENED TO
THE SIGN PANEL WITH 2 1/8" DIAM.
SCREWS AND 2 HEX NUTS (TYP.)

SIDE OPPOSITE STRIPES

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M222.

Access Control Gate

Standard Plan L-70.10-01

Effective: August 7, 2017 to August 5, 2018
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP
~ 48" x 12" (TYP.)

SEE MOUNTING DETAIL

5/8" DIAM. WIRE ROPE

MIDDLE POST
~ REMOVABLE

TOP OF ROADWAY

YELLOW REFLECTIVE TAPE ~ 3" (TYP.)

PAIRED (TYP.) ~ AGENCY PROVIDED

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

ELEVATION

PLASTIC PIPE ~ 12" (NOM.) ~ 2' x 7" LONG
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW ~ 5/8" DIAM. ~ 6"
WITH 2" FLAT WASHER

HEX LAG BOLT ~ 3/8-7UNC x 5"
WITH 1" DIAM. FLAT WASHER
(4 SETS TOTAL)

GALV. LAG SCREW ~ 3/16" DIA. W FLAT WASHER (TYP.) (2 SETS REQ.)

GALV. STEEL TUBE

1 1/2" DIA. HOLE (TYP.)

TOP OF STEEL TUBE

COMMERCIAL CONCRETE

END POST

SECTION A

END POST

SECTION B

SIDE OPPOSITE STRIPES

SIGN PANEL MOUNTING DETAIL

ACCESS CONTROL
DOUBLE GATE

STANDARD PLAN L-70.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EXPRES JUNE 13, 2018

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

DATE

SIGN PANEL MOUNTING DETAIL

PLASTIC PIPE ~ 12" (NOM.) ~ 2' x 7" LONG
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW ~ 5/8" DIAM. ~ 6"
WITH 2" FLAT WASHER (TYP.)

HEX LAG BOLT ~ 3/8-7UNC x 5"
WITH 1" DIAM. FLAT WASHER
(4 SETS TOTAL)

GALV. LAG SCREW ~ 3/16" DIA. W FLAT WASHER (TYP.) (2 SETS REQ.)

GALV. STEEL TUBE

1 1/2" DIA. HOLE (TYP.)

TOP OF STEEL TUBE

COMMERCIAL CONCRETE

END POST
**NOTES**

1. Where shown on the Plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown herein. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

---

**LEGEND**

- **R** = RAMP LANE WIDTH
- **L** = LANE WIDTH
- **WHITE EDGE LINE**
- **YELLOW EDGE LINE**
- **LANE LINE**
- **WIDE LANE LINE**
- **WIDE DOTTED LANE LINE**

---

**SINGLE-LANE ON-CONNECTION**

**SINGLE-LANE OFF-CONNECTION**

**SINGLE-LANE OFF-CONNECTION FOR ONE-LANE REDUCTION**
NOTES
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.
2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

RAMP CHANNELIZATION TWO LANE

STANDARD PLAN M-1.40-02

TWO-LANE OFF-CONNECTION
LEGEND

C-D R = COLLECTOR DISTRIBUTOR RAMP LANE WIDTH
C-D L = COLLECTOR DISTRIBUTOR LANE WIDTH
R = RAMP LANE WIDTH
L = LANE WIDTH

NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal geometric design. The dimensions may vary to fit existing conditions. See Contract.
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown herein. See the Standard Plans for RPM supplement and substitution patterns.

2. When weaving section is more than 3/4 of a mile in length, use lane line.

3. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

- L = LANE WIDTH
- R = RAMP LANE WIDTH
- D = DOTTED LANE WIDTH
- YELLOW EDGE LINE
- WHITE EDGE LINE
- END OF TAPER (SEE CONTRACT)
- BEGIN TAPER (SEE CONTRACT)
- TABLE

<table>
<thead>
<tr>
<th>POSTED MAIN LINE SPEED</th>
<th>D (SEE TABLE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 MPH</td>
<td>565'</td>
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<tr>
<td>40 MPH</td>
<td>610'</td>
</tr>
<tr>
<td>45 MPH</td>
<td>672'</td>
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<tr>
<td>60 MPH</td>
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</tr>
<tr>
<td>65 MPH</td>
<td>759'</td>
</tr>
<tr>
<td>70 MPH</td>
<td>1290'</td>
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</tbody>
</table>
1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50’ (ft) spacing is standard; however, for gore areas shorter than 150’ (ft), use a 25’ (ft) spacing, and for gore areas greater than 400’ (ft), a spacing of 100’ (ft) may be used.
NOTE

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' (ft) spacing is standard; however, for gore areas shorter than 150' (ft), use a 25' (ft) spacing, and for gore areas greater than 400' (ft), a spacing of 100' (ft) may be used.

ON-RAMP GORE AREA MARKING LAYOUTS

STANDARD PLAN M-2.21-00

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
STOPPING POINT FOR LEFT TURN LANE

LEFT-TURN CHANNELIZATION

SYMMETRICAL WIDENING ABOUT CENTERLINE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

APPROACH TAPER A

DOUBLE CENTERLINE (YELLOW)
(NARROW PATTERN)

OPTIONAL DOTTED EXTENSION LINE

WHITE EDGE LINE

CENTERLINE STRIPE
SEE NOTES

50'

B

LEFT-TURN CHANNELIZATION

ASYMMETRICAL WIDENING LEFT OF CENTERLINE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

APPROACH TAPER C

DOUBLE CENTERLINE (YELLOW)
(NARROW PATTERN)

OPTIONAL MARKED DECELERATION TAPER

CENTERLINE STRIPE
SEE NOTES

LEFT-TURN CHANNELIZATION

ASYMMETRICAL WIDENING RIGHT OF CENTERLINE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

APPROACH TAPER C

DOUBLE CENTERLINE (YELLOW)
(NARROW PATTERN)

CENTERLINE STRIPE
SEE NOTES

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways, with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane width.

Type 2L (SL) Traffic Arrow

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER A</th>
<th>Dimension</th>
<th>APPROACH TAPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 MPH</td>
<td>360°</td>
<td>60°</td>
<td>720°</td>
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<tr>
<td>55 MPH</td>
<td>330°</td>
<td>55°</td>
<td>600°</td>
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<tr>
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<td>300°</td>
<td>50°</td>
<td>540°</td>
</tr>
<tr>
<td>45 MPH</td>
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<td>420°</td>
</tr>
<tr>
<td>35 MPH</td>
<td>210°</td>
<td>35°</td>
<td>360°</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180°</td>
<td>30°</td>
<td>300°</td>
</tr>
<tr>
<td>25 MPH</td>
<td>150°</td>
<td>25°</td>
<td>240°</td>
</tr>
</tbody>
</table>

LEFT-TURN CHANNELIZATION

STANDARD PLAN M-3.10-03

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - SYMMETRICAL WIDENING
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING RIGHT OF CENTER LINE
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING LEFT OF CENTER LINE
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass In accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER G</th>
<th>APPROACH TAPER H</th>
<th>APPROACH TAPER J</th>
<th>APPROACH TAPER K</th>
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<tr>
<td>40 MPH</td>
<td>165'</td>
<td>27'</td>
<td>320'</td>
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<td>35 MPH</td>
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<td>30 MPH</td>
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<td>17'</td>
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<td>25 MPH</td>
<td>63'</td>
<td>13'</td>
<td>125'</td>
<td>21'</td>
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<td>20 MPH</td>
<td>40'</td>
<td>7'</td>
<td>80'</td>
<td>13'</td>
</tr>
</tbody>
</table>

RADIUS = RESPECTIVE H or K

OPTIONAL MARKED DECELERATION TAPER
(FOR LIMITED USE IN URBAN AREAS)
LEFT-TURN CHANNELIZATION TEE INTERSECTION WITH ACCELERATION LANE

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

OPTIONAL DOTTED EXTENSION LINE

WHITE EDGE LINE

OPTIONAL DOTTED EXTENSION LINE

WHITE EDGE LINE

INSIDE RADIUS OF LEFT-TURNING VEHICLE

INSIDE RADIUS OF LEFT-TURNING VEHICLE

NO PASS STRIP ON APPROACH EQUAL TO APPROACH TAPER A

OPTIONAL (SEE CONTRACT)

OPTIONAL (SEE CONTRACT)

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

CENTERLINE STRIPE

(SEE CONTRACT)

CENTERLINE STRIPE

(SEE CONTRACT)

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

Type 6R (SR) Traffic Arrow

CENTERLINE STRIPE

(SEE NOTES)

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

SHEET 1 OF 9
LEFT-TURN CHANNELIZATION IN TWO-WAY LEFT-TURN LANE

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-13. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

Can be reduced to a minimum of 50' to increase storage capacity.
NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two lane highway. The channelization plan may be used on four lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD Figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four lane undivided highways shall be double centerline.

6. All turn traffic arrows are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND

- L = 12" Typical Lane Width, See Contract for specified lane widths.
- Type 2L (SL) Traffic Arrow
- Type 2R (SR) Traffic Arrow

DOUBLE LEFT-TURN CHANNELIZATION

STANDARD PLAN M-3.50-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double center line.

6. All Traffic Arrows not required are optional, but recommended. Arrows may be added for longer storage lanes, or deleted for shorter storage lanes. See Contract Plans.

---

**LEGEND**

*L = 12' Typical Lane Width. See Contract for specified lane widths.


Type 2R (SR) Traffic Arrow

Type 3L (SL) Traffic Arrow

---

**NOTES**

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double center line.

6. All Traffic Arrows not required are optional, but recommended. Arrows may be added for longer storage lanes, or deleted for shorter storage lanes. See Contract Plans.
When specified in the Contract Plans, the HOV Symbol Marking shall be installed with an offset of 1 foot max. from the lane centerline.
**BICYCLE LANE SYMBOL LAYOUT**

**KEY NOTES**

1. Bid Item "Bicycle Lane Symbol" includes Bike Lane Arrow and Bike Rider Symbol.
2. 2' (ft) x 6' (ft) White Bike Lane Arrow.

**GENERAL NOTE**

See Contract for location and material requirements.
9'-0" - 0"

4" WIDE BROKEN YELLOW PAINTED LINE

PLAN CENTERLINE MARKING

3'-0" 9'-0"

10'-0" OR MIN. SIGHT DISTANCE (SEE NOTE 1)

BOLLARD

4" WIDE SOLID YELLOW PAINTED LINE

MARKING AROUND MULTIPLE BOLLARDS

1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle. (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.

9'-0" 4" WIDE SOLID YELLOW PAINTED LINE

MARKING AROUND BOLLARD

5'-0" 4'-0"

PAVED PATH

PAVED PATH

5'-0" 5'-0"

NOTE:

PLAN

4" WIDE SOLID YELLOW PAINTED LINE

MARKING AT INTERSECTION WITH ROADWAY

EDGE OF SHOULDER

CROSSWALK LINE

DETECTABLE WARNING SURFACE

PAINTED STOP LINE

4" WIDE SOLID YELLOW PAINTED LINE

PAINTED TRAFFIC LETTERS

PAVED PATH

PAVED PATH

7'-0"

5'-0"

6'-0" 10'-0" 5'-0"

DRAINAGE STRUCTURE OR CROSSING

PLAN

AROUND BOLLARD

MARKING

NOTE:

SHARED - USE PATH MARKINGS

STANDARD PLAN M-9.60-00

DETAIL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTE
See contract for location and material requirements.

GRID IS 1" (IN) SQUARE
"R" DETAIL

KEY NOTES
1. Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" (in) white transverse lines.
2. 24" (in) white transverse line.
3. W-10-1 Advance Warning sign (not included in RR crossing Symbol Bid Item).
4. Place Stop Line 15' (ft) from RR gate, if present.
1. See the Contract Plans for locations of crosswalk centerlines.
2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.
3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
NOTES

1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.


LEGEND

- [Reserved Parking Sign and post with (R7-801A) Plaque, if indicated (See Sign Fabrication Manual)]
- Access Parking Space Symbol
- Manufactured wheel stop
- Detectable Warning Pattern

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

1. Dotted Extension Line shall be the same color as the line it is extending.

2. Edge Line shall be white on the right edge of traveled way, and yellow on the left edge of traveled way (on one-way roadways). Solid Lane Line shall be white.

3. The distance between the lines of the Double Centerline shall be 12” everywhere, except 4” for left-turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-state routes) may specify a 4” distance for all locations. The distance between the lines of the Double Lane Line shall be 4”.
GENERAL NOTE
See Standard Plan M-20.10 for pattern and color requirements.

PROFILLED PLASTIC
(BROKEN LINE)
FOR:
CENTERLINE & LANE LINE - W = 4''
NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE - W = 4''
REVERSIBLE LANE LINE - W = 4''
WIDE BROKEN LANE LINE - W = 8''

EMBOSSED PLASTIC
(SOLID OR BROKEN LINE)
FOR:
CENTERLINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE
REVERSIBLE LANE LINE
DOUBLE CENTERLINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

DOTTED EXTENSION LINE
WIDE DOTTED LANE LINE - W = 8''

NOTE: LENGTHS MUST BE IN MILLIONS OF LINEARY FEET
100 TO 300 MLS MIN.
4 TO 8 MLS MAX.
15 TO 30 MLS

SECTION 1

BRIAN L. WACHOSKI
PRINCIPAL ENGINEER
APR 19 2015 2:27 PM

PROFILLED AND EMBOSSED PLASTIC LINES
STANDARD PLAN M-20.20-0:
SHEET 1 of 1 SHEET
APPROVED FOR PUBLICATION
APR 20 2015 10:07 AM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80' (ft) intervals on tangents and on horizontal curves with a radius of 1500' (ft) or more, and at 40' (ft) intervals on horizontal curves having radii of less than 1500' (ft). Center the RPMs in the gaps between the pavement marking lines.

2. Type 2Y RPMs, when specified, shall be placed outside the left edge line at 80' (ft) intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL."

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2WRPMs on multilane one-way roadways, and Type 2Y RPMs on two-lane two-way roadways.

4. The Type 2Y RPMs placed on multilane one-way roadways and all RPMs set in recesses shall have an abrasion-resistant coating.

5. Do not recess side-to-side RPMs on Wide Dotted Line Lanes.

**TYPE 2 RPM RAISED FACE COLORS**

- **TYPE 2YY** YELLOW AND YELLOW
- **TYPE 2W** WHITE – ONE SIDE ONLY
- **TYPE 2Y** YELLOW – ONE SIDE ONLY
SECTION A

TWO-WAY ROADWAY RECESSsed PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT

SECTION B

ONE-WAY ROADWAY RECESSsed PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT
NOTES
1. Raised pavement markers shall be installed only when specified in the Contract Plans.
2. See the Standard Plans for marker designation.
3. The portion labeled "OPTIONAL" is used only when the Optional Marked Deceleration Tape (see Standard Plans M-3.10 and M-3.20) is specified in the Contract Plans.

Type 2L (SL) Traffic Arrow

WIDE LANE LINE - SEE DETAIL A

DOUBLE CENTERLINE (YELLOW) - SEE DETAIL B

LEFT-TURN LANE
(SEE NOTE 3)

WIDE LANE LINE - SEE DETAIL A

DOUBLE CENTERLINE (YELLOW) - SEE DETAIL B

SEE DETAIL C

TWO-WAY LEFT-TURN CENTERLINE - SEE DETAIL C

TWO-WAY LEFT-TURN LANE

SEE DETAIL E

INSIDE RADIUS OF LEFT-TURNING VEHICLE

END TWO-WAY LEFT-TURN LANE

LONGITUDINAL MARKING SUPPLEMENT WITH RPMs
TURN LANES
STANDARD PLAN M-20.40-0

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
No natural text can be extracted from this diagram.
NOTE

1. The NO PASS LINE (when required) is applied parallel to the CENTERLINE, 4" away, with the Type 2YY RPM's aligned (similar to TWO-WAY LEFT-TURN LINE).

LONGITUDINAL MARKING
SUBSTITUTION W/RAISED
PAVEMENT MARKERS
STANDARD PLAN M-20.50-02

MATCH TYPE IN LINE
BEING EXTENDED

DOTTED EXTENSION LINE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTE
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher and on all on-ramps and off-ramps.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

SYMBOl MARKINGS - TRAFFIC ARROWS FOR HIGH-SPEED ROADWAYS
STANDARD PLAN M-24.20-02

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

TYPE 8L (LEFT)
TRAFFIC ARROW

TYPE 8R (RIGHT)
TRAFFIC ARROW

MARKING AREA
35.88 SQFT.

SYMBOL MARKINGS ~
TRAFFIC ARROWS FOR
HIGH-SPEED ROADWAYS
STANDARD PLAN M-24.20-02

1101x166
Apr 16 2015 5:10 PM
Apr 20 2015 10:10 AM
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
SYMBOL MARKINGS - TRAFFIC ARROWS FOR LOW-SPEED ROADWAYS

STANDARD PLAN M-24.40-02

MARKING AREA
15.94 SQ.FT.

TYPE 6SR (RIGHT)
TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

MARKING AREA
15.94 SQ.FT.

TYPE 6SL (LEFT)
TRAFFIC ARROW

SYMMETRICAL ABOUT CENTER POINT OF ELLIPSES
GRID IS 4" (IN) SQUARE

1/2" - ELLIPSE 'A' AXIS
ELLIPSE 'A' AXIS
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

MARKING AREA
19.98 SQ.FT.

TYPE 7S TRAFFIC ARROW

Washington State Department of Transportation

APPROVED FOR PUBLICATION

April 16, 2015 10:11 AM

By: Brian

STATE DESIGN ENGINEER
NOTE
1. If Rumble Strips are present, install marking outside of the Rumble Strip.

WHITE OR YELLOW - SEE CONTRACT
CHEVRON OR DIAGONAL

CROSSHATCH MARKING
W = 6" (IN) FOR POSTED SPEED LIMIT OF 40 MPH OR LOWER
W = 12" (IN) FOR POSTED SPEED LIMIT OF 45 MPH OR HIGHER

STOP LINE
MARKING AREA = 11.73 SQ.FT.
HALF-MILE MARKER

MARKING AREA = 6.00 SQ FT.
FULL MILE MARKER

AERIAL SURVEILLANCE MARKERS

DRAINAGE STRUCTURE INLET
MARKING AREA = 1.06 SQ FT.

HIGHLIGHT MARKINGS

DRAINAGE MARKING
CROSS CULVERT
MARKING AREA = 0.56 SQ FT.

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
NOTES:
1. If rumble strips are present, install marking outside of the rumble strip.
2. The flexible guide post shall be brown in color.
3. WSDOT BMP sticker to be placed on first flexible guide post only.

STORMWATER BMP MARKING DETAIL
MARKING AREA = 1.78 SQ. FT. FOR PAIR

STORMWATER BMP Delineation Detail

WSDOT STORMWATER BMP Sticker
(Facing Traffic)
**BARRIER DELINERATOR REQUIREMENTS**

- Spacing of Barrier Delineators shall be as shown in the Plans.
- The housing or bracket can be flexible or rigid, molded from a durable plastic or other durable material approved by the Engineer, and shall be attached to the barrier with an adhesive recommended by the manufacturer. The attachment point on the barrier surface shall be free of dirt, curing compound, moisture, paint, or any other matter that would adversely affect the adhesive bond.
- Barrier Delineators shall be one-sided for single direction traffic, or two-sided for bi-directional traffic.
- Color shall be white on the right of traffic, and yellow on the left of traffic.
- The reflective surface shall be rectangular or trapezoidal.
- Reflective Sheeting: 12 square inches minimum surface area, Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.
- Plastic Reflector: 9 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Specific Intensity (cd/ft-c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>0°</td>
<td>126</td>
</tr>
<tr>
<td>0°</td>
<td>20°</td>
<td>56</td>
</tr>
<tr>
<td>0°</td>
<td>30°</td>
<td>30</td>
</tr>
</tbody>
</table>

**NOTES**

1. When the Contract Plans requires a guide post with concurrent guardrail runs, the Contractor shall:
   - Drive the flexible guide post in line with the guardrail posts, or
   - Mount the shorter flexible guide post onto the guardrail post.
2. Guide posts shall be fastened to the wooden guardrail post using two 2" (in) × 3/8" (in) lag screws with washers, along centerline of post. Also acceptable is any approved attachment method submitted by the guard post manufacturer.
3. Guide posts shall be fastened to the steel guardrail posts using two galvanized 2" (in) × 3/8" (in) bolts with a washer on both sides, a lock washer, and nut. The nut shall be tightened to properly compress the lock washer. The drilled holes in the guardrail post web shall be painted with galvanizing repair paint as described in Standard Specification Section 8-11.3(1). Also acceptable is any approved attachment method submitted by the guide post manufacturer.
4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delineators where guide post are required.

**GUIDE POST TYPE DEFINITIONS - REFLECTIVE SHEETING APPLICATIONS**

<table>
<thead>
<tr>
<th>Type W</th>
<th>Type WW</th>
<th>Type Y</th>
<th>Type YY</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt=" guide post types" /></td>
<td><img src="image" alt=" guide post types" /></td>
<td><img src="image" alt=" guide post types" /></td>
<td><img src="image" alt=" guide post types" /></td>
</tr>
</tbody>
</table>

- FACING TRAFFIC, OR FLAT PLASTIC REFLECTOR LENS
- HOUSING OR BRACKET
- TRAFFIC FACE OF BARRIER
- TRAFFIC FACE OF BARRIER
NOTES


2. Guide posts shall be placed at 100' spacing on ramp tangents and tapers.

3. "S" dimension shown on Standard Plan M-40.40 or 100', whichever is smaller.

4. One half of "S" dimension shown on Standard Plan M-40.40 or 50', whichever is smaller.

5. Two spaces at 100'.

6. Three equal spaces when R < 75', four equal spaces when R > 75'.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50' feet maximum.
EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

NOTE

DIVIDED HIGHWAY

REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
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<th>TYPE G1</th>
<th>TYPE G2</th>
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<tr>
<td>![6&quot;] WHITE](WHITE_6.png)</td>
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<tr>
<td>![4&quot;] WHITE](WHITE_4.png)</td>
<td>![4&quot;] WHITE](WHITE_4.png)</td>
</tr>
<tr>
<td>![3&quot;] WHITE](WHITE_3.png)</td>
<td>![3&quot;] WHITE](WHITE_3.png)</td>
</tr>
</tbody>
</table>

THREE EQUAL SPACES WHEN R < 75'
FOUR EQUAL SPACES WHEN R ≥ 75'
100' DECELERATION TAPER

UNDIVIDED HIGHWAY WITHOUT ILLUMINATION

STANDARD PLAN M-40.30-01

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
GUIDE POST SPACING

<table>
<thead>
<tr>
<th>RADIUS (FEET)</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>115</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
<td>30</td>
</tr>
<tr>
<td>200</td>
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<tr>
<td>250</td>
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<tr>
<td>300</td>
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<td>500</td>
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<td>600</td>
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<tr>
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<tr>
<td>800</td>
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</tr>
<tr>
<td>900</td>
<td>85</td>
</tr>
<tr>
<td>1,000</td>
<td>90</td>
</tr>
<tr>
<td>1,200</td>
<td>100</td>
</tr>
<tr>
<td>1,700</td>
<td>120</td>
</tr>
<tr>
<td>2,300</td>
<td>140</td>
</tr>
<tr>
<td>3,000</td>
<td>160</td>
</tr>
<tr>
<td>3,700</td>
<td>180</td>
</tr>
<tr>
<td>4,500</td>
<td>200</td>
</tr>
<tr>
<td>5,500</td>
<td>220</td>
</tr>
<tr>
<td>6,500</td>
<td>240</td>
</tr>
<tr>
<td>7,600</td>
<td>260</td>
</tr>
<tr>
<td>8,800</td>
<td>280</td>
</tr>
<tr>
<td>10,000</td>
<td>300</td>
</tr>
</tbody>
</table>

INTERPOLATE FROM THE
TABLE FOR RADII NOT SHOWN

NOTES

1. The first guide post is positioned "S" distance from the
   beginning of curvature.
2. If the last guide post beyond the curve is 1/2 "S" or more,
   no additional posts are required.
3. If the last guide post beyond the curve is less than 1/2 "S",
   one additional post is required.

NOTE 1

NOTE 2

NOTE 3

TWO-WAY UNDIVIDED HIGHWAYS
GUIDE POSTS ON OUTSIDE OF CURVE
IN DIRECTION OF TRAVEL

MULTI-LANE DIVIDED HIGHWAYS
GUIDE POSTS ON INDORE AND OUTSIDE OF CURVE
FOR EACH DIRECTION OF TRAVEL

LEGEND

SEE TYPE DEFINITIONS,
STD. PLAN M-40.10

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

GUIDE POST PLACEMENT
HORIZONTAL CURVES

STANDARD PLAN M-40.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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NOTES

1. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

2. Locate the initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

NOTE

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

MEDIAN Crossovers

LANE reductions
ISOMETRIC VIEW

TYPICAL SHOULDER INSTALLATION

SHOULDER
RUMBLE STRIP

SECTION A

12" MAX.

7" ± 1/2"

1/2" MIN.
5/8" MAX.

SECTION B

16"

1/2" MIN.
5/8" MAX.

SHOULDER RUMBLE STRIP

MULTI-LANE DIVIDED HIGHWAY

SHOULDER RUMBLE STRIP

TYPE 1

FOR DIVIDED HIGHWAYS

STANDARD PLAN M-60.10-01

EFFECTIVE: AUGUST 7, 2017 TO August 5, 2018
IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE ACCELERATION TAPER.

40' MIN.

IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

RUMBLE STRIP PLACEMENT AT INTERSECTIONS
SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4 FOR UNDIVIDED HIGHWAYS

STANDARD PLAN M-60.20-02

SHOULDER TAPER DETAIL

1. NOT LESS THAN 4' - PROVIDE 5' WHEN BARRIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGE APPROACH SLABS

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

40' MIN.

TERMINATE SHOULDER RUMBLE STRIPS 40' MINIMUM FROM THE BEGINNING OR END OF EACH RIGHT TURN RADIUS.

TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER.

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

60' MIN.

STRUCTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH

100' MIN.

MAJOR ROAD

40' MIN.

EDGE OF PAVED SHOULDER - EPS

EDGE LINE

EDGE LINE

EDGE OF PAVED SHOULDER - EPS

SHOULDER RUMBLE STRIPS

SHOULDER RUMBLE STRIPS

SHOULDER RUMBLE STRIPS

TYPE 2 - 12' GAP AND 12' WIDE STRIP

TYPE 3 - 16' GAP AND 16' WIDE STRIP

TYPE 4 - 12' WIDE STRIP

48 MILLED UNITS

12' OR 16' GAP

48 MILLED UNITS

28 MILLED UNITS

12' GAP

28 MILLED UNITS

12' GAP

28 MILLED UNITS

SHOULDER TAPER DETAIL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

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NOTES

1. Centerline Rumble Strip installation requires a minimum distance of 12 feet from Centerline to edge of paved shoulder.

2. When directed by the Engineer, Rumble Strips may be installed along the turn pocket taper where there is a history of rear-end collisions in the turn pocket.
INTERSECTION WITH LEFT TURN CHANNELIZATION

INSTALL RUMBLE STRIP

TERMINATE AT END OF LEFT TURN CHANNELIZATION STRIPING

APPROX. MIDWAY BETWEEN MILLED GROOVES

RAISED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

REFER TO STANDARD PLAN M-20.30 FOR
RECESSED PAVEMENT MARKER DETAIL

RECESSED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

RUMBLE STRIP (TYP.)

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP

LONGITUDINAL MARKING (TYP.)

DRIVEWAY

RUMBLE STRIP USAGE AS DIRECTED BY ENGINEER

UNCHELANNELIZED INTERSECTIONS AND COMMERCIAL ROAD APPROACHES

CENTERLINE RUMBLE STRIP

STANDARD PLAN M-65.10-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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NOTE

1. Typically, four times the letter or numeral height = minimum, up to ten times = maximum, or according to Plans.
EIGHT FOOT HIGH LETTERS AND NUMERALS ARE SHOWN ON A FOUR-INCH SQUARE GRID
FOR USE ON ROADWAYS WITH A POSTED SPEED OF 45 MPH OR MORE

TRAFFIC LETTERS AND NUMERALS
(HIGH SPEED ROADWAYS)
STANDARD PLAN M-80.20-00

EXPIRES AUGUST 5, 2009

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 7, 2017 TO AUGUST 5, 2018
SIX FOOT HIGH LETTERS AND NUMERALS SHOWN ON A THREE-INCH SQUARE GRID

TEN FOOT HIGH LETTERS SHOWN ON A FIVE-INCH SQUARE GRID

FOR USE ON ROADWAYS WITH A POSTED SPEED OF 40 MPH OR LESS