Standard Plans
For Road, Bridge, and Municipal Construction

M 21-01
English
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Foreword

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

Updating the manual is a continuous process and revisions are issued periodically. Questions, comments, and recommendations for changes are welcome. The Comment Request Form on the reverse side of this page is provided to encourage comments and assure their prompt delivery. Use copies of the form to send any attachments, such as marked copies of specific standard plans. Your comments should be sent to Design Standards Graphics, Transportation Building, Olympia, WA 98504-7329.

Bentley MicroStation DGN CAD files, Adobe PDF files and some AutoCAD DWG CAD files can be downloaded from the Design Standards Graphic website at: http://www.wsdot.wa.gov/eesc/cae/std_plan/

Contact the Standard Plans Office at (360) 705-7246 if you have questions about the technical content of this manual.

Additional copies of this manual can be ordered from the Engineering Publications Office (360) 705-7430.

Harold Peterfeso
State Design Engineer
## Comments

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

Date: __________  Phone: __________

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

Comment (marked copies attached):

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## 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></td>
<td>Section A Concrete Pavement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-1</td>
<td>Cement Concrete Pavement Joints</td>
<td>10/8/99</td>
<td>2</td>
</tr>
<tr>
<td>A-2</td>
<td>Bridge Approach Slab</td>
<td>12/23/98</td>
<td>2</td>
</tr>
<tr>
<td>A-3</td>
<td>Transition from Concrete Overlay</td>
<td>5/9/97</td>
<td>2</td>
</tr>
<tr>
<td>A-4</td>
<td>Inlet Placement at Bridge End</td>
<td>3/7/97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Section B Drainage Structures and Hydraulics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-1</td>
<td>Catch Basin Type 1</td>
<td>7/31/01</td>
<td></td>
</tr>
<tr>
<td>B-1a</td>
<td>Catch Basin Type 1L</td>
<td>7/31/01</td>
<td></td>
</tr>
<tr>
<td>B-1b</td>
<td>Catch Basin Type 1P, Parking Lot C.B.</td>
<td>3/7/97</td>
<td></td>
</tr>
<tr>
<td>B-1e</td>
<td>Catch Basin Type 2</td>
<td>3/7/97</td>
<td></td>
</tr>
<tr>
<td>B-1z</td>
<td>Miscellaneous Details for Manholes and Catch Basins</td>
<td>5/30/97</td>
<td></td>
</tr>
<tr>
<td>B-2</td>
<td>Solid Metal Cover for Catch Basin</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-2a</td>
<td>Metal Frame and Grate for Catch Basin and Inlet</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-2b</td>
<td>Vaned Grate for Catch Basin and Inlet</td>
<td>4/18/97</td>
<td></td>
</tr>
<tr>
<td>B-2c</td>
<td>Bi-Directional Vaned Grate for Catch Basin and Inlet</td>
<td>7/25/97</td>
<td></td>
</tr>
<tr>
<td>B-3</td>
<td>Catch Basin Type 2 with Flow Restrictor-Oil Separator</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-3a</td>
<td>Catch Basin Type 2 with Baffle Type Flow</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restrictor-Oil Separator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-4b</td>
<td>Grate Inlet Type 1</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-4c</td>
<td>Grate Inlet Type 2</td>
<td>5/9/97</td>
<td>2</td>
</tr>
<tr>
<td>B-4f</td>
<td>Drop Inlet Type 1</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-4g</td>
<td>Drop Inlet Type 2</td>
<td>7/18/97</td>
<td></td>
</tr>
<tr>
<td>B-4h</td>
<td>Drop Inlet Grates</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-7</td>
<td>Flared End Sections</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-7a</td>
<td>Beveled End Sections</td>
<td>3/7/97</td>
<td></td>
</tr>
<tr>
<td>B-8</td>
<td>Structural Plate Underpass Design 1</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-8a</td>
<td>Structural Plate Underpass Design 2</td>
<td>7/25/97</td>
<td></td>
</tr>
<tr>
<td>B-9</td>
<td>Headwalls for Culvert Pipes</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-9a</td>
<td>Type 1 Safety Bars for Stepped Culvert Pipe or Pipe Arch</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 2 Safety Bars for Culvert Pipe or Pipe Arch (On Cross Road)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-9b</td>
<td></td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-9c</td>
<td>Tapered End Section with Type 3 Safety Bars</td>
<td>7/18/97</td>
<td></td>
</tr>
<tr>
<td>B-9d</td>
<td>Tapered End Section with Type 4 Safety Bars</td>
<td>7/18/97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(On Cross Road)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-11</td>
<td>Pipe Zone Bedding and Backfill</td>
<td>7/31/01</td>
<td></td>
</tr>
<tr>
<td>B-13</td>
<td>Coupling Bands for Corrugated Metal Pipe</td>
<td>12/4/98</td>
<td></td>
</tr>
<tr>
<td>B-18</td>
<td>Drop Connection for Sanitary Sewers</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-18a</td>
<td>Vertical Connection</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-18b</td>
<td>8 Inch Clean Out</td>
<td>7/18/97</td>
<td></td>
</tr>
<tr>
<td>B-19</td>
<td>Hydrant Setting Types A and B</td>
<td>5/30/97</td>
<td></td>
</tr>
<tr>
<td>B-20d</td>
<td>Residential Sidewalk Drain</td>
<td>7/18/97</td>
<td></td>
</tr>
<tr>
<td>B-21</td>
<td>2 Inch Blowoff Assembly</td>
<td>7/18/97</td>
<td></td>
</tr>
<tr>
<td>B-21a</td>
<td>Combination Air Release/Air Vacuum Valve Assembly</td>
<td>8/10/98</td>
<td></td>
</tr>
<tr>
<td>B-22</td>
<td>Concrete Blocking for Convex Vertical Bends</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-22a</td>
<td>Concrete Thrust Block</td>
<td>8/1/97</td>
<td></td>
</tr>
<tr>
<td>B-23a</td>
<td>Manhole Type 1</td>
<td>5/9/97</td>
<td></td>
</tr>
<tr>
<td>B-23b</td>
<td>Manhole Type 2</td>
<td>5/9/97</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-23c</td>
<td>Manhole Type 3</td>
<td>5/9/97</td>
</tr>
<tr>
<td>B-23d</td>
<td>Manhole Type 4</td>
<td>5/9/97</td>
</tr>
<tr>
<td>B-25</td>
<td>Manhole Ring and Cover</td>
<td>5/9/97</td>
</tr>
<tr>
<td>B-26</td>
<td>Concrete Inlet</td>
<td>7/18/97</td>
</tr>
<tr>
<td>B-27</td>
<td>Precast Concrete Drywell</td>
<td>8/1/97</td>
</tr>
<tr>
<td>B-28</td>
<td>Connection Details for Dissimilar Culvert Pipe</td>
<td>10/6/99</td>
</tr>
<tr>
<td>B-29</td>
<td>Side Sewer</td>
<td>4/24/98</td>
</tr>
<tr>
<td>B-30</td>
<td>Standing Side Sewer Connection</td>
<td>8/10/98</td>
</tr>
</tbody>
</table>

Section C  Traffic Barrier

C-1  Beam Guardrail (W Beam)  7/31/98  2 Sheets
C-1a Beam Guardrail (Thrie Beam)  7/31/98
C-1b Beam Guardrail Posts and Blocks  3/17/00  2 Sheets
C-1c Beam Guardrail  5/30/97
C-1d Thrie Beam Guardrail Reducer Section  3/14/97
C-2  Guardrail Placement (Cases 1, 2, and 3)  1/6/00
C-2a Guardrail Placement (Cases 4, 5, and 6)  7/17/98
C-2b Guardrail Placement (Cases 7 and 8)  6/12/98
C-2c Guardrail Placement, Median Bull Nose (Case 9)  1/8/99
C-2d Guardrail Placement (Cases 10a, 10b, and 10c)  5/22/98
C-2e Guardrail Placement (Cases 11a, 11b, and 11c)  3/7/97  2 Sheets
C-2f Guardrail Placement, Weak Post Intersection Design  3/14/97
(8' - 6" Max. Radius) (Cases 12a, 12b, 12c and 12d)
C-2g Guardrail Placement, Weak Post Intersection Design  7/27/01
(35' Max. Radius) (Cases 13a, 13b, 13c, and 13d)
C-2h Guardrail Placement (Case 14)  3/28/97
C-2i Guardrail Placement (Case 15)  3/28/97
C-2j Guardrail Placement (Cases 16, 17, and 18)  6/12/98
C-2k Guardrail Placement 12'-6" Span (Cases 19a and 19b)  7/27/01
C-2n Guardrail Placement 18'-9" Span (Case 20)  7/27/01
C-2o Guardrail Placement 25' Span (Case 21)  7/13/01
C-2p Guardrail Placement, Strong Post Intersection Design (Cases 22a, 22b, 22c, and 22d)  3/28/97
C-3  Guardrail Transition Sections  8/10/98
C-3a Guardrail Transition Sections  3/14/97
C-3b Guardrail Transition Sections  3/14/97  2 Sheets
C-3c Guardrail Transition Sections  3/28/97
C-4  Beam Guardrail Buried Terminal Type 1  7/13/01
C-4a Beam Guardrail Buried Terminal Type 2  7/13/01
C-4b Beam Guardrail Flared Terminal  6/23/00
C-4e Beam Guardrail Non-Flared Terminal  3/17/00
C-5  Guardrail Connection to Bridge Rail or Concrete Barrier  3/14/97
C-6  Beam Guardrail Anchor Type 1  5/30/97  2 Sheets
C-6a Beam Guardrail Anchor Type 2  3/14/97
C-6c Beam Guardrail Anchor Type 4  1/6/00
C-6d Beam Guardrail Anchor Type 5  5/30/97
C-6f Beam Guardrail Anchor Type 7  7/25/97
C-7  Beam Guardrail End Sections  8/10/98
C-7a Thrie Beam End Sections  8/1/97
## 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>C-8</td>
<td>Concrete Barrier Type 2</td>
<td>8/10/98</td>
<td>2</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>7/17/98</td>
<td>2</td>
</tr>
<tr>
<td>C-8c</td>
<td>Concrete Barrier Type 5</td>
<td>5/30/97</td>
<td></td>
</tr>
<tr>
<td>C-8d</td>
<td>Alternative Temporary Concrete Barrier</td>
<td>7/25/97</td>
<td></td>
</tr>
<tr>
<td>C-8e</td>
<td>Concrete Barrier Anchors</td>
<td>4/2/99</td>
<td></td>
</tr>
<tr>
<td>C-9a</td>
<td>Redirectional Land Form</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>C-10</td>
<td>Box Culvert Guardrail Steel Post</td>
<td>7/31/98</td>
<td>2</td>
</tr>
<tr>
<td>C-11</td>
<td>Cable Barrier</td>
<td>5/30/97</td>
<td></td>
</tr>
<tr>
<td>C-11a</td>
<td>Cable Barrier Placement</td>
<td>2/19/99</td>
<td></td>
</tr>
<tr>
<td>C-11b</td>
<td>Cable Barrier Terminal</td>
<td>9/28/01</td>
<td>2</td>
</tr>
<tr>
<td>C-12</td>
<td>Inertial Barrier Configurations</td>
<td>7/27/01</td>
<td></td>
</tr>
<tr>
<td>C-13</td>
<td>Single Slope Barrier Pre-Cast Type</td>
<td>4/16/99</td>
<td>2</td>
</tr>
<tr>
<td>C-13a</td>
<td>Single Slope Barrier Pre-Cast Type Transition Section</td>
<td>4/16/99</td>
<td></td>
</tr>
<tr>
<td>C-13b</td>
<td>Single Slope Barrier Pre-Cast Type Single Sided Section</td>
<td>4/16/99</td>
<td></td>
</tr>
<tr>
<td>D-1a</td>
<td>Reinforced Concrete Retaining Wall Type 1 and 1 SW</td>
<td>10/6/99</td>
<td>2</td>
</tr>
<tr>
<td>D-1b</td>
<td>Reinforced Concrete Retaining Wall Type 2 and 2 SW</td>
<td>10/6/99</td>
<td>2</td>
</tr>
<tr>
<td>D-1c</td>
<td>Reinforced Concrete Retaining Wall Type 3 and 3 SW</td>
<td>10/6/99</td>
<td>2</td>
</tr>
<tr>
<td>D-1d</td>
<td>Reinforced Concrete Retaining Wall Type 4 and 4 SW</td>
<td>10/6/99</td>
<td>2</td>
</tr>
<tr>
<td>D-1e</td>
<td>Reinforced Concrete Retaining Wall Type 5 and 5 SW</td>
<td>10/6/99</td>
<td>2</td>
</tr>
<tr>
<td>D-1f</td>
<td>Reinforced Concrete Retaining Wall Type 6 and 6 SW</td>
<td>10/6/99</td>
<td>2</td>
</tr>
<tr>
<td>D-2a</td>
<td>Noise Barrier - Type 1</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>D-2b</td>
<td>Noise Barrier - Type 2</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2c</td>
<td>Noise Barrier - Type 3</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2d</td>
<td>Noise Barrier - Type 4</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2e</td>
<td>Noise Barrier - Type 5</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>D-2f</td>
<td>Noise Barrier - Type 6</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>D-2g</td>
<td>Noise Barrier - Type 7</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>D-2h</td>
<td>Noise Barrier - Type 8</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>D-2i</td>
<td>Noise Barrier - Type 9</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2j</td>
<td>Noise Barrier - Type 10</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2k</td>
<td>Noise Barrier - Type 11</td>
<td>3/14/97</td>
<td>3</td>
</tr>
<tr>
<td>D-2l</td>
<td>Noise Barrier - Type 12</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2m</td>
<td>Noise Barrier - Type 13</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2n</td>
<td>Noise Barrier - Type 14</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2o</td>
<td>Noise Barrier - Type 15</td>
<td>3/14/97</td>
<td></td>
</tr>
<tr>
<td>D-2p</td>
<td>Noise Barrier - Type 16</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2q</td>
<td>Noise Barrier - Type 17</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2r</td>
<td>Noise Barrier - Type 18</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2s</td>
<td>Noise Barrier - Type 19</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2t</td>
<td>Noise Barrier - Type 20</td>
<td>3/14/97</td>
<td>2</td>
</tr>
<tr>
<td>D-2u</td>
<td>Access Door - Type 1</td>
<td>3/7/97</td>
<td></td>
</tr>
<tr>
<td>D-2v</td>
<td>Access Door - Type 2</td>
<td>3/7/97</td>
<td></td>
</tr>
<tr>
<td>D-2w</td>
<td>Access Door - Type 3</td>
<td>3/7/97</td>
<td></td>
</tr>
<tr>
<td>D-2x</td>
<td>Access Door - Type 4</td>
<td>3/7/97</td>
<td></td>
</tr>
</tbody>
</table>

### Section D Retaining Walls, Noise Walls, and Slope Protection

- D-1a  Reinforced Concrete Retaining Wall Type 1 and 1 SW  10/6/99  2 Sheets
- D-1b  Reinforced Concrete Retaining Wall Type 2 and 2 SW  10/6/99  2 Sheets
- D-1c  Reinforced Concrete Retaining Wall Type 3 and 3 SW  10/6/99  2 Sheets
- D-1d  Reinforced Concrete Retaining Wall Type 4 and 4 SW  10/6/99  2 Sheets
- D-1e  Reinforced Concrete Retaining Wall Type 5 and 5 SW  10/6/99  2 Sheets
- D-1f  Reinforced Concrete Retaining Wall Type 6 and 6 SW  10/6/99  2 Sheets
- D-2a  Noise Barrier - Type 1  3/14/97
- D-2b  Noise Barrier - Type 2  3/14/97  2 Sheets
- D-2c  Noise Barrier - Type 3  3/14/97  2 Sheets
- D-2d  Noise Barrier - Type 4  3/14/97  2 Sheets
- D-2e  Noise Barrier - Type 5  3/14/97
- D-2f  Noise Barrier - Type 6  3/14/97
- D-2g  Noise Barrier - Type 7  3/14/97
- D-2h  Noise Barrier - Type 8  3/14/97
- D-2i  Noise Barrier - Type 9  3/14/97  2 Sheets
- D-2j  Noise Barrier - Type 10  3/14/97  2 Sheets
- D-2k  Noise Barrier - Type 11  3/14/97  3 Sheets
- D-2l  Noise Barrier - Type 12  3/14/97  2 Sheets
- D-2m  Noise Barrier - Type 13  3/14/97  2 Sheets
- D-2n  Noise Barrier - Type 14  3/14/97  2 Sheets
- D-2o  Noise Barrier - Type 15  3/14/97
- D-2p  Noise Barrier - Type 16  3/14/97  2 Sheets
- D-2q  Noise Barrier - Type 17  3/14/97  2 Sheets
- D-2r  Noise Barrier - Type 18  3/14/97  2 Sheets
- D-2s  Noise Barrier - Type 19  3/14/97  2 Sheets
- D-2t  Noise Barrier - Type 20  3/14/97  2 Sheets
- D-2u  Access Door - Type 1  3/7/97
- D-2v  Access Door - Type 2  3/7/97
- D-2w  Access Door - Type 3  3/7/97
- D-2x  Access Door - Type 4  3/7/97
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
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<th>Publication Approval Date</th>
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<tr>
<td>D-2y</td>
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<tr>
<td>D-4</td>
<td>Backfill and Drainage for Retaining Walls</td>
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<tr>
<td>D-6</td>
<td>Gabions</td>
<td>6/19/98</td>
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<tr>
<td>D-7</td>
<td>Wire Mesh Slope Protection</td>
<td>10/6/99</td>
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<tr>
<td>D-7a</td>
<td>Wire Mesh Slope Protection Anchors</td>
<td>10/6/99</td>
</tr>
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<td>D-9</td>
<td>Concrete Slope Protection</td>
<td>12/11/98 2 Sheets</td>
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### Section E  Bridges and Trestles

| E-1     | Date Numerals                                          | 7/25/97                   |
| E-2     | Pile or Frame Detour Bridge with Asphalt Overlay       | 5/29/98 2 Sheets          |
| E-5     | Manhole Ring and Cover for Bridges                     | 5/29/98                   |

### Section F  Curbs, Approaches, Gutters, and Sidewalks

| F-1     | Cement Concrete Curbs and Gutters                      | 7/18/97                   |
| F-2     | Precast Traffic Curb                                   | 8/27/99                   |
| F-2a    | Block Traffic Curb                                     | 5/30/97                   |
| F-2b    | Extruded Curb                                          | 3/14/97 2 Sheets          |
| F-3     | Cement Concrete Sidewalk and Approach Details          | 2/9/00 2 Sheets           |

### Section G  Signs and Sign Supports

| G-1     | Ground Mounted Sign Placement                          | 9/12/01                   |
| G-2     | Sign Bridge                                            | 7/2/98 3 Sheets           |
| G-2a    | Sign Bridge Foundations                                | 7/2/98                    |
| G-3     | Cantilever Sign Structures                             | 7/2/98                    |
| G-3a    | Cantilever Sign Structure Foundations                   | 7/2/98 2 Sheets           |
| G-4a    | Roadside Sign Structures on Timber Posts               | 4/2/99                    |
| G-4b    | Roadside Signs on Laminated Wood Box Posts             | 8/12/94                   |
| G-7     | Milepost                                               | 7/18/97                   |
| G-8a    | Roadside Sign Structures for Multiple Steel Post Signs | 10/6/99 3 Sheets          |
| G-8b    | Small Steel Sign Support                               | 5/5/00 3 Sheets           |
| G-9a    | Overhead Sign Mounting Details                         | 4/2/99 2 Sheets           |
| G-9b    | Sign Mounting Details                                  | 4/2/99 3 Sheets           |

### Section H  Delineators and Miscellaneous Construction

| H-1     | Guide Posts                                            | 7/18/97                   |
| H-1a    | Guide Post Placement Grade Intersection                | 4/14/00                   |
| H-1b    | Guide Post Placement for Interchanges                  | 5/5/00                    |
| H-1c    | Guide Post Placement for Horizontal Curves             | 8/1/97                    |
| H-1d    | Miscellaneous Guide Post Placement                     | 7/18/97                   |
| H-1e    | Guide Post Placement for Bridges                       | 4/14/00                   |
| H-2     | Type III Barricade                                     | 8/1/97                    |
| H-3     | Raised Pavement Marking Details                        | 4/14/00                   |
| H-3a    | Pavement Marking Details                               | 6/23/00 2 Sheets          |
| H-4     | Continuous Shoulder Rumble Strips                      | 2/18/00 3 Sheets          |
| H-5     | Striping Details                                       | 2/18/00                   |
| H-5a    | Striping Details                                       | 2/18/00                   |
| H-5b    | Striping Details                                       | 2/18/00                   |
| H-5c    | Pavement Markings                                      | 8/1/97 3 Sheets           |
Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
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<tbody>
<tr>
<td>H-5d</td>
<td>Raised Pavement Marker Substitution Patterns</td>
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<td>H-6</td>
<td>Survey Monument</td>
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<td>Monument Case and Cover</td>
<td>8/10/98</td>
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<tr>
<td>H-8</td>
<td>Slope Treatment</td>
<td>9/18/98</td>
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<td>H-9</td>
<td>Embankment at Bridge Ends</td>
<td>4/18/97</td>
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<td>Mailbox Installation</td>
<td>6/23/00</td>
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<td>Type 1 Bollard</td>
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<tr>
<td>H-13a</td>
<td>Type 2 Bollard</td>
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<tr>
<td>H-14</td>
<td>Survey Stakes</td>
<td>4/23/99</td>
<td>2</td>
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</table>

Section I  Roadside and Site Development

I-1 Rest Area Septic Tank 7/18/97
I-2 Crest Gage 4/23/99
I-3 Automated Ground Water Monitoring Well 8/20/99

Section J  Illumination and Signals

J-1b Steel Light Standard Base Details 10/8/99 3 Sheets
J-1c Slip Base Adaptor for 4-Bolt Light Standard Base 4/24/98
J-1e Light Standards Wiring Details 8/1/97
J-1f Timber Light Standards 6/23/00
J-3 Type A, B, and C Service Lighting Details 8/1/97 2 Sheets
J-3b Modified Type B Service 4/24/98 2 Sheets
J-3c Type D Service 6/19/98
J-3d Type E Service 4/2/99
J-5 Pedestrian Pushbutton Details 8/1/97
J-6c Cabinet Foundation Details 4/24/98
J-6f Signal Head Mounting Details Pole and Post Top Mountings 4/24/98
J-6g Signal Head Mounting Details Mast Arm and Span Wire Mountings 8/1/97
J-6h Miscellaneous Signal Details 4/24/98
J-7a Signal Standard Type Designations and Type PPB, PS, I, RM, and FB Details 9/12/01 2 Sheets
J-7c Strain Pole Standards Type IV and V 6/19/98
J-7d Span Wire Installation 4/24/98
J-8a Induction Loop Details 8/1/97 2 Sheets
J-9a Typical Grounding Details 4/24/98
J-10 Electrical Conduit Placement 7/18/97
J-11a Standard Junction Box 9/12/01

Section K  Traffic Control Plans (For Local Agency Use Only)

K-1 Traffic Control Plan (one lane detour) 3/7/97
K-2 Traffic Control Plan (two lanes, one closed) 3/7/97
K-3 Traffic Control Plan (road closed, detour) 3/7/97
K-5 Traffic Control Plan (four lanes, one closed) 3/7/97
K-7 Traffic Control Plan (four lane divided, one closed) 3/7/97
K-8 Traffic Control Plan (multilane, two closed) 3/7/97
## Contents

<table>
<thead>
<tr>
<th>Plan No.</th>
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<th>Publication Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-10</td>
<td>Traffic Control Plan (Intersection, right turn only lane)</td>
<td>3/7/97</td>
</tr>
<tr>
<td>K-11</td>
<td>Traffic Control Plan (Intersection, left turn lane access)</td>
<td>3/7/97</td>
</tr>
<tr>
<td>K-13</td>
<td>Traffic Control Plan (portable barrier around work area)</td>
<td>3/7/97</td>
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<tr>
<td>K-16</td>
<td>Traffic Control Plan (two lanes, paving operation)</td>
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<tr>
<td>K-17</td>
<td>Traffic Control Plan (four lane, shoulder work)</td>
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<tr>
<td>K-18</td>
<td>Traffic Control Plan (urban street, shoulder work)</td>
<td>3/7/97</td>
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</table>

### Section L  Fence and Glare Screen

<table>
<thead>
<tr>
<th>Plan No.</th>
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<tbody>
<tr>
<td>L-1</td>
<td>Wire Fence</td>
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<tr>
<td>L-2</td>
<td>Chain Link Fence</td>
<td>7/18/97</td>
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<tr>
<td>L-3</td>
<td>Chain Link Gates</td>
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<tr>
<td>L-5</td>
<td>Glare Screen Type 1</td>
<td>7/31/98</td>
<td></td>
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<tr>
<td>L-5a</td>
<td>Glare Screen Type 2</td>
<td>7/31/98</td>
<td></td>
</tr>
<tr>
<td>L-6</td>
<td>Access Control Gate</td>
<td>7/25/97</td>
<td></td>
</tr>
</tbody>
</table>
**Transverse Contraction Joint**

- Sawed groove width: 3/16" min and 5/16" max
- Dowel bars only for pavement with dowel bar joints

**Transverse Construction Joint**

- Sawed groove width: 3/16" min and 5/16" max
- Dowel bars 1 1/2" dia x 19" on 12" centers

**Longitudinal Contraction Joint**

- Sawed groove width: 3/16" min and 5/16" max
- #5 tie bars 32" long on 36" centers

**Longitudinal Construction Joint**

- Sawed groove width: 3/16" min and 5/16" max
- Existing RCCP
- ACP
- PCCP to ACP

**Longitudinal Construction Joint**

- Sawed groove width: 3/16" min and 5/16" max
- Existing RCCP
- #5 tie bars 32" long on 36" centers

**Longitudinal Construction Joint**

- Sawed groove width: 3/16" min and 5/16" max
- Drilling and grouting when widening existing pavement with RCCP

---

**Cement Concrete Pavement Joints**

**Standard Plan A-1**

**Approved for Publication**

Clifford E. Mansfield 10/08/99

**Effective:** January 7, 2002 to August 4, 2002
The plan above represents only the basic 12' x 25' slab module with skew. All approach slab construction shall be for full width of traffic lanes and shoulders at both ends of the bridge. For slab extension to include shoulders, continue reinforcing steel spacing and slab thickness in the same relationship as in the basic slab module.

**PLAN**

**LONGITUDINAL SECTION**

**TABLE A**

<table>
<thead>
<tr>
<th>SKEW</th>
<th>LENGTH</th>
</tr>
</thead>
</table>
| 0'   | 11'-8" Str.
| 5'   | 11'-9" Str.
| 10'  | 11'-10 Str.
| 15'  | 12'-1'' Str.

**APPENDIX A**

<table>
<thead>
<tr>
<th>BAR LIST FOR STANDARD 12' x 25' SLAB MODULE</th>
<th>APPROXIMATE QUANTITIES (NO SKEW)</th>
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<tbody>
<tr>
<td>LOCATION</td>
<td>BAR SIZE NO. LENGTH</td>
</tr>
<tr>
<td>Longitudinal bottom</td>
<td>8 10 25'-3&quot;</td>
</tr>
<tr>
<td>Longitudinal bottom</td>
<td>8 10 24'-3&quot;</td>
</tr>
<tr>
<td>Longitudinal bottom</td>
<td>8 9 21'-6&quot;</td>
</tr>
<tr>
<td>Longitudinal top</td>
<td>7 19 8'-3&quot;</td>
</tr>
<tr>
<td>Longitudinal top</td>
<td>5 10 24'-8&quot;</td>
</tr>
<tr>
<td>Transverse bottom</td>
<td>6 19 See Table A</td>
</tr>
<tr>
<td>Transverse top</td>
<td>5 18 See Table A</td>
</tr>
<tr>
<td>Vertical tie bar</td>
<td>4 36 2'-0&quot; Straight</td>
</tr>
<tr>
<td>Transverse tie bar</td>
<td>5 14 2'-0&quot; Straight</td>
</tr>
<tr>
<td>Epoxy Coated reinforcing steel</td>
<td></td>
</tr>
</tbody>
</table>

**TRANSVERSE SECTION**

**CONSTRUCTION NOTES**

1. **For PCC roadway, insert dowels parallel to center line at 1'-0" along transverse construction joint. Additional details are shown on elevation below.**

2. **Approach slab edge treatment**
   - Expansion joint between bridge deck and slab - edge both sides with 1/2" R.
   - Longitudinal exterior edge - edge with 1/2" R.
   - Transverse construction joint between slab and PCC roadway - edge both sides with 1/2" R.
   - Longitudinal construction joint between adjacent lanes, only when required - edge first pour only with 1/2" R.

3. **Top reinforcement shall be supported by Mark 7 bars driven into subgrade on approximately the following centers:**
   - 3'-0" longitudinally
   - 2'-6" transversely

**CLIFFORD L. MANSFIELD**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**SHEET 1 OF 2 SHEETS**

**ADDED EPOXY COATED REINFORCEMENT**

**NOTE:** THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT AND IS INTENDED AS A WORKING DRAWING AND NOT FOR PUBLIC USE. THIS PLAN IS APPROVED FOR PUBLIC USE ONLY IN THE STATE OF WASHINGTON, BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MUST BE ON FILE WITH THE DEPARTMENT UPON REQUEST.

**EXPRESS JANUARY 9, 1999**

**ARRIVAL:** JANUARY 7, 2002 TO AUGUST 4, 2002
1. Anchor Rod. 7/8" DIA x length as follows:
   - Method A: One-piece 1' 10" long, threaded 8" MIN, for bridge deck embedment.
   - Method B: Two-pieces: 1' 3½" long, threaded 2" MIN, an end away from anchor head.
   - 0' 10" long, fully threaded 3" MIN each end.
2. Pipe, polyethylene or PVC, 1" DIA x 1' long.
3. Preformed joint filler. 3/16" thick x full depth.
4. 3/16" DIA x 8" hole, only for one-piece anchor rod installation.
5. Pavement seat, dimensioned as per plans. Cover with one layer 15" asphaltic building felt.
6. 7/8" stop type coupler with a minimum ultimate strength of 20,000 pounds.
7. (Williams 251 or approved equal).
8. 7/8" x 2 1/2" square plate with 2 nuts.

Bridge Approach Slab Anchors shall be placed 1' from outside edge of pavement and on 2" centers for full roadway width along back of bridge pavement seat, parallel with roadway centerline.

**BRIDGE APPROACH SLAB ANCHOR**

**COMPRESSION SEAL INSTALLATION**

- 2½" compression seal unless noted otherwise on Bridge Sheets.
- 1½" installation width for 2½" compression seal (See Bridge sheets for installation widths applicable to other compression seal sizes.)
- ½" Premolded joint filler
- Seal height varies with manufacturer. *Normal to verify prior to slab construction. pavement seat

**EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002**
CASE 3
ASPHALT CONCRETE PAVEMENT
(L-Type Abutment)

CASE 4
ASPHALT CONCRETE PAVEMENT

CASE 5
ASPHALT CONCRETE PAVEMENT
(ACP was on bridge and/or roadway
grade slopes up from bridge)

NOTES
1. Plane a taper into the existing pavement and shoulders (if paved). Depth shall
taper from 0” at the beginning of pavement, to 1” at end of taper. Does not
apply when existing pavement has been plane.
2. Before placing overlay, remove top 2” of existing joint filler, or 3” if existing
joint filler is fiberboard, and block out the joint. After overlay, install new premolded
joint filler. Top of joint filler shall be between 9/6” and 3/4” below overlay.
When a compression seal is in place, see Bridge Plans.
3. Before placing overlay, block out the joint. After overlay, install premolded
joint filler or rubberized asphalt filler. Top of joint filler shall be between
3/4” and 3/8” below overlay.
4. Full depth sawed grooves between 1/4” and 1/2” wide shall be placed directly over
the existing sawed grooves in the cement concrete pavement and cement concrete
shoulders.
5. Cement concrete shoulders shall be overlaid with cement concrete. Asphalt concrete
shoulders shall be overlaid with asphalt concrete.

TRANSITION FROM
CONCRETE OVERLAY

LEGEND

Concrete Overlay
Asphalt Concrete Overlay
1. Curb shall be Extruded Curb Type 1, 2, 3, 4, 4a, 5, or 5a, as specified in the contract.

2. Catch basin or grate inlet shall be located between guardrail posts.

INLET PLACEMENT AT BRIDGE END

SECTION A-A

SECTION B-B
NOTES

1. As an acceptable alternate to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used. Wire mesh shall not be placed in Inletwells.

2. The Inletwell diameter shall not be greater than 20". Inletwells shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the Inletwell wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with RCP Spec. 8-04-3.

3. The minimum depth from the finished grade to the pipe invert shall be 8'.

4. Frame and grate may be installed with flange down or cast into adjustment section.

5. The precast base section may have a rounded floor and the walls may be sloped at a rate of 1:24 of slope.

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

PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforced or Plain concrete</td>
<td>12&quot;</td>
</tr>
<tr>
<td>All Metal Pipe</td>
<td>10&quot;</td>
</tr>
<tr>
<td>CONCRETE * (Std. Rm. 8-08.22)</td>
<td>12&quot;</td>
</tr>
<tr>
<td>Solid Wall PVC (Std. Rm. P-06.01.33)</td>
<td>10&quot;</td>
</tr>
<tr>
<td>Preformed PVC Storm sewer pipe</td>
<td>10&quot;</td>
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</table>

* Corrugated polyethylene storm sewer pipe.

CATCH BASIN TYPE 1
STANDARD PLAN B-1
**PIPE ALLOWANCES**

<table>
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<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM ALLOWED DIAMETER</th>
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</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
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</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>21&quot;</td>
</tr>
<tr>
<td>CSPSP-N (Std. Expl. 8-46.20)</td>
<td>18&quot;</td>
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<tr>
<td>SOLID WALL PIPE (Std. Expl. 8-46.30)</td>
<td>21&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PIPE (Std. Expl. 8-46.35)</td>
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</tr>
<tr>
<td>CORRUGATED POLYETHYLENE STORM SEWER PIPE</td>
<td>21&quot;</td>
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</tbody>
</table>

**NOTES**

1. As an acceptable alternate to rebar, wire mesh having a minimum area of 6.12 square inches per foot may be used. Wire mesh shall not be placed in knockouts.

2. The knockout diameter shall not be greater than 20%. Knockout 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 Std. Spec. 5-04.3.

3. The maximum depth from the finished grade to the pipe invert shall be 3'.

4. Frame and grate may be installed with flange down or cast into adjustment section.

5. The present base section may have a rounded floor and the walls may be sloped at a rate of 1:2 or steeper.

6. Opening shall be measured at the top of the present base section.

---

**CATCH BASIN TYPE 1L**

**STANDARD PLAN 5-1a**
1. As an acceptable alternate to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used. Wire mesh shall not be placed in knockouts.

2. The knockout diameter shall not be greater than 16". Knockouts shall have a wall thickness of 2" minimum to 2 1/2" maximum.

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

4. Frame and grate may be installed with flange down or cast into adjustment section.

5. The precast base section may have a rounded floor and the walls may be sloped at a rate of 1:12 or steeper.

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

CATCH BASIN TYPE 1P
PARKING LOT C. B.
1. No steps are required when height is 4' or less.
2. The bottom of the precast catch basin may be rounded.
3. Frame and grate may be installed with flange down or cast into adjustment section.
4. Knockouts shall have a wall thickness of 2" minimum to 2 1/4" maximum.

**CATCH BASIN DIMENSION TABLE**

<table>
<thead>
<tr>
<th>Dia</th>
<th>Wall Thickness</th>
<th>Base Thickness</th>
<th>Maximum Knockout Size</th>
<th>Minimum Distance Between Knockouts</th>
<th>Base Reinforcing Steel 1/4&quot; in Each Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>48&quot;</td>
<td>4&quot;</td>
<td>6&quot;</td>
<td>36&quot;</td>
<td>8&quot;</td>
<td>INTEGRAL BASE 0.15</td>
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<tr>
<td>54&quot;</td>
<td>4 1/2&quot;</td>
<td>8&quot;</td>
<td>42&quot;</td>
<td>8&quot;</td>
<td>INTEGRAL BASE 0.19</td>
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<td>60&quot;</td>
<td>5&quot;</td>
<td>8&quot;</td>
<td>48&quot;</td>
<td>8&quot;</td>
<td>INTEGRAL BASE 0.25</td>
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<td>72&quot;</td>
<td>6&quot;</td>
<td>8&quot;</td>
<td>60&quot;</td>
<td>12&quot;</td>
<td>INTEGRAL BASE 0.24</td>
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<td>96&quot;</td>
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<td>12&quot;</td>
<td>84&quot;</td>
<td>12&quot;</td>
<td>INTEGRAL BASE 0.29</td>
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</tbody>
</table>
**96" FLAT SLAB TOP**
- 20" x 24", 24" DIA, 48" DIA or 54" DIA Hole
- 2" (TYP)
- 1" MIN 2½" MAX
- 12"

**72" FLAT SLAB TOP**
- 20" x 24", 24" DIA, 48" DIA or 54" DIA Hole
- 2" (TYP)
- 1" MIN 2½" MAX
- 8"

**48", 54" or 60" FLAT SLAB TOP**
- 22" x 24" or 24" DIA Hole
- 2" (TYP)
- 1" MIN 2½" MAX
- 8"

**NOTES:**
1. 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.

**TYPICAL ORIENTATION**
FOR ACCESS AND STEPS

**RECTANGULAR ADJUSTMENT SECTION**
- 34"
- 30"
- 20"
- 5" or 12"
- 6" or 12"

**CIRCULAR ADJUSTMENT SECTION**
- 34"
- 18" MIN
- 12" MAX
- 48" MIN

**MISCELLANEOUS DETAILS**
FOR MANHOLES AND CATCH BASINS

**ECCENTRIC CONE SECTION**
NOTES
1. 3" to 5" Draft permitted as needed.
2. Seating of grate shall be accomplished by one of the following: Alternate A shall be eight pads 1½" x 3/4" x 4" to 4" integrally cast with the grate. Alternate B shall be a machined surface outside a 17" circle, bottom only. (See Section B-B).
3. Tolerance on all dimensions shall be ±1/32" unless otherwise noted.

SECTION A-A

SECTION C-C

OPTIONAL RIB - BOTTOM VIEW

OMETAL FRAME AND GRATE FOR CATCH BASIN AND INLET

SECTION B-B

B-2a 05-09-97
1. The name of the manufacturer and direction of flow shall be embossed on the top surface of each grate. Lettering to be recessed 1/8".

2. Dimensions shall have a ± 1/8" tolerance, except as noted.

3. Edges shall have 1/8" radius, 3/8" chamfer or complete deburring.

4. As an alternate, eight pads 1 1/2" x 3/4" x 1/4" integrally cast with the grate may be used.
1. The name of the manufacturer shall be embossed on the top surface of each grate. Lettering to be recessed 1/4".

2. Dimensions shall have a ± 1/8" tolerance except as noted.

3. Edges shall have 1/8" radius, 1/8" chamfer or complete deburring.

4. As an alternate, eight pods 1/2" x 3/8" x 1/4", integrally cast with the grate may be used.
1. Pipe supports and restrictor/separators shall be constructed of the same material and be anchored at a minimum spacing of 36”. Attach pipe supports to manhole with %” stainless steel expansion bolts or embed supports into manhole wall 2”.

2. The vertical riser stem of the restrictor/separators shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8”.

3. The flow restrictor/separators shall be fabricated from one of the following materials:
   - 0.66” Corrugated Aluminum Alloy Drain Pipe
   - 0.64” Corrugated Galvanized or Aluminized Steel Drain Pipe
   - 0.60” aluminum alloy flat sheet, in accordance with ASTM B 209M, S002 H32 or EPS Galvanized steel shall have Treatment 1.

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

5. Multi-orifice elbows may be located as shown or all on one side of riser to assure ladder clearance. Size of elbows and placement to be specified in the Contract.

6. Restrictor plate or orifice as specified in the Contract. Omit plate if for oil pollution control only. Opening is to be cut round and smooth.

7. Shear gate shall be made of aluminum alloy in accordance with ASTM B 260 and ASTM B 275, designation ZG3A or cast iron in accordance with ASTM A 48, Class 300. Lift handle may be solid rod or hollow tubing with adjustable hook as required. Neoprene rubber gasket required between riser mounting flange and gate flange. Rating surfaces of lid and body shall be machined for proper fit. Flange mounting bolts shall be %” diameter stainless steel.

8. Shear gate maximum opening shall be controlled by limited hinge movement, step tab or some other device.

9. Alternate shear gate designs are acceptable, if material specifications are met and flange bolt pattern matches.
1. See Contract for size and location of all pipes and orifices.
2. Baffle wall shall have 4 Bar of 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 \( \frac{1}{4} \)". Attach orifice with \( \frac{5}{8} \)" stainless steel bolts. Orifice plate is not required when only oil separation is desired.
5. Upper flow orifice shall be aluminum, aluminized steel or galvanized steel. Galvanized steel shall have treatment 1.

CATCH BASIN TYPE 2 WITH BAFFLE TYPE FLOW RESTRICTOR- OIL SEPARATOR
1. Angles shall be set so that each bearing bar of precast/cast 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 edger tool.

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. Culvert or sewer pipes may be set at any angle to the centerline of the highway and may enter the inlet on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.

5. Grate B will be used only when specified in the Contract.
Angles shall be set so that each bearing bar or prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.

Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section.

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

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.

The flow line of the outlet pipe shall be 18" minimum above the inside bottom of the inlet structure.

The grade line of the top inside of any inlet pipe shall enter at a point no lower than at the grade line of the top inside of the outlet pipe.

Unit H and optional extension units J and K shall be grouted in place to the satisfaction of the Engineer.

All pickup holes shall be grouted full after the basin has been placed.
EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002

1. Angles shall be set so that each bearing bar on the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface.

2. Top of inlet shall be placed at ground level to present an unobstructed ditch or median section.

3. Bevel or round exposed concrete edges 1/4".

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

5. 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.

6. Precast inlet shall be marked with manufacturer’s identification inside the structure in some readily accessible location.

7. Inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.

8. Amount, type and grade of reinforcing steel is the responsibility of the manufacturer. The manufacturer is responsible for the structure until final acceptance in place with all required knockouts removed.

DIKE INSTALLATION FOR PREFERRED SLOPE

*See Contract For Backslope Details

DROP INLET TYPE 1

(Eight required per grate)

(Effective: January 7, 2002 to August 4, 2002)
1. Angles shall be set so that each bearing bar on the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface.

2. Top of inlet shall be placed at ground level to present an unobstructed ditch or median section.

3. Bevel or round exposed concrete edges 1/2".

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

5. 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.

6. Precast inlet shall be marked with the manufacturer’s identification inside the structure in some readily accessible location.

7. Inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.

8. Amount, type and grade of reinforcing steel is the responsibility of the manufacturer. The manufacturer is responsible for the structure until final acceptance in place with all required knockouts removed.
1. The culvert ends shall be beveled to match the embankment or ditch slope, without exceeding the limits shown on this plan.

2. Field cut 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.
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 herein. 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 natural occurring materials available in the vicinity of the structural plate underpass installation.

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

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<thead>
<tr>
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<th>RISE</th>
<th>12 GAGE THICK METAL</th>
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</thead>
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<td>7’-1”</td>
<td>4’-26”</td>
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<tr>
<td>6’-10”</td>
<td>8’-2”</td>
<td>5’-25”</td>
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**ALLOWABLE HEIGHTS OF COVER IN FEET**

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**CORRUGATED METAL**

**DIMENSIONS**

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**STRUCTURAL PLATE UNDERPASS DESIGN 2**

**SECTION**

1. Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.
1. The variable dimension indicated for the height of step for step mitered pipes shall conform to manufacturers’ recommendations unless specified differently on the plans or in the special provisions.

2. Reinforcing steel shall have 1/2" clear 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".

**Structural Plate Pipe Arches and Underpasses**

**Step Mitered Pipe**

**Full Mitered Pipe**

**Pipes and Structural Plate Pipes**

**Anchor Bolt Details**
1. Maximum span width is 54".

2. Spacing between safety bars, or between bars and the culvert crown shall be equal spaces of 30" maximum.

**Type 2 Safety Bars for Culvert Pipe or Pipe Arch (on Cross Road)**

- **Section A-A**
  - **1/2" Dia.** Threaded rod
  - **Hex Head Nut**
  - **3/4" Max**
  - **1 1/2"**
  - **6" (Typical)**
  - **Install adhesive anchorage system (Typical)**

- **Section B-B**
  - **3/4" x 4" x 10"** Steel plate
  - **3/4" Steel**
  - **1" x 1" x 1/4" Structural tubing**

**Notes**

- D = Inside Dia of culvert
- Slope to match side slope, 6:1 preferred, not steeper than 4:1
SAFETY BAR END TREATMENT DETAIL

3" Galvanized pipe fits outside end, then bend outside 4" to match and section sides.

CROSS DRAINAGE BAR DETAIL

METAL END SECTIONS FOR CIRCULAR PIPES

<table>
<thead>
<tr>
<th>Pipe Diameter (inches)</th>
<th>Minimum Thickness (inches)</th>
<th>Dimensions (inches)</th>
<th>L Dimensions (inches)</th>
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Metal End Sections for Arched Pipes

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<td>.41 x 89</td>
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TAPERED END SECTION WITH TYPE 3 SAFETY BARS

Connector Details

B-9c  07-18-97
1. Connection is a 3/8" DIA threaded rod over top of end sections side lugs and bolted to end section. On 15" through 24" pipe, an alternative may be a 1" wide strap 16 gage or 12 gage galvanized steel, fastened with a 3/8" DIA, 6" long galvanized bolt and square head nut.

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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<tr>
<th>Pipe DIA (Inches)</th>
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### METAL END SECTIONS FOR ARCHED PIPES

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### CROSS ROAD DRAINAGE STRUCTURE

- Reinforced edge full length of end section. See Section A-A.
- Safety bars (TYP) See Note 2.
- Galvanized steel rod 3/4" DIA MIN or No. 4 galvanized reinforcing bar.
- 30" and larger end sections may be multiple panels. Seams shall be lapped 2" and joined with 3/4" x 3/4" bolts on 3" centers maximum.
- 3/4" DIA hex head bolts (TYP).
- 1/2" DIA carriage head bolts (TYP).
- Optional toe plate extension, 6" less than overall width.

**N O T E**

**TAPERED END SECTION WITH TYPE 4 SAFETY BARS (ON CROSS ROAD)**

- 3" Galvanized pipes: Flatten end, then bend outside 4" to match end section sides.

**S A F E T Y  B A R  E N D  T R E A T M E N T  D E T A I L**

- Connector details.
NOTES
1. See Standard Specifications Section 7-06.3(3) for Pipe Zone Backfill.
2. See Standard Specifications Section 8-03.12(3) for Gravel Backfill for Pipe Zone Bedding.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.
DUCTILE IRON DROP CONNECTION

CONCRETE ENCASED DROP CONNECTION

1/2 Blind flange as dam

D.I.P. Tee Clearance 2" (Outside Diameter)

One length of ductile iron pipe (Class 501) to solid bearing when span is more than 48"

Flexible joint

Backfill with compacted material as directed by engineer

Cement Concrete Class 3000 block poured in place

D.I.P. 90° bend clearance 2"

Typical manhole foundation construction

Mortar dam or plug as required by engineer

Typical Manhole

Tee

2" MIN

One length of ductile iron pipe (Class 501) to solid bearing when span is more than 48"

All pipe except ductile iron pipe shall be concrete encased

Flexible joint

Backfill with compacted material as directed by engineer

Cement Concrete Class 3000 poured in place

90° Bend

Typical manhole foundation construction

DROP CONNECTION FOR SANITARY SEWERS
**Single branch wyes for two connections on each side**

- 6" Sewer pipe
- Plug
- 6" Wye

**45° Bends for one connection on each side**

- 6" Sewer pipe

**Cement Concrete**

**SECTION B-B**

**VERTICAL CONNECTION**

**SECTION A-A**
1. Paint pipe threads with asphalt paint after assembly.
2. All piping to be galvanized steel.
3. Valve and piping to valve to be 2" unless otherwise noted on plan.
4. Locate blowoff outlet near property corner if possible.

PLAN

ELEVATION

2" Female x 1P x 2½" male NPS hose connection with cap

Drill ½" hole

15 Pound Asphalitic felt

Gravel pocket

Solid concrete bearing block 4" x 8" x 16"

Gate valve with 2" square operating nut

Cast iron valve box and lid

Varies

36" H
1. Size of combination air release/air vacuum valve shall be specified in the Contract. 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, top top of main.
Two tie rods with turnbuckles. Thread 6".

Blocking for 11.25° or 22.5° vertical bends.

Four tie rods with turnbuckles. Thread 6".

Blocking for 45° vertical bends.

DIMENSION TABLE

<table>
<thead>
<tr>
<th>PIPE DIA</th>
<th>TEST PRESSURE PSI</th>
<th>BEND ANGLE</th>
<th>CONCRETE VOLUME FTYR</th>
<th>CUBE SIZE FT</th>
<th>TIE ROD DIA</th>
<th>TIE ROD EMBELEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>250</td>
<td>11.25°</td>
<td>22.5°</td>
<td>6</td>
<td>1.8</td>
<td>1/8&quot;</td>
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<td></td>
<td></td>
<td>11.25°</td>
<td>22.5°</td>
<td>12</td>
<td>2.3</td>
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<td></td>
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<td>22.5°</td>
<td>21</td>
<td>3.0</td>
<td>1/8&quot;</td>
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<tr>
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<td>2.9</td>
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<td>4.5</td>
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<td>3.4</td>
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<td>22.5°</td>
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<td>22.5°</td>
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<td>22.5°</td>
<td>355</td>
<td>7.1</td>
<td>1/8&quot;</td>
</tr>
</tbody>
</table>

Concrete blocking for convex vertical bends.

NOTES:
1. Steel tie rods to be heavily coated with asphalt after installation.
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 (2) minimum diameter rods on valves up through 10" diameter. Valves larger than 10" require special tie rod design.

<table>
<thead>
<tr>
<th>Size</th>
<th>Test Pressure (PS)</th>
<th>Thrust at Fittings in Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tee and End Ends</td>
<td>45° Bend</td>
</tr>
<tr>
<td>4&quot;</td>
<td>250</td>
<td>3,140</td>
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<td>6&quot;</td>
<td>250</td>
<td>7,070</td>
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<td>250</td>
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<td>38,485</td>
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<td>16&quot;</td>
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<td>50,765</td>
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<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Safe Bearing Load (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muck, peat, etc.</td>
<td>0</td>
</tr>
<tr>
<td>Soft clay</td>
<td>1,000</td>
</tr>
<tr>
<td>Sand</td>
<td>2,000</td>
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<tr>
<td>Sand and gravel</td>
<td>3,000</td>
</tr>
<tr>
<td>Sand and gravel cemented with clay</td>
<td>4,000</td>
</tr>
<tr>
<td>Hard shale</td>
<td>10,000</td>
</tr>
</tbody>
</table>

CONCRETE THRUST BLOCK
Circular adjustment section
Eccentric cone section
Precast riser sections
Steps or ladder
Mortar fillet
Channel and shelf
Reinforcing steel

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIA</th>
<th>WALL THICKNESS</th>
<th>BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>BASE REINFORCING STEEL 50 IN/FT EACH DIRECTION</th>
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</thead>
<tbody>
<tr>
<td>48&quot;</td>
<td>4&quot;</td>
<td>6&quot;</td>
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<td>8&quot;</td>
<td>42&quot;</td>
<td>6&quot;</td>
<td>0.19</td>
</tr>
<tr>
<td>60&quot;</td>
<td>5&quot;</td>
<td>9&quot;</td>
<td>48&quot;</td>
<td>6&quot;</td>
<td>0.25</td>
</tr>
</tbody>
</table>

NOTES:
1. Knockouts shall have a wall thickness of 2" minimum to 2½" maximum.

MANHOLE TYPE 1

SEPARATE CAST IN PLACE BASE
PRECAST BASE WITH INTEGRAL RISER
Gravel backfill for pipe zone bedding
SEPARATE PRECAST BASE

"O" Ring
1. Gasket and groove may be in the seat or underside of cover.

2. For bolt-down manhole ring and covers that are not designated “watertight,” the neoprene gasket, groove, and washer are not required.

3. Washer shall be lead or neoprene.

4. In lieu of blind pick notch for storm sewer manhole covers, drill three 1” diameter holes at 120° spacing.

5. Proprietary manhole covers without bottom ribs are acceptable.
NOTES
1. As an acceptable alternate to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used. Wire mesh shall not be placed in knockouts.

2. The knockout diameter shall not be greater than 18". Knockouts shall have a wall thickness of 1 1/8" minimum to 2" maximum.

3. Frame and grate may be installed with flange down or cast into adjustment section.

4. The precast base section may have a rounded floor and the walls may be sloped at a rate of 1:24 or steeper.

5. Opening shall be measured at the top of the precast base section.

CONCRETE INLET

PRECAST BASE SECTION

FRAME AND VANED CRATE

RECTANGULAR ADJUSTMENT SECTION
NOTES:
1. Precast cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.

SEEPAGE PORT DETAIL
(See Note 2)

PRECAST CONCRETE DRYWELL
1. Concrete collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum 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. When a coupling band connection requires attaching a bell end of a concrete pipe the bell end of the pipe shall be removed before the connection is installed.

3. Increase the outside diameter of the metal pipe to match the outside diameter of the concrete pipe with 12" wide rubber gaskets. Thickness as required. Rubber gaskets shall be in accordance with Section 9-04.4(3) of the Standard Specifications.

4. Use a flat type K coupling band. Type K coupling bands with splines 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.

5. Steel welded wire fabric shall be in accordance with Section 8-07.7 of the Standard Specifications. 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 W3.9 x W3.9 (6 gage)
   - 4 x 4 W4.0 x W4.0 (4 gage)
NOTES

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.
STANDING SIDE SEWER CONNECTION
STANDARD PLAN B-30

24" x 24" x 24" Concrete block or Controlled Density Fill

45° bend

4" or 6" Sewer Pipe (See Contract)

Tee

Sewer main

45° bend

NOTE: This is not a legal engineering document. It may contain errors or omissions. The original signed by the Engineer is approved for publication and may be obtained upon request.

8/10/98
Clifford E. Mansfield
DEPUTY STATE DESIGN ENGINEER
DEPARTMENT OF TRANSPORTATION
VANCOUVER, WASHINGTON

APPROVED FOR PUBLICATION
8/10/98
TYPE 20
See Detail A
See Detail B
G-2 Post (See Note 1)

TYPE 21

DETAIL A
\( \frac{3}{8}'' \) DIA x 1 1/2'' hex head bolt with hex nut and 1 1/2'' square x .135'' washer

DETAIL B
\( \frac{1}{2}'' \) DIA x 1 1/2'' Hex head bolt with hex nut. Guardrail rests on top of bolt.

BEAM GUARDRAIL
1. Saw top of post and block to 1" above thrice beam guardrail reducer section.
GUARDRAIL PLACEMENT

STANDARD PLAN C-2

NOTES
1. Type 4 anchor required. For details, see Standard Plan C-4c.
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. Fast spacing is 6'-3" except where noted.
2. For terminal type and details, see Contract and applicable Standard Plans.
3. 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.
4. See Contract for dimensions.
5. See Contract forGuardrail Transition Section and Guardrail Connection to Bridge Rail or Concrete Barrier.

<table>
<thead>
<tr>
<th>FLARE RATE TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATE</td>
</tr>
<tr>
<td>15/1</td>
</tr>
<tr>
<td>14/1</td>
</tr>
<tr>
<td>12/1</td>
</tr>
<tr>
<td>11/1</td>
</tr>
<tr>
<td>10/1</td>
</tr>
<tr>
<td>9/1</td>
</tr>
</tbody>
</table>

CASE 4
One or Two Way Traffic

CASE 5
One Way Traffic
1. Attach standard wood or steel blocks to concrete structure with 3/8" expansion anchor or 5/8" threaded rod in a 1" x 8" hole grouted with epoxy.

2. For Type 3 Guardrail, terminate the guard rail by lapping it behind the first 10 x 10 post of the Type 16 Transition Section, or as approved by the Engineer.

3. The Type 10 or Type 11 Guardrail shall extend 12'-6" MIN past the structure to allow installation of the Type 16 transition for the opposing traffic.

4. If the minimum number of 12'-6" thrie beam sections required to span the structure exceeds more than 6'-3" (but less than 12'-6") past the structure, then a 6'-3" section of nested thrie beam should be added. Otherwise, install an additional 12'-6" section.

5. Thrie Beam Guardrail Reducer Section Type B.

6. This Type 16 Transition shall end at a 10 x 10 post. Place nested thrie beam with 10 x 10 posts at 3'-11/2" MAX spacing between the end of the transition and the structure.

### FLARE RATE TABLE

<table>
<thead>
<tr>
<th>Rate</th>
<th>Posted Speed (MPH)</th>
</tr>
</thead>
<tbody>
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<td>70</td>
</tr>
<tr>
<td>14/s</td>
<td>60</td>
</tr>
<tr>
<td>12/s</td>
<td>55</td>
</tr>
<tr>
<td>11/s</td>
<td>50</td>
</tr>
<tr>
<td>10/s</td>
<td>45</td>
</tr>
<tr>
<td>9/s</td>
<td>40 or less</td>
</tr>
</tbody>
</table>

Guardsrails Placement

Standard Plan C-2b
GUARDRAIL PLACEMENT

STANDARD PLAN C-2d

NOTES

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

CASE 10A

CASE 10B

CASE 10C

EXPRES MARCH 3, 2010

APPROVED FOR PUBLICATION

5/22/98

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIC WASHINGTON
NOTES

1. SRI Terminal shown. For terminal type and details see Contract and applicable Standard Plans.

2. Attach standard blocks to concrete structure with 1/2” DIA expansion anchor or 1/2” DIA threaded rod in a 1” DIA x 8” hole grouted with epoxy.

3. Type 4 anchor or Type 4 anchor (Thrie Beam) required.

4. 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.

5. If the distance from end of Type II Guardrail to column structure exceeds 6’-3” using 12’-6” thrie beam sections, add a 6’-3” nested section of thrie beam with 10 x 10 posts, spaced at 3’-11½” (MAX), and begin transition.

6. Thrie Beam Guardrail Reducer Section Type B.

7. Guardrail post spacing for Type II Guardrail past the End Bridge Pier shall be at 6’-3” spacing, maximum, with 6 x 8 post and standard block.

GUARDRAIL PLACEMENT

CASE IIIC

One Way Traffic
CASE 12 ☐D
(see Note 7)

Beam Guardrail
Anchor Type 7

Terminal pay limit (SRT shown) see Note 4

CASE 12 ☐C
(see Note 7)

Beam Guardrail
Anchor Type 7

X Spaces at 6'-3" (1 space MIN)

CASE 12 ☐A
(see Note 8)

Beam Guardrail
Anchor Type 5 pay limit

Splice bolt slot
Rail element
Identification plate
Identification post

CASE 12 ☐B
(see Note 7)

X Spaces at 6'-3" (1 space MIN)

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

IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 6)

IDENTIFICATION PLATE
(see Note 5)

See Note 2

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 ¾" x 9" long bolt, nut, and 1½" washer on back of post.
4. For terminal type and details, see Contract and applicable Standard Plan(s).
5. Radius dimensions shall be etched into plate replacing the letters "WIN", shown on the Identification Plate Detail. Digits shall be 1½" MIN height and ½" 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 end treatment on main road. Second letter indicates end treatment on main road. For instance, a Type 5 Anchor on the side road and a bridge connection on the main road would be Case 12 AC.
8. For the 8'-6" radius, 5ive CRT posts are required including the CRT post at point 6.
9. For CRT post details, see Standard Plan "Beam Guardrail Posts and Blocks".
NOTES
1. For Service Level 1, Weak Post Bridge Roll System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plants.
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".

Direction of Traffic

CASE 14

GUARDRAIL PLACEMENT
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.


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.

---

**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>Rate</th>
<th>Posted Speed (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:1</td>
<td>70</td>
</tr>
<tr>
<td>14:1</td>
<td>60</td>
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<td>12:1</td>
<td>55</td>
</tr>
<tr>
<td>11:1</td>
<td>50</td>
</tr>
<tr>
<td>10:1</td>
<td>45</td>
</tr>
<tr>
<td>9:1</td>
<td>40 or less</td>
</tr>
</tbody>
</table>

---

**GUARDRAIL PLACEMENT**

**STANDARD PLAN C-2**

**CASE 16**

**CASE 17**

**CASE 18**

---

 Clifford E. Mansfield

6/12/98

APPROVED FOR PUBLICATION

Vice President, State Department of Transportation

SEPTEMBER 1, 2002

EXPIRES: MAY 3, 2003

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NOTE: THIS PLAN IS NOT A FINAL DRAWING DOCUMENT BUT AN ELECTRONIC DRAFT IN THE FORM OF A PDF SUBMITTED TO THE STATE OF WASHINGTON FOR CONSTRUCTION. IT SHOULD BE REVIEWED PRIOR TO SUBMITTAL TO THE MASTER CONTRACTOR AND CONSTRUCTION MANAGEMENT. confirming all requirements prior to construction.
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.
NOTES
1. See Contract for transition and connection type.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Guardrail installation shall be Beam Guardrail Type 1 with standard post and block.
4. First letter of case designation indicates end treatment on side road. Second letter indicates end treatment on main road. For instance a terminal on the side road and a bridge connection on the main road would be Case 22 BC.
5. For terminal type and details, see Contract and applicable Standard Plan(s).
6. Radius dimensions shall be etched into plate replacing the letters "HH" shown on the Identification Plate Detail. Digits shall be 1/2" MIN height and 3/4" MAX width. Plate shall be galvanized after etching.
7. 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.

GUARDRAIL PLACEMENT
STRONG POST
INTERSECTION DESIGN

IDENTIFICATION PLATE MOUNTING DETAIL
(See Note 6)
EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002

GUARDRAIL TRANSITION SECTIONS
STANDARD PLAN C-3

NOTE:
1. See Standard Plan, "Guardrail Connection to Bridge Rail or Concrete Barrier."
2. Use 6'-0" long 10x10 timber posts with 8x8 blocks.
3. Use 6'-6" long 10x10 timber posts with 8x8 blocks.

See Note 1

See Note 2

See Note 1

See Note 3

See Note 1
1. See Standard Plan, "Guardrail Connection to Bridge Rail or Concrete Barrier."

2. For post details, see Standard Plan, "Beam Guardrail Posts and Blocks".

**GUARDRAIL TRANSITION SECTIONS**

**TYPE 3**

- Five spaces at 3'-11/2" MAX
- Beam Guardrail pay limit
- See Note 1

**TYPE 4**

- Three spaces at 3'-11/2" MAX
- Transition pay limit
- Beam Guardrail pay limit
- See Note 1
- Added 6x8 posts with standard block

**TYPE 5**

- Four spaces at 1'-6½" MAX
- Two spaces at 3'-1½" MAX
- 1'-3" MAX (total length = 6'-3")

**TYPE 6**

- Eight spaces at 3'-11/2" MAX (total length = 28'-0")
- 6'-3" Post spacing
- C-2 Post (TYP)

**TYPE 7**

- Transition pay limit
- Beam Guardrail pay limit

**NOTES**

- See Standard Plan, "Guardrail Connection to Bridge Rail or Concrete Barrier."

- For post details, see Standard Plan, "Beam Guardrail Posts and Blocks".
1. See contract for number of thrie beam sections for bridge rail.

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

3. An ACP ramp is required from the roadway surface to the top of the bridge curb or sidewalk. The slope of the ramp shall be 20:1 or flatter.
1. See Contract for the number of thrie beam sections for Type II Guardrail.

2. If the distance from the end of the Type II Guardrail to column/structure exceeds 6'-3" using 19'-6" thrie beam sections, add a 6'-3" nested section of thrie beam to reduce the distance to less than 6'-3".
NOTES

1. Unless otherwise indicated in the contract, the SRT-350 (12.5, 8-Pole) as manufactured by Trinity Industries, Inc., or the FLAT TL2 as manufactured by Road Systems, Inc., shall be installed per manufacturer’s recommendations. If specified in the contract, the FLAT 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 enroaching 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/ice post washers and snow/ice rail washers are called for in the contract, the snow/ice rail washers must be omitted within the terminal limits.

4. Offset distances:
   - FLAT 350 - 4'-0" (MIN)
   - FLAT TL2 - 1'-6" (MIN)

Beam Guardrail
Flared Terminal pay limit (see Notes 1 and 2)

10'-0" MIN
6:1 Taper

20:1 slope MAX
(relative to grade)

10:1 slope MAX

Plan View

Tangent line

37'-6" Straight Flare

Elevation View

SRT Option

Ground line

Elevation View

FLAT Option

Ground line
NOTES:

1. An ET2000-PLUS (TL3) as manufactured by Trinity Industries, Inc. or 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 ET 2000-PLUS (TL2) as manufactured by Trinity Industries, Inc. or an SKT-TL2 as manufactured by Road Systems, Inc. shall be installed according to manufacturer's recommendations.

2. A retroreflective 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 plate is entirely off shoulder.

5. Length for ET 2000-PLUS (TL2) and SKT-350 is 50'. Length for ET 2000-PLUS (TL2) and SKT-TL2 is 29'.

PLAN

ELEVATION
Unrestrained precast barrier

A CONNECTION

Type 3 transition pay limit

N Beam or thru beam end section Design F

Face of guardrail, edge of shoulder

See Note 1

Unrestrained precast barrier

Transition pay limit

B CONNECTION

Transition pay limit

12'-6"

See Notes 1 and 2

Transition pay limit

2'-4"

MAX

K Beam or thru beam end section Design F

Curb width 9" or less, or concrete barrier

3'-1/2"

MAX

Face of guardrail, edge of shoulder

C CONNECTION

Transition pay limit

6'-3"

MAX

K Beam or thru beam end section Design F

Curb width greater than 9", 18" MAX

Curb width 9" or less, or concrete barrier

3'-1/2"

MAX

Face of guardrail, edge of shoulder

D CONNECTION

See Note 3

Transition pay limit

2'-4"

MAX

K Beam or thru beam end section Design F

Bridge traffic barrier

E CONNECTION

Transition pay limit

6'-3"

MAX

K Beam or thru beam end section Design F

GUARDRAIL CONNECTION TO BRIDGE RAIL OR CONCRETE BARRIER

Beam guardrail pay limit

2'-4"

MAX

End Section design F

Direction of traffic (oneway only)

F CONNECTION

End face of rail base

Inside face of rail base

03-14-97

C-5
NOTES

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

2. For end section details see Standard Plan "Beam Guardrail: End Sections".

3. For post details, see Standard Plan "Beam Guardrail: Posts and Blocks".

4. Eight 3/8" x 1/2" 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. Torque bearing plate with 10d nail at corners to prevent turning.

7. Anchor pay limit does not apply when anchor is included in Beam Guardrail Terminal.
1. Roll section and W8 x 17 post shall be fabricated to receive \( \frac{3}{8} \)" hex head bolts as shown.

2. All bolts shall be high strength 3/8" hex head bolts with anchor roll washers.
BEAM GUARDRAIL ANCHOR TYPE 4
STANDARD PLAN C-6c

NOTES

1. For details, see Standard Plan C-6a.
2. For end section details see Standard Plan C-7 or C-7a.
3. For details, see Standard Plan C-4b.
4. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
5. Post and block shall match beam guardrail posts.

Figure: Beam Guardrail Anchor Type 4

Measurements:
- Anchor Pay Limit
- Beam Guardrail Pay Limit
- Anchor Rail Washer
- End Section Design C
- Standard 2" Pipe Sleeve (2 3/8" OD)
- Bearing Plate
- Two 1" Nuts and Washers

Word: W Beam Installation

Conclusion: Details for beam guardrail anchor type 4 are provided in the standard plan C-6c.

Date: May 3, 2000

Approved for Publication:
Clifford E. Mansfield
01-06-00

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

EXPRESS WAY 3, 2000
BEAM GUARDRAIL ANCHOR
TYPE 4
STANDARD PLAN C-6c

NOTE: THIS PLAN IS A DEPARTMENT ENGINEERING DOCUMENT BUT AN ELECTRONIC DRAFTING EDITION. IT IS INTENDED TO PROVIDE THE ENGINEER AND APPROVER FOR FURTHER REVIEW. IT IS NOT TO BE USED FOR CONSTRUCTION FOR CONSTRUCTION.
1. Attach W-beam to steel pipe with \( \frac{3}{8}'' \times 1\frac{1}{4}'' \) button head bolt with no washer. No connection to the post is required.

2. For end section details see Standard Plan, "Beam Guardrail End Sections".

3. For details see Standard Plan, "Beam Guardrail Anchor Type 1".

4. For details see Standard Plan, "Beam Guardrail Posts".

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

\( \frac{3}{8}'' \times 2'' \) Button head bolt or \( \frac{3}{8}'' \times 1\frac{1}{4}'' \) hex head bolt and hex nut with anchor rail washers under bolt head and nut (See Note 3).

Beam guardrail post limit

Anchor plate (See Note 3)

End Section Design C (See Note 2)

\( \frac{1}{4}'' \) Cable clips 16 required. Torque nuts to 50 ft./lbs.

Bearing plate (See Note 3)

Standard 2" OD pipe sleeve (23/8" OD)

Two 1" nuts and washer (See Note 5)

Anchor Post Assemblies (See Note 4)

DETAIL B

Tack weld 2\( \frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{1}{4}'' \) steel plate with \( \frac{3}{8}'' \) hole to tubular steel

1" Nut

1" x 4"

Stud threaded full length

BEAM GUARDRAIL ANCHOR TYPE 5
1. For details, see Standard Plan, "Beam Guardrail Anchor Type 1".

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 details, see Standard Plan, "Beam Guardrail Posts and Blocks".

4. Post shall match beam guardrail posts.

**BEAM GUARDRAIL ANCHOR TYPE 7**
1. End Section Design G shall be used except where noted on the plans or contract.

2. Bolts shall be 3/16” ASHTO M 164 chemically bonded anchors. Anchor installation shall be per manufacturer’s recommendations, in dry conditions.

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” I10, 2” OD, 0.134” thick, narrow type A Plain Washer or a anchor rail washer shall be placed under the splice bolt heads.
1. Bolts shall be high strength, $\frac{3}{8}''$, with chemically bonded anchors.

2. In cases where Design F End Section is lapped on the outside of the guardrail, a galvanized 1'' ID, 2'' OD, 0.034'' thick, narrow Type A Plain washer or an anchor roll washer will be placed under the splice bolt heads.
1. Wire rope loops shall be 44" long, except for top loop of Terminal, which shall be 24" long.

2. Wire seizing shall be eight wraps of 16 gauge wire with ends twisted together, or equivalent fastening.
SPECIAL BASE PLATE

Four 32 mm O/D holes

B SECTION

Base plate

1" bolt with heavy hex nuts and washers

Top of barrier

2 1/2" rebar

HEADED BOLT

ANCHOR BOLT DETAIL

BAR LIST

All dimensions are cut to cut

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</table>
| M6   | Concrete Barrier | 20 | 4    | 3½' (89) | 2½ ½" | 5' - 3½" to 5' - 9½"

BENDING DIAGONAL

NOTE: This plan shall be used for 45° and 50° light standards with 32, MAX length double end shoe.
1. For details on loops, connecting pin, reinforcing steel, and terminal units, see Standard Plan Concrete Barrier Type 2.

2. See plans for surface treatment on back face of barrier.

3. At the juncture between the Concrete Barrier Type 5 and the Bridge Barrier, cover the exposed foot of the Type 5 Barrier with an earth berm.

---

Bevel or round edges (3/4" max)
PLAN - TYPE 3 ANCHOR LOCATIONS

Shown for two-way traffic, four anchors required. For one-way traffic, install two anchors on traffic side of barrier.

Type 3 Anchor

Traffic this side only. Work area to be protected.

Shim (see note 2)

3/4" Expansion bolt

Anchor Assembly

For Type 1 Anchor Assembly
3" x 2" x 1/2" x 8" Angle

For Type 2 Anchor Assembly
3" x 2" x 3/4" x 8" Angle

Type 1 and Type 2 Anchors

Single Face Concrete Barrier

ANCHOR ASSEMBLY
(TYPE 1 AND 2)

NOTES

1. After removing temporary barrier from structures, clean and fill deck bolt holes with a 2:1 sand/cement grout, by volume.

2. Shims may be required to fit the bracket to the median barrier and roadway surface.

3. Location of anchors is to be adjusted to miss the main reinforcing in the deck when drilling holes.

4. For Type 1 Anchor Assembly provide two assemblies for each section of concrete median barrier on the roadway surface, located approximately 2'-6" from barrier ends and at center of barrier.

5. For Type 2 Anchor Assembly provide three assemblies for each section of concrete median barrier on the roadway surface, located approximately 2'-6" from barrier ends and at center of barrier.

ANCHOR ASSEMBLY (TYPE 1 AND 2)
1. Slope varies to suit conditions
   - Not steeper than 2:1
   - Not steeper than 3:1 for mowing
2. Berm transition offset optional for approach end
3. 10'-0" Minimum radius rounding when conditions permit
NOTES

1. When installed in front of slopes steeper than 6:1, distance between posts and slope break point shall be 12" Min.

2. Where barrier is parallel to the edge of the traveled way, every sixth post shall have a reflector. Reflectors shall be white when installed on the right side of traffic, and yellow when installed on the left side of traffic.

TABLE A

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<tr>
<th>Curve Radius</th>
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<td>700' or more</td>
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<td>699' to 220'</td>
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<td>219' to 110'</td>
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<tr>
<td>Less Than 110'</td>
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</table>
1. Stagger Spring Cable End assemblies for clearance between units. Installation of cable end assemblies shall be as follows:

LENGTH OF CABLE RUNS:
- Up to 500’ - Use the Spring Cable End Assembly on one end, and turnbuckle only on the other end of each cable.
- Over 500’ to 2000’ - Use the Spring Cable End Assembly on each end of each cable.


3. Distance from tangent of barrier run to notch for top cable on breakaway anchor angle shall be 4’.

4. The distance from the top of the footing to top of the highest cable is:
   - 27” for TYPE 1 Cable Barrier,
   - 30” for TYPE 2 and TYPE 3 Cable Barrier.

5. Where the cable is connected to a cable socket with a wedge type connector, one wire of the wire rope shall be crimped over the base of the wedge to hold it firmly in place.
## Dimensions

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## Wall Design

- Vertical Front Face and 2:1 Backslope
- Reinforced Concrete Retaining Wall
- Type 3 and 3 SW
- Standard Plan D-1c
- Sheet 2 of 2 Sheets

**NOTE:** This plan is not a legal engineering document but an electronic duplicate. The original signed by the Engineer and approved for publication is kept on file by the Washington State Department of Transportation. A copy may be obtained upon request.

**Reinforced Concrete Retaining Wall Type 3 and 3 SW Standard Plan D-1c**

**Approved for Publication:**
Clifford E. Mansfield
Date: 10/06/99
Deputy State Design Engineer
State of Washington Department of Transportation

**13/19 New Approval Date:**
10/06/99
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</tbody>
</table>

**WALL DESIGN WITH SLOPING FRONT FACE AND 2:1 BACKSLOPE**

**REINFORCED CONCRETE RETAINING WALL TYPE 4 AND 4 SW STANDARD PLAN D-1d**

**NOTE:** THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, DATED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS NOT ON FILE WITH THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield  10/06/99

**EFFECTIVE:** JANUARY 7, 2002 TO AUGUST 4, 2002
| WALL DESIGN WITH VERTICAL FRONT FACE AND 2:1 BACKSLOPE |

**REINFORCED CONCRETE RETAINING WALL**

**TYPE 5 AND 5W STANDARD PLAN D-1e**

**EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002**

**NOTE:** THIS PLAN IS A FORM SHEET PLAN AND DETERMINES THE REQUIREMENTS FOR THE STRUCTURAL DESIGN AND WORK OF A CONTRACT OR AGREEMENT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TYPICAL REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR THE DRAWINGS AND DRAWING SPECIFICATIONS ON THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR THE DRAWING SPECIFICATIONS ON THE CONTRACT DOCUMENTS.

**WALL DESIGN WITH VERTICAL FRONT FACE AND 2:1 BACKSLOPE**

**EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002**

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<tr>
<th>DIMENSIONS</th>
<th>BAR E (size #4)</th>
<th>BAR F</th>
<th>BAR K</th>
<th>BAR N</th>
<th>STEEL REINFORCEMENT</th>
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<tr>
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<td>H (value)</td>
<td>B</td>
<td>C</td>
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<td>19,253</td>
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</tbody>
</table>

**Note:** The plan is not a final engineering document but an electronic duplicate of the original and approved for publication by the Washington State Department of Transportation. A copy may be obtained upon request.
1. Walls will be designed. Noise Barrier Type 1A, 1B, 1C, or 1D. 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 shall be spaced at 120 feet maximum.
5. The contract specifies actual foundation requirements 01 or 02.
FOOTING WIDTH TRANSITION DETAIL

(For locations without footing step)
NOTE: Transverse bars not shown

JOINT AND CORNER DETAIL

NOISE BARRIER - TYPE 2
CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING
FOOTING WIDTH TRANSITION DETAIL
(For locations without footing step)

NOTE: Transverse bars not shown

NOISE BARRIER - TYPE 3
CAST-IN-PLACE CONCRETE WALL
ON SPREAD FOOTING
(OFFSET FOOTING)
### TYPICAL SECTION

- Height may vary if required to provide a smooth profile consistent with the roadway profile.

### BAR B (TYP)

- Fine ground line
- Optional construction joint with roughened surface
- Bar C
- Cast against undisturbed soil

### BAR E (TYP)

- 2" Clearance
- Bar C

### BAR D (TYP)

- 3'-0" MIN
- 2'-0" MAX
- 1'-0" MAX (for B2)

### BAR B (TYP)

- 3'-0" MIN
- 1'-0" MAX

### JOIN AND CORNER DETAIL

- Joint and corner detail

### NOISE BARRIER - TYPE 5

- Cast-in-place with traffic barrier on trench footings

### TRENCH FOOTING

- Construction joint (see Note 4)

### EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002

1. Wall to be designated Noise Barrier Type 5A, 5B, 5C, or 5D. The contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet MIN of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.
5. The contract specifies actual foundation requirements B1 or B2.

### BAR C (TYP)

- Construction joint (see Note 4)

### EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002

03-14-97
1. Wall to be designated Noise Wall Type 7A, 7B, 7C or 7D. The Contract specifies actual wall designations.

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

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. The Contract specifies actual foundation requirements DL or D2.
NOTES
1. Wall to be designated Noise Barrier Type 9A, 9B, 9C or 9D. The Contractor 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 - TYPE 9
PRECAST CONCRETE WALL WITH SPREAD FOOTING

TYPICAL SECTION

ELEVATION

D-2i
03-14-97
**DETAIL B**

**FOOTING WIDTH TRANSITION DETAIL**
(for locations without footing step)

NOTE: Transverse bars not shown

**JOINT AND CORNER DETAIL**

**NOISE BARRIER - TYPE 9**
PRECAST CONCRETE WALL
WITH SPREAD FOOTING
NOTES:
1. Wall to be designated Noise Barrier 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.

**NOISE BARRIER - TYPE 10**
**PRECAST CONCRETE WALL WITH OFFSET SPREAD FOOTING**

**TYPICAL SECTION**
- **Required for wall height 24'-0" - Type 10C**,
- **walls 24'-0" - 24'-6" - Type 10B and**
- **w/3'-0" of 24'-0" - Type 10B and 24'-0" - Type 10C**

**FINAL GROUND LINE**
- 2'' x 2'' Holes for dowel bar. See Detail B.
- 3'' Clearance Bar H alternate placement of hooks
- Grout hole with grout ducts to exit opposite side from traffic

**WALL THICKNESS**
- 3/8'' Chamfer Alternate as shown
- Surface treatment (see Note 3)

**ELEVATION**
- 2'-0'' MIN. Alternate Lap (Typ)
- 6'' MIN.
- 1'-0'' MAX.
- 6'' MIN. (Typ) See Joint Detail

**PRECAST PANEL TO BE PLACED VERTICALLY**
- Reinforcing steel (Bar D centered) on wall

**BAR H**
- 3'-0'' MIN. 2'-0'' MIN. Lap (Typ)
- 3'-0'' MAX. Spacing

**LEVEL (Typ)**
- 4'-0'' MAX

**SEAL - 1/8'' (Typ)**
- See Detail B

**LONGITUDINAL FOOTING REINFORCEMENT (Typ)**
- Uncutted soil

**WALL H**
- W and H are as shown

**Right-of-Way**
- See Contract

**WORK LINE**
- X/2-1/2''

**D-2j 03-14-97**

Sheet 1 of 2 Sheets
DETAIL B

FOOTING WIDTH TRANSITION DETAIL
(for locations without footing step)
NOTE: Transverse bars not shown

NOISE BARRIER - TYPE 10°
PRECAST CONCRETE WALL WITH
OFFSET SPREAD FOOTING
<table>
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<th>M</th>
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<tr>
<td>14'-0&quot;</td>
<td>14'-0&quot;</td>
<td>15'-5&quot;</td>
</tr>
</tbody>
</table>

- **Type IIA**
  - DEPTH D1: 5'-0" to 15'-0"
  - DEPTH D2: 5'-0" to 15'-0"
  - BAR A: 6'-5" to 15'-5"
  - BAR B: 6'-5" to 15'-5"
  - Y: 5" to 15" (in increments of 5"
  - PLATE THICK.: 2"-0" to 2"-0"
  - ANCHOR BOLT DIA: 1/2" to 1/2" (in increments of 1/2"

- **Type IIB**
  - DEPTH D1: 5'-0" to 15'-0"
  - DEPTH D2: 5'-0" to 15'-0"
  - BAR A: 6'-5" to 15'-5"
  - BAR B: 6'-5" to 15'-5"
  - Y: 5" to 15" (in increments of 5"
  - PLATE THICK.: 2"-0" to 2"-0"
  - ANCHOR BOLT DIA: 1/2" to 1/2" (in increments of 1/2"

- **Type IIC**
  - DEPTH D1: 5'-0" to 15'-0"
  - DEPTH D2: 5'-0" to 15'-0"
  - BAR A: 6'-5" to 15'-5"
  - BAR B: 6'-5" to 15'-5"
  - Y: 5" to 15" (in increments of 5"
  - PLATE THICK.: 2"-0" to 2"-0"
  - ANCHOR BOLT DIA: 1/2" to 1/2" (in increments of 1/2"

**NOTES**
1. Wall to be designated Noise Barrier Type IIA, IIB, IIC, or IID. The Contract specifies actual wall dimensions.
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 01 or 02.
**Overall Dimensions:**

- **Panel Length:** 12'-0" MAX

**Details:**

- **Step Detail:**
  - Top of pilaster
  - Level (TYP)
  - *3 Ties at 12" OC MAX

- **Wall Reinforcement:**
  - Outside of pilaster to outside of pilaster minus 4½"

- **NOISE BARRIER - TYPE 11:**
  - PRECAST CONCRETE WALL ON SHAFT FOUNDATION

- **End Panel:**

- **Shear-Key:**
  - 2" (TYP)
  - Grout
  - 3" R

- **Base Plate Detail:**
  - Slot C for anchor bolt (TYP)
  - Hole for B Bar (TYP)

- **Detail D:**
  - Set elevation of leveling nut before setting panel.
  - Anchor bolts:
    - AASHTO M183
    - Grade 3.1
  - Nuts with hardened washers or plate washer

- **Bar B:**
  - Deformed reinforcement bar
  - Standard rivet head based on nominal size bar
  - Button head shall bear firmly and uniformly against base plate. Bar B shall be held secure during concrete placement to prevent gaps between button head and base plate.
**OPTIONAL ANGLE POINT**

- **Dimensions:**
  - 30°: 4/8" (MIN)
  - 40°: 5/8" (MIN)
  - 50°: 6/8" (MIN)
  - 60°: 7/8" (MIN)
  - 70°: 7 3/8" (MIN)
  - 80°: 8" (MIN)
  - 90°: 9 3/8" (MIN)

**Surface Treatment:**
- Surface treatment as required (Typ)

**Notes:**
- Shaft (Typ)
- Seal (Typ)
- 6" MIN
- 20° MAX

**Additional Details:**
- Shaft and panel
- #3 Tie
- Bar A (Typ)
- Bar B (Typ)
- Pilaster and shaft
- #3 (Typ)

**Noise Barrier - Type 11**

**Precast Concrete Wall on Shaft Foundation**

---

**D-2k**

**03-14-97**
1. Wall to be designated Noise Barrier Type 12A, 12B, 12C, and 12D. The Contract specifies actual wall designation.

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

3. Compaction of trench height differential shall not exceed 1 foot.

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

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

6. All joints shall be in full contact and sealed.
Joint and Corner Detail

Noise Barrier - Type 12
Precast Concrete Wall with Traffic Barrier on Trench Footing

See Note 3
1. Wall to be designated Noise Wall Type 11A, 11B, 13C or 13D. 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 SI or C2.
NOISE BARRIER - TYPE 13
PRECAST CONCRETE WALL
WITH TRAFFIC BARRIER ON SPREAD FOOTING

DETAIL B

Angle point
Corner panel
Reinforced pre
listed panel height reinforcement schedule
Traffic side

Joint and corner detail

Bar B
Bar C
Bar E
Bar J

2" R
1'-9"
2'-2"

2'-9"

x - x = 4½"
**DETAIL A**

- Black-out 10" long, Grout after bolting plate
- 1/4" x 3 x 0'-3" Washer (TYP)
- 1/4" Anchor bolt
- Set elevation of leveling nut before setting panel

**BASEPLATE DETAIL**

- 1/4" Hole for #8 Bar (TYP)
- 4 1/4" x 1 1/2" AASHTO 2.03 galvanized embedded in grout. 1/4" Chamfer all corners
- Slot 1 1/4" x 1/4" for 1/4" anchor bolt (TYP)

**BAR A**

- Standard grout head based on nominal bar size

**BASEPLATE DETAIL**

- Noise Wall
- End of panel
- Seal -1/2" (TYP)

**TYPICAL INTERMEDIATE AND END PANEL**

- End of panel
- 20° MAX
- 4" Noise wall
- E Shaft

**ANGLE POINT PLAN**

- Adjust reinforcement as necessary to accommodate angle point
- 1/4" Chamfer (TYP)
- 2 1/2" (TYP) Gap (TYP)
- E Shaft

**JOINT AND CORNER DETAIL**

- Corner panel Bar D
- Reinforced per listed panel height reinforcement schedule
- Traffic side

**NOISE BARRIER - TYPE 14**

- PRECAST CONCRETE WALL WITH TRAFFIC BARRIER ON SHAFT FOUNDATION

---

*Sheet 2 of 2 Sheets*
1. Walls to be designated Noise Barrier Type 15A, 15B, 15C or 15D. 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. Plywood and Glulam panels at timber to be pressure preservative treated.

5. The Contract shall specify actual foundation requirements D1 or D2.

### Noise Barrier - Type 15

#### Timber Panel Wall on Trench footing

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**Notes**

**Elevation**

**Typical Section**

**Elevation End Detail**

---

**Plan**

**Section A-A**

---

**Diagram:**

- Panel width
- Batten both sides (TYP)
- See Contract
- Work line
- 1 Dimension (see TYP)
- Panel
- Batten (TYP)
- Final ground line
- 1'-0" MIN Batten embedment
- Panel set vertical
- Final ground line
- 3'-0" MIN
- Compacted trench
- Compacted trench

---

**Diagram Notes:**

- 6'MIN, 2'-0" MAX
- Level (TYP)
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<thead>
<tr>
<th>WALL HT</th>
<th>CMU DIM X</th>
<th>DEPTH DI</th>
<th>DEPTH D2</th>
<th>BAR C</th>
<th>BAR D</th>
<th>WALL HT</th>
<th>CMU DIM X</th>
<th>DEPTH DI</th>
<th>DEPTH D2</th>
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<td>16'-0&quot;</td>
<td>8&quot; x 1'-0&quot; x 3'-0&quot;</td>
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<td>16'-0&quot;</td>
<td>8&quot; x 1'-0&quot; x 3'-0&quot;</td>
</tr>
</tbody>
</table>

**NOTES**

1. Wall to be designated Noise Barrier Type 16A, 16B, 16C, or 16D. The contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be no low 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. Construction joints in the footing shall be spaced at 120 feet minimum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.

**ELEVATION**

**NOISE BARRIER - TYPE 16**

**MASONRY WALL ON TRENCH FOOTING**

---

**D-2p 03-14-97**
Typical Expansion Joint

At expansion joints, continuous expansion joint filler placed in both block recesses. Size as required.

Typical both sides of wall

Bond Beam Detail

Bond beam limit

Bond beam limit

Polyurethane sealant

Backer rod

NOISE BARRIER - TYPE 16
MASONRY WALL ON TRENCH FOOTING
**TYPICAL EXPANSION JOINT**

Expansion joint filler placed in sawn block recesses.

**FOOTING WIDTH TRANSITION DETAIL**

For locations without footing step:
NOTE: Transverse bars not shown

**NOISE BARRIER - TYPE 17**

MASONRY WALL ON SPREAD FOOTING

---

**BOND BEAM DETAIL**

- Bond beam units
- Bond beam limit
- *5 at 4'-0" MAX (TYP)"

**DETAIL A**

Typical both sides of wall

- Polyurethane sealant
- ⅛" Joint
- Backer rod
### Typical Expansion Joint

Cells with vertical reinforcing and bond beam to be filled with grout.

*5 (TYP)

See Detail A

**TYPICAL EXPANSION JOINT**

**Bond Beam Detail**

- Bond beam units
- Bond beam limit

**Detail A**

Typical both sides of wall

**Footage Width Transition Detail**

(For locations without footing step)

**NOTE:** Transverse bars not shown

**Noise Barrier - Type 1B**

Masonry Wall on Offset Spread Footing

---

**BAR SIZE** | **SPICE LENGTH**
---|---
*6 | 2'-8"
*7 | 3'-4"
*8 | 4'-10"

---

**D-2r**

03-14-97
**DETAIL A**

- Hooks parallel to wall layout line
- 4" Shaft
- #4 Stirrup spacing of 12"
- Three - #4 Stirrup spacing at 6"
- Concrete shaft
- #3.5 spiral at 8" pitch

**TYPICAL EXPANSION JOINT**

- As expansion joints, continuous expansion joint filler placed in sawn block recesses, size as required.
- Polyurethane sealant
- See Note 5
- #5 (Typ) Traffic side
- See Detail B
- 1/4" Joint
- Backer rod

**DETAIL B**

Typical both sides of wall

**NOISE BARRIER - TYPE 19**

**MASONRY WALL ON SHAFT WITH GRADE BEAM FOUNDATION**

**BOND BEAM DETAIL**

- Bond beam units
- Bond beam limit

**STEP DETAIL**

- #4 OS
- 1'-0" Even multiples of 6'
- 3'-0"
Provide some number and size dowels as 3 Bars lap 2'-0" MIN
One #5 full height
1 1/2" Clearance

B Bars - for quantities greater
than four place balance
on outside faces as shown

SECTION A-A
Pilaster and shaft

NOTES
1. Wall to be designated Noise Barrier, Type 2A,
   2B, 2C or 2D. The Contract specifies actual wall
designations.
2. For intermediate wall heights, use the next
   higher H.
3. All masonry shall be a 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. Construction joints in the footing shall be
   spaced at 120 feet maximum.
8. The Contract shall specify actual foundation
   requirements DI or D2.
9. See "Masonry Wall Finishes and Details" sheet for masonry finishes, special shapes, sizes and layouts.

NOISE BARRIER - TYPE 20
MASONRY WALL ON
SHAFT FOUNDATION

D-2t
03-14-97
**SECTION B-B**

- Pilaster and shaft
- 5''
- Clearance: 3.5 at 100 mm pitch
- A Bar
- 2'-0''

**SECTION C-C**

- Solid grout cap
- Grout top course solid
- Vertical Reinforced B Bars #4 at 1.220 in MIN
- 6'' CMU (TYP)
- Reinforcement C Bars at center line of wall
- Grout all cells below grade solid, MIN two courses (TYP)
- Reinforcement C Bar
- 4'' Compacted level crushed gravel base
- Alternates Use Douglas Fir 2x8 continuous or other suitable material for leveling first course

**SECTION D-D**

- Typical Expansion Joint
- 1/4'' Clearance to face shell
- 5'' Full height
- Becker rod with polyurethane sealant both wall faces
- Two #4 full height
- C Bar
- 1/4'' Dia x 1-0'' Shaped 40 pipe with 46 x 30'' grade 40 welded tail as shown topped with and spaced per C Bars

**NOISE BARRIER - TYPE 20**

**MASSIVE WALL ON SHAFT FOUNDATION**

**ANGLE POINT PLAN**

D-2t 03-14-97
Wall Reinforcement, see Noise Barrier Type II Precast Concrete Wall on Shaft Foundation

Top of concrete pad

Grout metal frame

$\frac{1}{2}$" Anchor (TYP)

Grout cell

Elevation to match final ground line

Concrete Pad Class 2000

SECTION A-A

SECTION B-B

ELEVATION

ACCESS DOOR - TYPE 3
MASONRY WALL ON SHAFT FOUNDATION

Door to open toward roadway

Install door hinges, three locations

Install galvanized hasp type lock which will accommodate state furnished lock on roadway side

$5 \times 4'-0"$

(TYP)

$4''$

(TYP)

$\frac{1}{2}$" Anchor (TYP)

$6 \times 1'-0"$

(TYP)

$4'-4"$ MAX opening

$5 \times 1'-0"$

(TYP)
Install galvanized hasp type lock which will accommodate state furnished lock on roadway side.

Door to open toward roadway.

Elevation to match final ground line.

Concrete wall

Bend wall reinforcement (TYP).

See wall detail sheets for reinforcement not shown.

Elevation to match final ground line.

CONCRETE PAD

Concrete Pad Class 2000

ACCESS DOOR - TYPE 4
CAST IN PLACE
CONCRETE WALL

BOTTOM OF WALL DETAIL

<table>
<thead>
<tr>
<th>WK Number</th>
<th>Bar Size</th>
<th>Bend Type</th>
<th>Number Per Door</th>
<th>X</th>
<th>Y</th>
<th>Total Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>4</td>
<td>50</td>
<td>8</td>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>12</td>
<td>4</td>
<td>90</td>
<td>8</td>
<td>8'-2&quot;</td>
<td>8'-2&quot;</td>
<td>8'-2&quot;</td>
</tr>
<tr>
<td>14</td>
<td>4</td>
<td>90</td>
<td>8</td>
<td>5'-4&quot;</td>
<td>4'-8&quot;</td>
<td>4'-8&quot;</td>
</tr>
</tbody>
</table>

1/2" Chamfer

4'-0" MAX

9/16" Anchor (TYP)
NOTES

1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOFABRIC CLASS.
**WIRE MESH SLOPE PROTECTION**

**STANDARD PLAN D-7**

**SLOPE PROTECTION**

**NOTES**

1. The Contractor may provide two wire rope clips at 3'-0" O.C. in lieu of three-wire type wire rope clips as shown.

2. All horizontal wire ropes by continuously weathertight with wire or hog rings of approximately 6" intervals.

3. Wire rope clips are used for connections of netting.

**ASSEMBLY DETAILS**

- Top wire rope
- Anchor wire rope
- Hog rings at 2" intervals (TP)
- 4" OD x 3/8" Steel ring (TP)
- Intermediate horizontal wire rope
- 4'-0" Lap
- Intermediate vertical wire rope
- Steel ring, anchor rod or bottom horizontal wire rope
- Wire rope clips (see note 3)
- Rope thimble
- 3 1/2" x 3 1/2" x 3 1/2" Steel plate
- Anchor wire rope
- U-BOLT
- 3/8" x 1" x 3" Steel plate
- 9 gage Steel wire
- Hog ring

**WIRE ROPE CONNECTION**

**Maximum length of horizontal wire rope = 150'**

**Usage:**
- Use to clamp intermediate horizontal wire ropes to vertical wire ropes.

**EXPIRES JULY 1, 2001**

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield

**DEPARTMENT OF TRANSPORTATION**

**EXPIRES JULY 1, 2001**

**DEPARTMENT OF TRANSPORTATION**

**EXPIRES JULY 1, 2001**
TYPE 1 ANCHOR
(FOR USE IN EARTH)

TYPE 2 ANCHOR
(FOR USE IN COMBINED EARTH AND ROCK)

TYPE 3 ANCHOR
(FOR USE IN SOLID ROCK)

NOTE:
1. Two turn bane wire rope clips at 3" centers may be substituted for three un-bolted wire rope clips shown.
ELEVATION
CONCRETE SLOPE PROTECTION
(Pneumatically placed or poured in place cement concrete shown)

Concrete
Slope protection

Embankment slope

SECTION

EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002

SIDE ELEVATION
(For fill section on lower roadway)

*Fill slope shall be rounded to allow placement of concrete slope protection.

TYPE 1 SLOPE PROTECTION CUT SECTION DETAIL
(Pneumatically placed or poured in place cement concrete shown)

10 Gage 6"x 6" wire mesh reinforcement. (See Std. Spec. 9-07.1)

This side may be poured against undisturbed soil.

SIDE ELEVATION
(For cut section on lower roadway)

TYPE 2 SLOPE PROTECTION CUT SECTION DETAIL
(Pneumatically placed or poured in place cement concrete shown)

4029
REGISTERED ARCHITECT

ANDREW YOUNG
STATE OF WASHINGTON
Principal Architect

CONCRETE SLOPE PROTECTION
STANDARD PLAN D-9

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Clifford E. Mansfield 12/11/98
DEPUTY STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
TYPICAL PREPRINTS
NOTES

1. The design and shape of the semi-open concrete masonry unit shown is only one example of the products that may be used.

2. The Type 3 Slope Protection Curb Detail shall be used only when the lower roadway cross section requires a curb.

SKEWED BRIDGE PLAN
(Semi-open concrete masonry units shown)

SEE NOTE 2

TYPE 3 SLOPE PROTECTION CURB DETAIL (Elevation)
(Semi-open concrete masonry units shown)
NOTE:
Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is \( \frac{3}{4}" \).

Parallel to top of traffic barrier.

TYPICAL DATE

DATE NUMERALS

END VIEW
**PRECAST CEMENT CONCRETE BUMPER CURB**

- **Dimensions:**
  - 2" Clearance (TYP)
  - 3/8" DIA Holes
  - 1/2" MIN, 10" MAX

- **Details:**
  - Two #3 Bars
  - Non-shrink grout
  - 3:1 Sand and cement grout 1" depth
  - Two #6 Bars

**ATACHMENT DETAIL**

**INTEGRAL CEMENT CONCRETE BARRIER CURB**

- **Dimensions:**
  - R = 1/2"
  - R = 1"
  - Top of curb at approach

**CEMENT CONCRETE BARRIER CURB**

- **Dimensions:**
  - R = 1/2"
  - Top of curb at approach

**CEMENT CONCRETE BARRIER CURB AND GUTTER**

- **Dimensions:**
  - R = 1/2"
  - Top of curb at approach

**SINGLE FACED MOUNTABLE CEMENT CONCRETE CURB**

- **Dimensions:**
  - R = 1/2"
  - R = 1 1/2"

**MOUNTABLE INTEGRAL CEMENT CONCRETE CURB**

- **Dimensions:**
  - R = 1/2"
  - R = 1 1/2"

**MOUNTABLE CEMENT CONCRETE CURB AND GUTTER**

- **Dimensions:**
  - R = 1/2"
  - R = 1 1/2"

**DOUBLE FACED MOUNTABLE CEMENT CONCRETE CURB**

- **Dimensions:**
  - R = 1/2"
  - R = 1 1/2"

**CEMENT CONCRETE CURBS AND GUTTERS**

- **Dimensions:**
  - R = 1/2"
  - Top of curb at approach
The main body of the curb and the longitudinal rib shall form a uniform transition from a Type C section to a Type A (back to back) section.
TYPE C BLOCK

TYPE A BLOCK

BLOCK TRAFFIC CURB
**NOTES**

2. Type 4a and Type 5a curbs do not require steel tie bars or adhesive for anchoring.

**SPACING OF ANCHOR BARS**

**EXTRUDED CURB**

**F-2b**

03-14-97
NOTES
1. A minimum 3" wide accessible route shall be maintained in all pedestrian accessible areas.
2. Construction joints shall be placed along sidewalks at 15" maximum spacing. All joints shall be cleaned and edged.
3. Joints shall be located so that runoff does not flow past curb ramps.
4. This area may also incorporate the following Decorative paving:
   Decorative paving should be placed in areas.Bench or seating areas.
5. Curb ramps shall be poured as a separate unit from the sidewalk, isolated by expansion joint material on all sides except at end of ramp next to the roadway.
6. Minimum landing width is 4' for new construction. For alterations, the minimum is 3'. See Construct Plans.
7. Ramp texturing is to be done with an expanded metal grate placed and removed from very concrete to leave a diamond pattern as shown. The long axis of the diamond pattern shall be perpendicular to the curb. Grooves shall be ½" deep and ¾" wide.
8. See Construct Plans for mounting height of Sign RT-801.
9. Cement concrete approaches shall be constructed of air-entrained concrete Class 2000 and may be poured integral with curb.
10. When a flush condition is not feasible, the change in elevation between surfaces shall not exceed 1/2". The edge of the higher surface, up to 1/2" in height, may be vertical. The edge of the higher surface, up to 1/2" in height, shall be beveled with a slope no steeper than 2:1.

Cement Concrete Sidewalk and Approach Details
Standard Plan F-3

Approach Plan

Approach Plan

Approach Plan
TYPICAL JOINT DETAIL
Chord shown - End Post Similar

PLAN

SECTION C-C
Diagonal shall be slotted for gusset.

PLAN

SECTION D-D

ALTERNATE JOINT DETAIL
Not for connections between vertical diagonals and chords.

END POST OR CHORD SHOP SPLICE
See note 9

DEAD LOAD CAMBER

CHORD FIELD SPLICE
2" Rigid conduit to be installed where directed by the engineer.

**PLAN**

Symmetrical about E except conduit.

Anchor bolt - 1" x 2"-3" threaded rod or stud bolt with three washers and four heavy hex nuts.

Concrete shall be placed directly on gravel. Rollers or vibrators shall be used to compact the concrete and form shall be removed while concrete is still wet and before it hardens.

2" Clearance

**ELEVATION**

Foundation - Type 1

1 1/2" DIA notes must be used on anchor bolts. Anchor bolts shall be of 2" size.

2" Grout (place after rigid bridge is erected)

Notes:
- End caps shall be erected on a true vertical. Placing shall be accomplished by means of a true vertical. After placing, tighten upper nut on anchor bolt 1/3 turn from snug tight.

**VIEW H-H**

Foundation - Types 2 and 3

NOTES:
1. See contract plans for type of foundation to be used.
2. Use Class 4000 Concrete through out.

**BAR LIST**

<table>
<thead>
<tr>
<th>Foundation Type</th>
<th>Mark</th>
<th>Location</th>
<th>60&quot; or Less</th>
<th>61&quot; to 100&quot;</th>
<th>101&quot; to 150&quot;</th>
<th>151&quot; to 200&quot;</th>
<th>201&quot; to 250&quot;</th>
<th>251&quot; to 300&quot;</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Short - vertical</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Short - spiral</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Cap - top</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Cap - sides</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Cap - clamps</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Cap - horizontal</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Cap - diagonal</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**FINISH GROUND LINE**

**STANDARD PLAN G-20**

**SIGN BRIDGE FOUNDATIONS**

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield
7/2/98
Post will be Micro-Lam® laminated veneer Type L or Type M post manufactured by Trus Joist or an equivalent that has been crash tested and approved by the FHWA.

- \( H_1, H_2, H_3, H_4 \) = Length of post.
- \( V \) = Elevation difference from edge of lane to bottom of sign.
- \( W \) = Distance from edge of lane to center of nearest post.
- \( X \) = Horizontal measurement of sign.
- \( Y \) = Vertical measurement of sign or signs.
- \( Z \) = Height from ground to mid-height of sign or signs at longest post.
- \( D \) = Post embedment.

See “Sign Specifications” sheet of Contract Plans for \( H, V, W, X, \) and \( Y \) values.

### Laminated Post Embedment Depth

**Depth (D) in Feet**

<table>
<thead>
<tr>
<th>Height ( Z ) (FT)</th>
<th>Total Sign Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 50</td>
</tr>
<tr>
<td>9 to 12</td>
<td>6</td>
</tr>
<tr>
<td>13 to 18</td>
<td>6</td>
</tr>
<tr>
<td>16 to 22</td>
<td>7</td>
</tr>
<tr>
<td>19 to 26</td>
<td>7</td>
</tr>
</tbody>
</table>

### Roadside Signs on Laminated Wood Box Posts

**Detail B**

- **Type L Post**
  - Dimension: 14\(\frac{3}{8}\)" x 7\(\frac{3}{8}\)"
- **Type M Post**
  - Dimension: 7\(\frac{3}{8}\)"

**Traffic Direction**

**Detail C**

- **Galvanized nails**
  - 20 Gauge galvanized metal cap

**Traffic Direction**

- **1" DIA holes**
  - Connected by sawcut (both sides TYP)

- **Finished ground line**

**Section A-A**

- **Type L Post**
  - Dimension: 14\(\frac{3}{8}\)" x 7\(\frac{3}{8}\)"

- **Type M Post**
  - Dimension: 7\(\frac{3}{8}\)"

**GALVANIZED METAL CAP**
1. Mileposts of the type specified shall be placed as shown herein. If conditions preclude placement at the correct location, the mileposts may be moved as much as 50’ in either direction mileposts that cannot be placed within this degree of accuracy shall be omitted entirely.

2. Mileage for mileposts shall commence at the south or west terminus of the highway route and progress in a north or east direction.

3. All Spur and Equation signs shall have “S” and “B” plaques.

4. Mileposts in cut sections shall be placed at back of ditch. Milepost markers may be placed up to 30’ from the edge of the traveled way.

5. See “Washington State Sign Fabrication Manual” for the dimensions and colors of the Milepost/Plaque.
For material requirements, see Standard Specification 906.16.

Hinge Connection Details

All multiple steel post signs

Hinge Bolts shall be tightened 1/2 turn past snug tight.

Hinge plates shall be Type M-500 as manufactured by Transpo Industries, Inc., or an equivalent that has been crash-tested and approved by FHWA.

NOTE: This is not a LEA design document but an electronic duplicate of the original, issued by the Engineer and approved for publication in PDF form for use by the Washington State Department of Transportation. A copy may be obtained by contacting:

Clifford E. Mansfield
State Design Engineer
Washington State Department of Transportation

APPROVED FOR PUBLICATION

Clifford E. Mansfield
10/09/99
**TYPE 2A BASE CONNECTION DETAIL**

Use only when sign area is less than 55 square feet per post.

<table>
<thead>
<tr>
<th>BOSS &amp; OFFSET TABLE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( Z &gt; 10 )</td>
<td>0.0875&quot;</td>
</tr>
<tr>
<td>( 10 \leq Z &lt; 14 )</td>
<td>0.0675&quot;</td>
</tr>
<tr>
<td>( Z \leq 14 )</td>
<td>0.0375&quot;</td>
</tr>
</tbody>
</table>

**SHIM DETAIL - TYPE 2A**

Use no more than two shims per anchor coupling.
Use no more than three shims for any two anchor couplings.

**ANCHOR FERRULE DETAIL - TYPE 2A**

Shims shall be 14 gauge or 18 gauge.

**COUPLING BOLT DETAIL - TYPE 2A**

**ROADSIDE SIGN STRUCTURES**

**FOR MULTIPLE STEEL POST SIGNS**

**STANDARD PLAN G-6a**

**SHEET 2 OF 3 SHEETS**

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DATE**

**EXPRES JUNE 20, 2002**

**NOTE:** This plan is not a legal engineering document but an electronic supplement. The original, signed by the engineer, is approved for publication and is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.
**DIMENSION TABLE FOR TYPE 2B BASES**

<table>
<thead>
<tr>
<th>Post Size</th>
<th>Anchor Ferrule Spacing</th>
<th>Keyway Offset 1</th>
<th>K Distances are * &amp; 0.004&quot;</th>
<th>Bracket Width BW</th>
<th>Hole G12 R0</th>
<th>Spacing S</th>
<th>Fasteners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø6 x 9</td>
<td>1 / 8&quot; 3&quot;</td>
<td>When Z &gt; 7&quot; 9&quot;</td>
<td>When Z &gt; 9&quot; 12&quot;</td>
<td>When Z &gt; 12&quot; 15&quot;</td>
<td>5 1/2&quot;</td>
<td>1 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>Ø6 x 12</td>
<td>1 / 4&quot; 4&quot;</td>
<td>5 1 / 2&quot;</td>
<td>1 1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø6 x 16</td>
<td>1 / 4&quot; 4&quot;</td>
<td>5 1 / 2&quot;</td>
<td>1 1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø6 x 18</td>
<td>1 / 4&quot; 4&quot;</td>
<td>5 1 / 2&quot;</td>
<td>1 1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø6 x 21</td>
<td>1 / 4&quot; 4&quot;</td>
<td>5 1 / 2&quot;</td>
<td>1 1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø10 x 22</td>
<td>1 / 8&quot; 4&quot;</td>
<td>6 1 / 2&quot;</td>
<td>2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø10 x 26</td>
<td>1 / 8&quot; 4&quot;</td>
<td>6 1 / 2&quot;</td>
<td>2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SHIM DETAIL - TYPE 2B**

Shims shall be 14 gage or 16 gage.

Use no more than two shims per anchor coupling.

Use no more than three shims for any two anchor couplings.

**ANCHOR FERRULE DETAIL - TYPE 2B**

**BRACKET DETAIL - TYPE 2B**

**ANCHOR COUPLING DETAIL - TYPE 2B**

**COUPLING BOLT DETAIL - TYPE 2B**

**GROUND DETAILS**

- Eight 3/8" Bars
- M6 A325 T62
- "6:4" Pitch
- 1/4" Flat Turned Button
- Concrete Foundation
- (Grilled shank permitted)
- 2 1/2" Clearance to bias reinforcement

**TYPE 2B FOUNDATION DETAIL**
GUIDE POST TYPES

<table>
<thead>
<tr>
<th>Type</th>
<th>Reflective Sheeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>White sheeting facing traffic</td>
</tr>
<tr>
<td>Y</td>
<td>Yellow sheeting facing traffic</td>
</tr>
<tr>
<td>WW</td>
<td>White sheeting both sides</td>
</tr>
<tr>
<td>YY</td>
<td>Yellow sheeting both sides</td>
</tr>
<tr>
<td>WR</td>
<td>White facing traffic, red on opposite side</td>
</tr>
<tr>
<td>YR</td>
<td>Yellow facing traffic, red on opposite side</td>
</tr>
<tr>
<td>G</td>
<td>Type WW with 3&quot; x 3/8&quot; green sheeting below each white sheet</td>
</tr>
</tbody>
</table>

NOTES

1. The contractor shall either:
   a. Drive the flexible guide post in line with the guardrail posts, or
   b. Install the shorter flexible guide post on the guardrail post.

2. Guardrail-mounted guide posts shall be fastened to the guardrail post with two 20d galvanized nails, or two 2" x 3/8" log screws with washers, as near to the centerline of the post as possible. Also acceptable is any approved method submitted by the guide post manufacturer.

3. Guide posts shall be 2' from the edge of shoulder unless otherwise specified.

4. Flexible tubular posts shall have a band of reflective sheeting near the tops of the post, at least 8" wide, around the entire post.

FLEXIBLE GUIDE POST
(GROUND MOUNT)

(Flexible guide post with wood guardrail posts)

FLEXIBLE GUIDE POST
(SURFACE MOUNT)
GUIDEPOST SPACING

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>S</th>
<th>RADIUS</th>
<th>S</th>
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<tr>
<td>700'</td>
<td>120'</td>
<td>4500'</td>
<td>300'</td>
</tr>
</tbody>
</table>

Spacing for radii not shown may be interpolated from table and rounded to nearest 10'. Spacing shall be 30'-0" minimum and 200'-0" maximum.

NOTES:
1. First guide post is positioned "S" distance from beginning of curvature.
2. If last guide post beyond the curve is \(\frac{1}{2} S\) or more, no additional posts are required.
3. If last guide post beyond the curve is less than one half "S", one additional post is required.

TWO-WAY UNDIVIDED HIGHWAYS

Guide posts on outside of curve in direction of travel

GUIDE POST PLACEMENT FOR HORIZONTAL CURVES

MULTI-LANE DIVIDED HIGHWAYS

Guide posts on inside and outside of curve for each direction of travel

LEGEND

- Type W
- Type Y
- Type WW

See table in Standard Plan
GUIDE POSTS for definition of guide post types
1. Barricades shall be installed in accordance with part VI of the MUTCD.

2. Sand bags shall not be stacked.

3. Rails shall be placed both front and back of barricade if required for two-way traffic. Rails shall be the same size.

4. Lumber shall be standard grade or better.

5. Right (R) barricades are placed to the right of traffic. Left (L) barricades are on the left of traffic.

6. Where a barricade extends entirely across a roadway, the stripes shall slope downward in the direction toward which traffic must turn in detouring. Where both right and left turns are allowed, the chevron stripes shall slope downward in both directions from the center of the barricade.

7. If sign is required field drill two holes to accommodate 3/4" machine bolt, washer and nut. The sign shall be installed so that the center rail is not covered.

---

**Type III Barricade**

**Front View**

- 3/4" exterior plywood, treated edge, reflectorized rolls, fastened with two galvanized 3/4" x 3" lag bolts with flat washer per post.

- See DETAIL A

- See Note 3

- 4x4 post (TYP)

- 1" Dia. hole

- Clamp cable both sides of post or wrap cable around post and thru hole a second time.

- 16d nails (TYP)

- 30c spike on back side

- 3/4" x 4" plywood brace (TYP) nailed on front

---

**Side View**

- 1/4" steel cable

- Sand Bags as required

- 1/4" x 4" turnbuckle with hook

- 1/4" x 2" eyebolt

- 2x4 (TYP)

---

**NOTES**

- See Sign Plan or Traffic Control Plans

- See Note 7

- 8" Min. to 12" Max

- Reflectorized stripes orange and white

---

**Additional Information**

- Warning light lens

- Vandal proof bolt, per manufacturers recommendations

- 4" x 4" x 1/4" angle

- Four No. 10 wood screws 2 1/2" long MIN

- 4x4 post

---

**Diagram**

- Warning light

- Battery box

- H-2 08-01-97
1. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPM’s on multilane one way roadways, and Type 2YY RPM’s on two lane two way roadways.

MULTILANE ONE WAY TRAFFIC

M-1. For lane lines, Type 2W RPM’s shall be spaced at 80’ intervals on tangents and horizontal curves with a radius of 5000’ or more, and 40’ intervals on horizontal curves having radii less than 5000’.

M-2. When specified, Type 2YY RPM’s shall be placed outside the left edge line. Placement is shown on “Left Edge of Lane Placement”.

TWO LANE TWO WAY TRAFFIC

T-1. For center lines, Type 2YY RPM’s shall be spaced at 80’ intervals on tangents and horizontal curves with a radius of 5000’ or more, and 40’ intervals on horizontal curves having radii less than 5000’. Type 2YY RPM’s are to be centered between skip lines.
NOTES:
1. First Type 2L arrow is installed 50' back of stop bar or crosswalk. Second arrow is located 100' back, or at left turn pocket.
2. "S" = 140' for posted speed < 50 MPH.
   "S" = 170' for posted speed ≥ 50 MPH.
3. Stopping point shall be marked with stop bar only when mainline movement is controlled by a stop sign or traffic signal.
4. Raised pavement markers shall be installed only when specified in the Contract Plans.
6. No Pass Line on approach side with skip center line on departure side unless Double Yellow Center Line is required in the contract.

### TABLE 1

<table>
<thead>
<tr>
<th>Posted Speed (mph)</th>
<th>Taper Rate (T)</th>
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### TABLE 2

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### TABLE 3

<table>
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<th>No Pass Length (ft)</th>
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</thead>
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<td>470</td>
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<tr>
<td>30</td>
<td>260</td>
</tr>
<tr>
<td>25</td>
<td>200</td>
</tr>
</tbody>
</table>

W₁ = Approaching through lane
W₂ = Departing lane
T₁ = Width of left turn lane on approach side of "S"
T₂ = Width of left turn lane on departure side of "S"
W₃ = Total width of channelization (W₁ + W₂ + T₁ + T₂)

END TWO-WAY LEFT TURN LANE
Continuous Rumble Strips

Median Crossovers

Terminate Rumble Strips within Crossover

Continuous Rumble Strips on Median Shoulders

Continuous Rumble Strips on Outside Shoulders

Major Road

Minor Road

Terminate Rumble Strips at Beginnings and Ends of Right Turn Radii

Radius Point of Right Turn Radius - Type

Undivided Highway
NOTES:

Where indicated on the plans or special provisions, raised pavement markers shall be used to supplement or substitute for painted pavement markings.

TWO LANE ON CONNECTION

TWO LANE OFF CONNECTION

DETAIL A

DETAIL B

PAVEMENT MARKING DETAILS
STANDARD PLAN M-5a

APPROVED FOR PUBLICATION
Clifford E. Mansfield 2/18/00

COPYRIGHTED BY THE STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF TRANSPORTATION
NOTES
Where shown on the plans or specified in special provisions, lane markers shall be used in lieu of or supplementary to the painted pavement markings shown herein.

COLLECTOR ROAD ON CONNECTION

COLLECTOR ROAD OFF CONNECTION

PAVEMENT MARKING DETAILS
STANDARD PLAN H-5b

APPROVED FOR PUBLICATION
Clifford E. Mansfield 2/18/00
PAVEMENT MARKINGS

ARROW SYMBOLS

TYPE 1

6''

TYPE 2L (LEFT) SHOWN
TYPE 2R (RIGHT)

3''

TYPE 3L (LEFT) SHOWN
TYPE 3R (RIGHT)

5'' - 6''

TYPE 4

6''

TYPE 5

8''

4'' square (Typ)

See contract for location
and material requirements.
RAILROAD - HIGHWAY GRADE CROSSINGS
PAVEMENT MARKING PLACEMENT DETAIL

KEY
1. RR CROSSING SYMBOL
2. 600 mm STOP BAR
3. W10-1 ADVANCE WARNING SIGN
4. SEE "STANDARD ALPHABETS FOR HIGHWAY SIGNS AND PAVEMENT MARKING, 1977 METRIC EDITION" FOR LETTER LAYOUT.

RR CROSSING SYMBOL DETAILS

See MUTCD Section 2C-3, Table II-1e
NOTE:
1. The brass disc will be furnished by the State.
2. The hole shall be 3½" 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.
3. The top of the concrete shall be troweled smooth and the brass disc set in the center with top flush and level. When the concrete is set, cover the entire monument with moist earth and leave for three days.
4. Top of monument may be recessed or protruding depending on conditions.

DETAIL OF GROOVE FOR \( \frac{1}{8} \)" LETTERS

NOTE:
Dotted letters to be \( \frac{1}{8} \)" high and will be stamped by WSDOT Personnel. Only the assigned identification numbers are to appear on the brass disc.
VALUES OF Z (feet)
For Class A Slope Treatment

\[ Z = \frac{\frac{K}{2} \sqrt{\left(\frac{J}{2}\right)^2 + \left(\frac{D}{2}\right)^2 + (\frac{DS}{4})}}}{\frac{K}{2} - \left(\frac{L}{2}\right) + \left(\frac{Z}{2}\right)} \]

In this equation the term \( \frac{DS}{4} \) is positive when the slope treatment stake is lower than the slope stake (descending ground); and negative when the slope treatment stake is higher than the slope stake (ascending ground).

LEGEND:
J Distance from slope stoke to slope treatment stake, measured on natural ground slope.
K Distance from slope stoke to lower limit of slope treatment, measured down face of cut slope.
H Difference in elevation between finished shoulder grade and slope stoke.
D Difference in elevation between slope stoke and slope treatment stoke.
Z Depth of slope treatment or slope stoke as determined by a straight line between the midpoints of J and K.
S Horizontal distance per foot cut for the slope under consideration.

(FOR A 3:1 SLOPE, S=3)

<table>
<thead>
<tr>
<th>CUT SLOPE</th>
<th>CLASS A</th>
<th>CLASS B</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:1</td>
<td>J 7'</td>
<td>K 5'</td>
</tr>
<tr>
<td>3:1</td>
<td>J 7'</td>
<td>K 5'</td>
</tr>
<tr>
<td>2:1</td>
<td>J 7'</td>
<td>K 9'</td>
</tr>
<tr>
<td>1.75:1</td>
<td>J 7'</td>
<td>K 12'</td>
</tr>
</tbody>
</table>

SLOPE TREATMENT
STANDARD PLAN H-8

EXPRESSES:  JANUARY 7, 2002 TO AUGUST 4, 2002

DIANE C. JACKSON
PROFESSIONAL ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Clifford E. Mansfield
09/18/98
DEPUTY STATE DESIGN ENGINEER

NOTE:
1. Slope treatment shall be constructed simultaneously with the roadway excavation. Ordinarily, hand trimming will not be required if satisfactory results are obtained with mechanical equipment.
2. It is essential that the construction of cut and fill slopes and the application of slope treatment fit as naturally as possible into the existing landscape to provide an aesthetically and geometrically satisfactory completed roadway.
3. When the distance K is greater than the distance from the top of cut to the bottom of ditch, slope treatment shall begin at bottom of ditch.
1. Manufacturer shall submit shop drawings of pipe railing for review.
   Design shall be in accordance with AASHO specifications.

2. Aluminum pipe railing shall have no external surface welds.
MAILBOX SIZE
1. 1A OR 2
   (SEE DETAIL SHEET 2)

PLATFORM
(SIZE DETAIL SHEET 2)
(SEE NOTE 1)

NOTEs:
1. An alternate platform may be installed, provided that
   it is compatible with the bracket shown.
2. A Type 2 Support is required for installing multiple
   mailboxes on one support. No more than 6 mailboxes
   are allowed on a Type 2 support.
3. Attach a newspaper box to a steel post with two 1 7/8"
   Muffler Clamps spaced 4" apart. Fpdrn drill 7/16"
   hole in the newspaper box to fit, use 2 1/2" x 1/4" 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.
4. 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. Center the mailbox on the platform to ensure space
   for the mailbox door to open and to allow space for
   installing the fasteners.

MAILBOX & PLATFORM DIMENSIONS

<table>
<thead>
<tr>
<th>MAILBOX DIMENSIONS</th>
<th>PLATFORM DIMENSIONS</th>
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</thead>
<tbody>
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<tr>
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<td>2</td>
<td>24&quot;</td>
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STEEL POST FASTENERS

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<th>BOLT SIZE</th>
<th>QUANTITY</th>
<th>WASHERS</th>
<th>LOCKNUTS</th>
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<td>4</td>
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WOOD POST FASTENERS

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<tr>
<td>3/8&quot; x 3/4&quot;</td>
<td>4</td>
<td>8</td>
<td>4</td>
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</table>
SECTION A-A

POST

SIDE VIEW

FINISH GRACE

6" x ¼" DIA Steel bar

Concrete footing round or square

1'-2½" Round or Square

1'-2½"

3'-4"

½" Steel cap plate

5/16" Reflective tape

3/4" Steel pipe

6" x ¼" DIA bar

⅛" Drilled hole

FRONT VIEW

TYPE 2 BOLLARD

PLAN

Concrete footing round or square

1'-2½"
**ALIGNMENT STAKE**
Stake every 100 feet on tangents, every 25 feet on curves.

**CLEARING/GRUBBING LATH**
Stake at each full station, 100 feet on tangents, every 25 feet on curves. No hub necessary.

**SLOPE STAKE**

**OFFSET FROM**

**SLOPE LATH REFERENCES**

**SLOPE TREATMENT (ST) STAKES FOR CUT SECTIONS**

**DIALIGHT STAKE**

**STANDARD PLAN H-14**

**SURVEY STAKES**

**NOTE:** THIS PLAN IS A LEGAL DOCUMENT AND SHOULD BE ACCURATE AT THE TIME OF ITS ISSUANCE.
AUTOMATED GROUND WATER MONITORING WELL

STANDARD PLAN L3

NOT TO SCALE
SLIP BASE

FOUNDATION

1/2" wide drain hole in grout pad

GROUT PAD

Pole base plate

ANCHOR BOLT LAYOUT

Anchors bolts:
Install pole base plate directly on leveling nuts and washers.

FIXED BASE

GROUT PAD

Pole base plate

ANCHOR BOLT LAYOUT

Anchors bolts:

FOUNDATION DETAIL

(See Note 1)

LIGHT STANDARD ORIENTATION

SLIP BASE

ELEVATION

Three 1/2" anchor bolts, 6-6" long (see Notes 3 and 4)

6" bolt hole in center of grout pad

6" bolt hole in compost of grout pad

4/4" wide drain hole in grout pad

Pole base plate

SLIP BASE

ELEVATION

1/2" clamping bolts

Hardened washers (TYP)

Keeper plate

Plate washer (TYP)

Pole base plate

6/4" anchor plate

Top of foundation

3/4" chamfer (TYP)

Place grout even with top of foundation after plumbing light standard

Steel Light Standard Base Details

Standard Plan J-1b

Sheet 1 of 3 sheets

Note: This plan is not a legal engineering document but an electronic duplicate
for official record by the engineer and approved for publication as of July 30, 1999
at the Washington State Department of Transportation. A copy may be obtained
upon request.

APPROVED FOR PUBLICATION
Clifford E. Mansfield 10/09/99

State Dept. of Highways

Washington State Department of Transportation

205,000

Copy by: Highways State Dept. of Washington
NOTES:

1. See Standard Plan C-6b for base plate and foundation requirements when light standards are mounted on concrete barriers.

2. Round and smooth all edges along wire-way to protect conductors. See Standard Plan J-1e for wiring details.

3. The top of the anchor rod shall be both threaded and galvanized a minimum of 12". The bottom of the anchor rod shall be threaded a minimum of 12". Galvanizing shall be in accordance with 44SHTO. Wall anchor threads are not allowed.

4. Strap templates shall be held in place by nuts 6" from the top of the foundation, and 12" on bottom of anchor bolts resting on 4" x 5½" square washers.

5. Pole base plate for a slip base design shall be 1¼" 44SHTO M233 Gr. 345. Pole base plate for a fixed base design may be either 1½" 44SHTO M233 Gr. 345 or 1½" 44SHTO M215.

6. Installation of a 50' pole with double mast arms on a slip base is not allowed.
**KEY**

1. Clamping Bolts, 1/2" DIA hex head bolt & nut, three plane washers, 60 ft-lb torque, (three per slip base)
2. Threaded Slotted Stud, see SCHEDULE for DIA, hardened washer and heavy hex nut (four per base plate). Insert stud and center punch at bottom periphery to lock tapped stud in place prior to grouting.
3. Keeper Plate
4. Stop Plate
5. Grout, acrylic, white:
6. Pole Bolt existing
7. Bottom Slip Plate
8. Foundation existing
9. Anchor Plate
10. Anchor Bolt existing, to clear slip plate by 1/4" MIN.
11. "1/2" Fillet weld
12. Heavy hex nut (Typ)
13. Existing ground level
14. Finished ground level
15. Traffic level
16. Roughen surface & apply epoxy resin just before placing

**ASSEMBLY DETAILS**

After bolting bottom slip plate assembly to foundation, fill slotted bolt holes with grout.

Grade around foundation to ensure stub height does not exceed 4".

Removal of the girder base from the existing base plate is required.

Misaligned anchor bolts must be removed and replaced.

**SCHEDULE**

<table>
<thead>
<tr>
<th>Adapter Type</th>
<th>Anchor Bolt DIA</th>
<th>Derivation Order</th>
<th>Existing Base Type</th>
<th>Laydown Plate Width</th>
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<tr>
<td>A-3</td>
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<td>1/2&quot;</td>
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<td>A-4</td>
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<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>11</td>
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<tr>
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<td>1 1/2&quot;</td>
<td>1 1/2&quot;</td>
<td>11</td>
</tr>
</tbody>
</table>

* Use matching diameter for threaded studs
* Contractor shall verify BC in field before ordering. If BC or anchor bolt sizes differ from those listed, contact Bridge and Structures Office.
* Plus or minus 2-3/8"
Install sized reducing washer and connector to secure conductors at end of mast arm.

Single or Double Mast Arm as required.

For Double Mast Arm, install additional cable and quick disconnects.

24" Slack required to allow quick disconnects to be pulled outside handhole 6" MIN.

See Detail A

Junction box

Conductor attachment bracket

Pole and bracket cable to lamp

Handhole

Conductors

Insulating grounding bushing

Bend

Strip outer cable sheath below bracket

Eliminate all slack

Quick disconnects

Insulated grounding bushing

Galvanized steel conduit

WIRING DETAIL LIGHT STANDARD SLIP BASE

*Application for fixed base similar except no cable tie is required at junction box.

TYPICAL JUNCTION BOX LOCATION

Alternate locations allowed provided junction box to base distance does not exceed 10'.

DETAIL A

Conductors

120 Pound tensile strength black cable tie
TYPE A SERVICE, 120 VOLT

See Note 5

Conduit to luminaire, size as required

Photocell control

Bend conduit to pole and strap within 1' above meter

30' Class V treated timber pole

Bend conduit to pole and strap within 1' above cabinet

3" - 6" nipple or wap fitting

ER Conduit Body

Hub and gasket

Service breaker, 120VAC, 1P 15A

TYPE B SERVICE, 120/240 VOLT

See Note 5

Conduit to luminaire, size as required

Photocell control

Bend conduit to pole and strap within 1' above meter

30' Class V treated timber pole

Bend conduit to pole and strap within 1' above cabinet

3" - 6" nipple or wap fitting

Hub and gasket (Typ)

Service cabinet use metal standoffs to mount to pole

TYPE C SERVICE, 480 VOLT

See Note 5

Conduit to luminaire, size as required

Photocell control

Bend conduit to pole and strap within 1' above meter

30' Class V treated timber pole

Bend conduit to allow removal of weatherhead, strap below bend

Conduit and conductors, size to utility requirements

1" conduit, three #12

30' Class V treated timber pole

Bend conduit to pole and strap within 1' above cabinet

3" - 6" nipple or wap fitting

Hub and gasket (Typ)

Service cabinet use metal standoffs to mount to pole

PHOTOELECTRIC CONTROL DETAILS

Two \(\frac{3}{8}'' \times \frac{3}{8}''\) galvanized bolts

Timber pole

Two \(\frac{3}{8}'' \times 3''\) galvanized lag screws

Two \(\frac{3}{4}'' \times \frac{3}{4}''\) brass bolts; drill bracket to fit meter base

Threadless couplings (Typ)

Conduit body

TYPE A, B AND C SERVICE
LIGHTING DETAILS
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 conduit shall be secured to the pole with conduit strap at 5' centers.

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 the meter socket in a separate raintight enclosure.

5. Bend and attach pole within 1' of enclosure. See Standard Plan "Typical Grounding Details."

6. For Type B service wiring diagram, use Standard Plan "Modified Type B Service." For Type C service wiring diagram, use Standard Plan, "Type C Service."

7. See breaker schedule in contract for breaker and contactor sizes.
GENERAL NOTES
1. THE FOLLOWING EQUIPMENT WITHIN THE SERVICE ENCLOSURE SHALL HAVE AN
   APPROPRIATELY ENGRAVED PHENIC NAME PLATE ATTACHED WITH
   SCREWS OR RIVETS. KEY NUMBERS 2, 3, 4, 5, 7, 8 AND 11.
2. 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 CONTRACTOR SHALL VERIFY
   THE SERVING UTILITY'S REQUIREMENTS PRIOR TO INSTALLING THE SERVICE
   EQUIPMENT.
3. A 1/3 TOLERANCE IS ALLOWED IN ALL DIMENSIONS.
4. DIMENSIONS SHOWN ARE NOMINAL AND SHALL BE ADJUSTED TO ACCOMODATE
   THE VARIOUS SIZES OF EQUIPMENT INSTALLED BY THE CONTRACTOR.
5. FOR DETAILS ON SERVICE GROUNDING SEE STD PLAN, "TYPICAL GROUNDING DETAILS."

KEY
① METER BASE - 4 JAW WITH MANUAL BYPASS LEVER
② MAIN BREAKER (SEE BREAKER SCHEDULE)
③ SIGNAL BREAKER (SEE BREAKER SCHEDULE)
④ CONTROL BREAKER (50-15 AMP)
⑤ TEST SWITCH (SPST - 10 AMP - 125 VOLT - "T" RATED)
⑥ PHOTOLECTRICAL CONTROL, STD. SPEC. 9 - 29.11.121
⑦ BRANCH BREAKER (SEE BREAKER SCHEDULE)
⑧ CONTACOR (SEE BREAKER SCHEDULE)
⑨ NEUTRAL BUS
⑩ RECEPTACLE, GROUNDED (20 AMP)
⑪ RECEPTACLE BREAKER (GF-SPST-20 AMP - 125 VOLT - "T" RATED)
⑫ POLISHED WIRE CLASS 16" x 6"
⑬ 8 MM DIAMETER DRAIN HOLE, DRILL BEFORE GALVANIZING.
⑭ MOUNTING HOLE, SEE SERVICE CABINET MOUNTING DETAIL.
⑮ PHOTOCCELL ENCLOSURE - SEE PHOTOCELL ENCLOSURE MOUNTING DETAILS.
⑯ HINGED DEAD FRONT WITH 1/4 TURN FASTENERS.

SERVICE CABINET DETAIL

CABINET OR PANEL WALL
PANI0 MOUNTING PANEL COVER
1/8" x 3/8" NEOPRENE CASKET

DOOR HINGE DETAIL

WIRING SCHEMATIC

EXPRES JUNE 4, 1999

MODIFIED
TYPE B SERVICE

STANDARD PLAN J-3b
**Metal Pole Installation**

(Pedestrian PushButton - Metal Pole)

**Wood Pole Installation**

(Pedestrian PushButton - Wood Pole)

**Cast Aluminum Conduit**

**Pedestrian Pushbutton Details**

---

**Key**

1. Pushbutton switch assembly
2. Cast metal housing
3. Protective collar
4. Pushbutton switch
5. Gasket
6. Stainless steel fastener
7. Cast aluminum conduit
8. Aluminum plug with 3/4" drilled weep hole
9. Aluminum "H" extrusion
10. Chase nipple - 1/4" hex head x 1/2" pipe thread x 2-1/2" long
11. 1/2" x 16 and 2-1/2" stainless steel bolt with washer
12. 1/2" x 4" lag bolt with washer
13. Drill and tap shaft for 1/4" bolt
14. Drill and tap shaft for 1/2" nipple
15. Conduit and fittings as required for timber pole installations; reverse conduit and conduit for top feed
16. 3/8" drilled hole for 1/4" lag bolt

**Note:**

When "PPB-M" or "PPB-W" are specified in the contract, the arrow shall be installed in the opposite direction than as shown for "PPS-M" or "PPS-W".
NOTES

1. Where pad or pedestal mounts are located in a sidewalk, construct mount top flush with sidewalk grade, omitting chamfer where top and sidewalk abut.

2. Pad mount design is typical.

3. Place a silicone seal between the cabinet foundation and the cabinet for the pad mount design.

PEDESTAL BASE DETAILS

- 4" steel pipe
- 3" X 5" handhole with cover
- 3/8" X 2'-0" X 4' steel anchor bolts
- 4" bar at approximately 1'-0" centers
- 4 bars at approximately 1'-0" centers
- 7/8" DIA bolt circle for at least 4 bolt holes
- 3/8" DIA each

CABINET FOUNDATION DETAILS

- 4" pipe flange
- 4" X 9" slipfitter
- 6" min 1/8" diameter plastic drain
- shim to plumb
- see note 3
- #4 hoops
- #4 bar each corner

PAD MOUNT

- 6" Cabinet width 6" + 2"
- 1'-6" Cabinet depth 1'-6"
- Install one spare 2" conduit and caps as required.
- Locate conduits centrally in foundation

ANCHOR BOLTS AND DATA FOR SPACING TO BE SUPPLIED BY CABINET MANUFACTURER.
SIDE MOUNT
TYPE A - PED.
TYPE H - VEHICLE

SIDE MOUNT
TYPE B - PED.
TYPE K - VEHICLE

KEY
1. CENTER PIPE
2. LOCKNIPPLE
3. NIPPLE
4. SERRATED ELBOW
5. SERRATED OR FLANGED ELBOW
6. REAMED TEE WITH SET SCREW
7. REAMED ELBOW WITH SET SCREW
8. BRONZE TERMINAL COMPARTMENT WITH:
   - GASKETED COVER
   - FASTENERS
   - WIRE LEADS
   - MOUNTING SADDLE FOR SIDE MOUNTS
   - 1/2" DIAM. HOLE
   - 1/2" POSITION TERMINAL STRIP
   - WIREWAY FOR SIDE MOUNTS
9. BRONZE COLLAR, 4-1/4" I.D. WITH SET SCREWS
10. CHIMNEY CAP
11. GASKET AND WASHER
12. CONDUIT LOCKNUT
13. TYPE E RING MOUNTING
14. FASTENER WITH Spacer
   - 1/2" LAG SCREWS ON WOOD POLE
   - 1/2" BOLTS TAPPED TO METAL POLE
15. FLATHEAD SOCKET BOLT
16. 1/2" INSERT CAP FOR EXTERNAL WIRE ENTRANCE
   REQUIRED ON TIMBER POLE MOUNTINGS ONLY.

NOTES:
1. SEE CONTRACT FOR HEAD TYPE, MOUNTING HEIGHT AND ORIENTATION.
2. ALL NIPPLES, FITTINGS AND CENTER PIPES SHALL BE 1-1/2" DIAM.
   NOMINAL TRADE SIZE (NEC).
3. INSTALL NEOPRENE GASKET OUTSIDE HEAD WHEN FLANGED ELBOWS
   ARE SUPPLIED.

TOP MOUNT
TYPE D - PED.
TYPE F - VEHICLE

SIGNAL HEAD MOUNTING DETAILS POLE & POST
TOP MOUNTINGS

STANDARD PLAN J-6F

APPROVED FOR PUBLICATION
Clifford E. Mansfield 4/24/98
DEPUTY STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
1. Type M mounting shall have 9/16" ring groove and seal top and bottom of signal attachment.

2. Type M mounting for conventional heads shall have a 2" diameter opening at the signal attachment.

3. Type M mounting for optically programmed heads shall have a 3/4" opening at the signal attachment.

4. Type N mounting with optically programmed heads shall be installed with 1/4" nominal arms.

5. See Standard Plan "Miscellaneous Signal Details" for visor, tether wire, and backplate requirments.
ANCHOR BOLT, NUT, & WASHER SIZES

<table>
<thead>
<tr>
<th>Nгр</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
</tr>
<tr>
<td>TԴ</td>
</tr>
<tr>
<td>4 - 2</td>
</tr>
<tr>
<td>4 - 2</td>
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<tr>
<td>4 - 2</td>
</tr>
<tr>
<td>4 - 2</td>
</tr>
<tr>
<td>4 - 2</td>
</tr>
</tbody>
</table>

TYPE PPB, PS, & I STANDARD DETAILS

2'' CLEARANCE

2'' CLEARANCE

H1 (SQUARE)

H2 (ROUND)

TWO THREADS MIN

3/8'' MAX

1/4'' CHAMFER

PLAN

ELEVATION

SIGNAL STANDARD TYPE DESIGNATIONS

TYPE PPB
PED. PUSH BUTTON POST

TYPE PS
PED. HEAD STANDARD

TYPE I & RM
VEHICLE HEAD AND RAMP METER STANDARD

TYPE FB
FLASHING BEACON STANDARD

TYPE II
MAST ARM STANDARD

TYPE III
LIGHTING AND MAST ARM STANDARD

TYPE IV
STRAIN POLE STANDARD

TYPE V
LIGHTING AND STRAIN POLE STANDARD

TYPE PPB, PS, I, RM & FB STANDARD DIMENSION CHART

<table>
<thead>
<tr>
<th>S</th>
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<tr>
<td>TԴ</td>
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<tr>
<td>4 - 2</td>
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<tr>
<td>8 - 0</td>
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<tr>
<td>10 - 0</td>
</tr>
<tr>
<td>SEE SHEET 2</td>
</tr>
<tr>
<td>SEE SHEET 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASE DIAD</td>
</tr>
<tr>
<td>PLATE THICKNESS</td>
</tr>
<tr>
<td>PLATE WIDTH</td>
</tr>
<tr>
<td>HOLE DIAD</td>
</tr>
<tr>
<td>BOLT DIAD</td>
</tr>
<tr>
<td>FOUNDATION DIAD</td>
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<tr>
<td>FOUNDATION DIAD</td>
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<tr>
<td>NUT &amp; WASHER</td>
</tr>
<tr>
<td>CUSHION PAD DIAD</td>
</tr>
<tr>
<td>PLASTIC DIAD</td>
</tr>
<tr>
<td>VERTICAL BAR</td>
</tr>
<tr>
<td>HORIZ, RE BAR</td>
</tr>
<tr>
<td>HORIZ, RE BAR</td>
</tr>
<tr>
<td>HANDLE DIAD</td>
</tr>
<tr>
<td>CAP DIAD</td>
</tr>
</tbody>
</table>

**TAPERED ROUND OR OCTAGONAL SHAFT, 1" DIA, 4" OD AT SLIPFITTER WELD. TAPER = 0.14 INCHES/FT.**

**LEVELING NUT HEIGHT 1" MAXIMUM. LEVELING NUTS NOT REQUIRED FOR TYPE PPB STANDARD**

Designated by: WA State Department of Transportation
**STRAIN POLE DIMENSION CHART**

<table>
<thead>
<tr>
<th>KEY</th>
<th>ITEM</th>
<th>POLE CLASS (Resultant Horizontal Tension)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1000 lb</td>
</tr>
<tr>
<td>A</td>
<td>Base plate width</td>
<td>15&quot;</td>
</tr>
<tr>
<td>B</td>
<td>Anchor bolt circle diameter</td>
<td>16&quot;</td>
</tr>
<tr>
<td>C</td>
<td>Pole base diameter</td>
<td>10&quot;</td>
</tr>
<tr>
<td>D</td>
<td>Base plate thickness</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>E</td>
<td>Anchor bolt size</td>
<td>1½&quot; x 5&quot;</td>
</tr>
<tr>
<td>F</td>
<td>Anchor plate size</td>
<td>1½&quot; x 3½&quot;</td>
</tr>
<tr>
<td>G</td>
<td>Vertical steel members and size</td>
<td>(Eight #8)</td>
</tr>
</tbody>
</table>

**NOTES**

1. 2½" diameter weatherhead may be substituted for the elbow and nipple assembly.
2. Pole shaft shall have 0.14/ft taper.
4. Handholes may be 6" x 4" oval or rectangle.

---

**CONSTRUCTION DETAIL**

**HANDHOLE DETAIL**

- Steel bolt, long with washer and nut for ground.
- Tap plate F for anchor bolt threads
- #4 hoops, round or square at 1-0" approximate centers

**FOUNDATION DETAIL**

- Steel shown for round
- Base plate shown

---

**ATTACHMENT POINT ANGLES**

- 45°-0" or 50°-0" from light source to base plate (See Contract)
- All handholes 180°-0°
- Luminaires and wireway
- Wireways two per pole (See Detail)
- Strain clamp one per cable connection (See Detail)
- 1½" hole frame
- Handhole cover with gasket
- Filled with 2 stainless steel (ASTM F-593) screws

---

**TYPE V STANDARD**

- 2¼" Split coupling
- 2½" DIA elbow (See Note 1)
- 2½" DIA Chase Nipple
- 2½" DIA Short Nipple

**TYPE IV STANDARD**

- Wireway detail
- Mast arm length as noted in Contract
- 40°-0" or 50°-0" from light source to base plate (See Contract)

---

**STRAIN POLE STANDARDS TYPE IV AND V**

- STANDARD PLAN J-7c
- APPROVED FOR PUBLICATION
- Clifford E. Mansfield
  6/1998
- WA STATE DEPARTMENT OF TRANSPORTATION
TYPICAL CONDUIT PLACEMENT FOR LOOP LEAD-IN WIRES

<table>
<thead>
<tr>
<th>Loop lead pairs</th>
<th>1-2</th>
<th>3</th>
<th>4-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduit size (MIN)</td>
<td>1&quot;</td>
<td>1/4&quot;</td>
<td>1/2&quot;</td>
<td>2&quot;</td>
<td>3&quot;</td>
</tr>
</tbody>
</table>

**TABLE A**

Scotchcast epoxy B2A or B2A-L splice kit

Soldered compression connection

Splice detail

---

LEAD-IN SAWCUTS AND CONDUIT PLACEMENT DETAIL

INDUCTION LOOP DETAILS

**J-8a**

08-01-97
LOOP INSTALLATION NOTES
1. Install junction box and lead-in conduit.
2. Saw loop slots and lead-in slots.
3. Lay out loop wire beginning at junction box, allowing 6’ minimum slack.
4. Install wire in loop slot. See Loop Winding Details.
5. Return to junction box and identify leads with plan detector number and “S” for start and “F” for finish.
6. Twist each pair of lead-in wires two turns per foot from loop to junction box and install in lead-in slot and conduit. Reverse direction of twist for each successive pair installed.
7. Construct supplemental splice containing any series or parallel loop connections required in plans. Supplemental splices are subject to the same requirements shown for the loop lead and shielded cable splice.
8. Splice loop leads or supplemental splice leads to shielded cable as noted.
9. Complete installation and test loop circuits or combination loop circuits.
10. Front of loop should be measured from back of stop bar, or back of crosswalk where no stop bar is installed.
11. Seal ends of conduit.

INDUCTION LOOP DETAILS
1. Sealant
2. Twisted polypropylene rope (Size for snug fit)
3. Loop wire - number varies (See Loop Winding Details)
4. Lead-in wires: One pair for each loop served, three pairs maximum per sawcut (See Installation notes)
5. Extend sawcut sufficient length to provide full sawcut depth around corners
1. If parallel circuits of different sizes are contained in one conduit, the size of the grounding conductor shall be determined on the basis of the largest conductor. Only one grounding conductor is required for each conduit regardless of the number of circuits contained.

2. Service ground per serving utility requirement. If the utility uses aluminum service conductors, an approved Al-Cu pressure type ground connector shall be used to secure the service neutral to the copper neutral bar in the service enclosure. Except for the above, all grounding conductors shall be copper.

3. Equipment grounding conductors and grounding electrode conductors shall be sized in accordance with the National Electric Code (No. 8 minimum).

Required to supplement equipment grounding for luminaire standards with direct burial, aerial feeds, or where required in plans.

Ground Rod Details

Supplemental Ground

Service Ground

Typical Grounding Details

Standard Plan J-90

NOTE: This plan is not a legal engineering document and is not intended for inspection. Issued by the Engineer and approved for publication without certification by the Department of Transportation. A copy may be obtained upon request.

Clifford E. Mansfield
Deputy State Design Engineer

APPROVED FOR PUBLICATION
4/24/98

State of Washington Department of Transportation
TYPICAL GROUNDING DETAILS

GROUND ROD DETAILS

Required at all services and separately derived systems.

Ground Rod

Edge of Foundation, Pole or Service Support

Clamp

Junction Box or 8” Drain Tile with Approved Cover

Code Size GSC

To Service Neutral Bus

To Grounding Terminal or Connection to Equipment Grounding System
1. Sign sequence is the same for both directions of travel, adjusted for direction of roadway curves.

2. Steady burning warning lights (Type C, MUTCD) may be used to mark channelizing devices at night as needed.

3. Either reverse cone taper or sign GZ2-2a may be used to show end of work area.

4. Other curve or turn warning signs may be substituted for sign W1-3l and W1-3r to depict roadway alignment as appropriate.

<table>
<thead>
<tr>
<th>SPEED (MPH)</th>
<th>X TAPER</th>
<th>X TANGENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>35/50</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>35/40</td>
<td>35</td>
<td>350</td>
</tr>
<tr>
<td>25/30</td>
<td>40</td>
<td>700</td>
</tr>
</tbody>
</table>

Buffer Data

<table>
<thead>
<tr>
<th>Speed (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (FT)</td>
<td>55</td>
<td>85</td>
<td>120</td>
<td>170</td>
<td>220</td>
<td>280</td>
</tr>
</tbody>
</table>

Buffer Vehicle Roll Ahead Distance

<table>
<thead>
<tr>
<th>4 Yard Dump Truck</th>
<th>Stationary Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>24,000 LBS</td>
<td>R (FT) = 100</td>
</tr>
</tbody>
</table>
1. Floodlights shall be provided to mark flagger stations at night.

2. If entire work area is visible from one station, one flagger may be used, otherwise two flaggers and signing will be required each direction.

3. Sign sequence is the same for both directions of travel.

4. See Buffer Data Table. Use of buffer vehicle is recommended. It may be a work vehicle. If buffer vehicle is used, minimum from end of taper to work area shall be total of "R" (roll ahead distance) plus length of vehicle, plus "B" (buffer space). If buffer vehicle is not used, minimum distance shall be "B".

5. Steady burning warning lights (Type C, MUTCD) should be used to mark channelizing devices at night as needed.

6. Either reverse cone taper or sign G20-2a may be used to show end of work area.

---

**BUFFER DATA**

<table>
<thead>
<tr>
<th>Speed (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (FT)</td>
<td>55</td>
<td>65</td>
<td>75</td>
<td>80</td>
<td>90</td>
<td>100</td>
</tr>
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</table>

**Buffer Vehicle Roll Ahead Distance**

- 4 Yard Dump Truck
- 24,000 LBS
- Stationary Operation
- R (FT) = 100

**SIGN SPACING TABLE**

<table>
<thead>
<tr>
<th>Speed</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>45/50 MPH</td>
<td>500 ft</td>
</tr>
<tr>
<td>35/40 MPH</td>
<td>300 ft</td>
</tr>
<tr>
<td>25/30 MPH</td>
<td>200 ft</td>
</tr>
</tbody>
</table>

**CHANNELIZING DEVICE SPACING (FT)**

<table>
<thead>
<tr>
<th>MPH</th>
<th>Taper</th>
<th>Tangent</th>
</tr>
</thead>
<tbody>
<tr>
<td>35/50</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>25/30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

**FOR LOCAL AGENCY USE**

Traffic Control Plan

Typical application of traffic control devices on a two-lane highway where one lane is closed and flagging is provided.

K-2 03-07-97
NOTE:
1. Regulatory traffic control devices to be modified as needed for the duration of the detour.
2. Flashing warning lights (Type A, MUTCD) shall be used to mark barricades at night as needed.
3. Detour trailblazers shall be installed as necessary throughout detour route.

SIGN SPACING TABLE

<table>
<thead>
<tr>
<th>Speed</th>
<th>Sign Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>45/50 MPH</td>
<td>500'</td>
</tr>
<tr>
<td>35/40 MPH</td>
<td>350'</td>
</tr>
<tr>
<td>25/30 MPH</td>
<td>200'</td>
</tr>
</tbody>
</table>

LEGEND

Type III Barricade

Typical application - Roadway closed beyond detour point
For local agency use

Traffic control plan

Buffer vehicle roll ahead distance

Buffer Data

<table>
<thead>
<tr>
<th>Speed (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (FT)</td>
<td>65</td>
<td>85</td>
<td>100</td>
<td>110</td>
<td>120</td>
<td>130</td>
</tr>
</tbody>
</table>

Buffer vehicle roll ahead distance

4 Yard Dump Truck
24,000 LBS

For local agency use

Legend:

--- Channelizing devices
--- Collateralized markings (see notes)
--- Sequential arrow sign
--- Sequential arrow sign

Typical application of traffic control devices where directional traffic volumes are uneven.
**Channelizing Device Spacing (FTI)**

<table>
<thead>
<tr>
<th>MPH</th>
<th>Taper</th>
<th>Tangent</th>
</tr>
</thead>
<tbody>
<tr>
<td>35/50</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25/30</td>
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</tbody>
</table>

**Buffer Data**

**Buffer Space**

<table>
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<th>35</th>
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<th>45</th>
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<tbody>
<tr>
<td>B (FT)</td>
<td>55</td>
<td>85</td>
<td>120</td>
<td>170</td>
<td>220</td>
<td>280</td>
</tr>
</tbody>
</table>

**Buffer Vehicle Roll Ahead Distance**

<table>
<thead>
<tr>
<th>4 Yard Dump Truck</th>
<th>24,000 LBS</th>
<th>Stationary Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (FT)</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**Minimum Taper Length = L in Feet**

<table>
<thead>
<tr>
<th>Lane Width (feet)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
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<tbody>
<tr>
<td>10</td>
<td>105</td>
<td>150</td>
<td>205</td>
<td>270</td>
<td>450</td>
<td>500</td>
</tr>
<tr>
<td>11</td>
<td>115</td>
<td>165</td>
<td>225</td>
<td>295</td>
<td>495</td>
<td>550</td>
</tr>
<tr>
<td>12</td>
<td>125</td>
<td>180</td>
<td>245</td>
<td>320</td>
<td>540</td>
<td>600</td>
</tr>
</tbody>
</table>

**Legend**

- Channelizing Devices
- Sequential Arrow Sign

Typical application - daytime operation of short duration on a four-lane divided roadway where one lane is closed.
NOTES:

1. Flashing warning lights and/or flags shall be used to call attention to early warning signs when specified in contract.

2. See Buffer Data Table. Use of buffer vehicle is recommended. It may be a work vehicle. If buffer vehicle is used, minimum distance from end of taper to work area shall be total of "R" (roll ahead distance) plus length of vehicle, plus "B" (buffer space). If buffer vehicle is not used, minimum distance shall be "B".

BUFFER DATA

<table>
<thead>
<tr>
<th>Buffer Space</th>
<th>Speed (MPH)</th>
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<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (FT)</td>
<td></td>
<td>55</td>
<td>85</td>
<td>120</td>
<td>170</td>
<td>220</td>
<td>280</td>
</tr>
<tr>
<td>Buffer Vehicle Roll Ahead Distance</td>
<td>4 Yard Bump Truck</td>
<td>24,000 LBS</td>
<td>Stationary Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R (FT)</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MINIMUM TAPER LENGTH = L IN FEET

<table>
<thead>
<tr>
<th>Low Point Feet</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>105</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>350</td>
</tr>
<tr>
<td>11</td>
<td>115</td>
<td>165</td>
<td>215</td>
<td>265</td>
<td>315</td>
<td>365</td>
</tr>
<tr>
<td>12</td>
<td>125</td>
<td>180</td>
<td>230</td>
<td>280</td>
<td>330</td>
<td>380</td>
</tr>
</tbody>
</table>

SIGN SPACING TABLE

<table>
<thead>
<tr>
<th>Speed (MPH)</th>
<th>45/50</th>
<th>35/40</th>
<th>25/30</th>
</tr>
</thead>
<tbody>
<tr>
<td>500'</td>
<td>500'</td>
<td>350'</td>
<td>200'</td>
</tr>
</tbody>
</table>

CHANNELIZING DEVICE SPACING (FT):

<table>
<thead>
<tr>
<th>MPH</th>
<th>Taper</th>
<th>Tangent</th>
</tr>
</thead>
<tbody>
<tr>
<td>35/50</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25/30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

LEGEND

- - - Channelizing Devices
- - - - - - - - - - - - - - Sequential Arrow Sign

Typical Application - Closing two lanes of a multi-lane highway.
1. Flashing warning lights (Type 4, MUTCD) should be used to mark barricades at night, as needed.
2. Conflicting pavement markings and those no longer applicable shall be removed or obliterated.
3. Prohibit turns as necessary for traffic conditions.

**BUFFER DATA**

<table>
<thead>
<tr>
<th>Buffer Space</th>
<th>Speed (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft</td>
<td>55</td>
<td>85</td>
<td>120</td>
<td>170</td>
<td>220</td>
<td>280</td>
<td></td>
</tr>
</tbody>
</table>

**MINIMUM TAPER LENGTH = L IN FEET**

<table>
<thead>
<tr>
<th>Lane Width (feet)</th>
<th>Taper Speed (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>105 150 205 270</td>
</tr>
<tr>
<td>11</td>
<td>115 165 225 295</td>
</tr>
<tr>
<td>12</td>
<td>125 180 245 320</td>
</tr>
</tbody>
</table>

**FOR LOCAL AGENCY USE**

<table>
<thead>
<tr>
<th>CHANNELIZING DEVICE SPACING (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPH</td>
</tr>
<tr>
<td>35/50</td>
</tr>
<tr>
<td>25/30</td>
</tr>
</tbody>
</table>

**TRAFFIC CONTROL PLAN**

<table>
<thead>
<tr>
<th>SIGN SPACING TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
</tr>
<tr>
<td>45/50 MPH</td>
</tr>
<tr>
<td>35/40 MPH</td>
</tr>
<tr>
<td>25/30 MPH</td>
</tr>
</tbody>
</table>

Typical application - Work area near an intersection, allowing right turns.
1. Flashing warning lights (Type A, MUTCD) should be used to mark barricades at night as needed.

2. Steady burning warning lights (Type C, MUTCD) should be used to mark channelizing devices at night as needed.

3. Conflicting pavement markings and those no longer applicable shall be removed or obliterated.

4. Prohibit turns as necessary for traffic conditions.

---

**Minimum Taper Length = \( L \) in Feet**

<table>
<thead>
<tr>
<th>Lane Width (feet)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>16</td>
<td>22</td>
<td>25</td>
<td>29</td>
<td>49</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>18</td>
<td>24</td>
<td>25</td>
<td>32</td>
<td>54</td>
</tr>
</tbody>
</table>

**Sign Spacing Table**

<table>
<thead>
<tr>
<th>Speed</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>45/50 MPH</td>
<td>500' +</td>
</tr>
<tr>
<td>35/40 MPH</td>
<td>350' +</td>
</tr>
<tr>
<td>25/30 MPH</td>
<td>200' +</td>
</tr>
</tbody>
</table>

**Channelizing Device Spacing (ft)**

<table>
<thead>
<tr>
<th>MPH</th>
<th>Taper</th>
<th>Tangent</th>
</tr>
</thead>
<tbody>
<tr>
<td>35/50</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25/30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>
NOTES

1. Conflicting pavement markings and those no longer applicable shall be removed or obliterated.

2. Exposed ends of concrete barriers must be maintained outside the clear zone and adequately flared or fitted with impact attenuators.

   Flare formula:
   \[
   50 \text{ MPH} \quad \text{--- 12ft}
   45 \text{ MPH} \quad \text{--- 10ft}
   40 \text{ MPH} \quad \text{--- 8ft}
   \]

3. The advance warning sign series W20-1, W20-5(R), and W4-2(L) shall be repeated in median where sufficient width exists.

4. Steady burning warning lights (TYPE C, W8203D) shall be used to mark channelizing devices at night.

<table>
<thead>
<tr>
<th>CHANNELIZING DEVICE SPACING (FT)</th>
<th>Speed</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MPH</td>
<td>Taper</td>
</tr>
<tr>
<td>45/50 MPH</td>
<td>500'</td>
<td></td>
</tr>
<tr>
<td>35/50 MPH</td>
<td>350'</td>
<td></td>
</tr>
<tr>
<td>25/30 MPH</td>
<td>200'</td>
<td></td>
</tr>
</tbody>
</table>

SIGN SPACING TABLE

TRAFFIC CONTROL PLAN

MINIMUM TAPER LENGTH = L IN FEET

<table>
<thead>
<tr>
<th>Lane Width (feet)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>105</td>
<td>150</td>
<td>200</td>
<td>270</td>
<td>450</td>
<td>500</td>
</tr>
<tr>
<td>11</td>
<td>115</td>
<td>165</td>
<td>225</td>
<td>295</td>
<td>495</td>
<td>550</td>
</tr>
<tr>
<td>12</td>
<td>125</td>
<td>180</td>
<td>245</td>
<td>320</td>
<td>540</td>
<td>600</td>
</tr>
</tbody>
</table>
1. No encroachment on traveled lane. If encroachment is necessary, lane must be closed.

2. See Buffer Data Table. Use of buffer vehicle is recommended. It may be a work vehicle. If buffer vehicle is used, minimum distance from end of taper to work area shall be total of "R" (roll ahead distance) plus length of vehicle, plus "B" (buffer space). If buffer vehicle is not used, minimum distance shall be "B".

<table>
<thead>
<tr>
<th>Buffer Space</th>
<th>Speed (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25</td>
</tr>
<tr>
<td>B (FT) =</td>
<td>55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Buffer Vehicle Roll Ahead Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Yard Dump Truck</td>
</tr>
<tr>
<td>24,000 LBS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yard</th>
<th>Stationary Operation</th>
<th>Moving Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
<td>175</td>
</tr>
</tbody>
</table>

**CHANNELIZING DEVICE SPACING (FT)**

<table>
<thead>
<tr>
<th>Speed</th>
<th>MPH</th>
<th>Taper</th>
<th>Tangent</th>
</tr>
</thead>
<tbody>
<tr>
<td>45/50 MPH</td>
<td>35/50</td>
<td>30</td>
<td>80</td>
</tr>
<tr>
<td>35/40 MPH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25/30 MPH</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MINIMUM TAPER LENGTH = L IN FEET**

<table>
<thead>
<tr>
<th>Lane Width (Feet)</th>
<th>Posted Speed (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>30 150 200 270 450 500</td>
</tr>
<tr>
<td>10</td>
<td>165 225 295 495 550</td>
</tr>
<tr>
<td>11</td>
<td>125 180 245 320 340</td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>
1. See Buffer Data Table. Use of buffer vehicle is recommended. It may be a work vehicle. If buffer vehicle is used, minimum distance from end of taper to work area shall be total of “R” (roll ahead distance) plus length of vehicle, plus “B” buffer space. If vehicle is not used, minimum distance shall be “B.”

Buffer vehicle with beacon (optional) (See Note 1)

or reverse cone taper to show end of work area

**For Local Agency Use**

**TRAFFIC CONTROL PLAN**

**BUFFER DATA**

<table>
<thead>
<tr>
<th>Speed (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (FT)</td>
<td>55</td>
<td>85</td>
<td>120</td>
</tr>
</tbody>
</table>

Buffer Vehicle Roll Ahead Distance

<table>
<thead>
<tr>
<th>4 Yard Dump Truck</th>
<th>Stationary Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>24,000 LBS</td>
<td>R (FT) = 100</td>
</tr>
</tbody>
</table>

**CHANNELIZING DEVICE SPACING (FT)**

<table>
<thead>
<tr>
<th>MPH</th>
<th>Taper</th>
<th>Tangent</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25/30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

**MINIMUM TAPER LENGTH = L IN FEET**

<table>
<thead>
<tr>
<th>Lane Width (Feet)</th>
<th>Posted Speed (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>30, 35</td>
</tr>
<tr>
<td>10</td>
<td>105, 150, 205</td>
</tr>
<tr>
<td>11</td>
<td>115, 165, 225</td>
</tr>
<tr>
<td>12</td>
<td>125, 180, 245</td>
</tr>
</tbody>
</table>

**SIGN SPACING TABLE**

<table>
<thead>
<tr>
<th>Speed</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>350’</td>
</tr>
<tr>
<td>25/30</td>
<td>200’</td>
</tr>
</tbody>
</table>

**LEGEND**

- Channelizing Devices

Typical application - shoulder work on urban street with minor encroachment on traveled lane.

EFFECTIVE: JANUARY 7, 2002 TO AUGUST 4, 2002
WIRE FENCE - TYPE 1

Concrete Class 3000
12" Round section
14' MAX
18" Square section

Two strand 12½ gauge four pointed barbed wire
60° MIN. 65° MAX

Line post
Vertical clinch stay
Gate or end post

Pull post

Brace

LINE BRACE
(Maximum spacing 1000 feet)

Concrete Class 3000
12" Round section

18" Square section

See Note 3

Stone or concrete block
(MIN weight 100 pounds)
or drilled and grouted
hole in solid rock

TREATMENT OF SAGS
14' MAX

WIRE FENCE - TYPE 2

Concrete Class 3000
12" Round section
14' MAX
18" Square section

Two strand 12½ gauge four pointed barbed wire
60° MIN. 65° MAX

Line post
Vertical clinch stay
Gate or end post

Corner post
Brace

CORNER BRACE
(Angles 30° and over)

Concrete Class 3000

INTERSECTING FENCE BRACE

WIRE FENCE

STEEL POST DETAILS
Details for Type 2 Fence identical
as shown for Type 1 Fence

L-1
07-18-97
SINGLE WIRE GATE, 14' WIDE

DOUBLE WIRE GATE, 20' WIDE

CORNER BRACE
(Angles 30° and over)

INTERSECTING FENCE BRACE

END BRACE

LINE BRACE
(Maximum spacing 1000 feet)

WOOD POST DETAILS

WIRE FENCE

NOTES:
1. Details for Type 2 Fence, same as Type 1.
2. Wood anchors shall be 2x4 lumber, 12" long MLA, fastened with three 16d galvanized nails.
3. Four wire clamps per post required for mesh wire. Three additional clamps per post required in sag section.

L-1
07-18-97
Sheet 2 of 2 Sheets
**MEMBER**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>ROUND</th>
<th>H-COLUMN</th>
<th>ROLL FORMED</th>
<th>ROUND</th>
<th>H-COLUMN</th>
<th>ROLL FORMED</th>
<th>ROUND</th>
<th>ROLL FORMED</th>
<th>ROUND</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.D. Pipe (Inches)</td>
<td>Weight Per Foot (Pounds)</td>
<td>Size (Inches)</td>
<td>Weight Per Foot (Pounds)</td>
<td>Size (Inches)</td>
<td>I.D. Pipe (Inches)</td>
<td>Weight Per Foot (Pounds)</td>
<td>Size (Inches)</td>
<td>Weight Per Foot (Pounds)</td>
<td>Size (Inches)</td>
<td>Weight Per Foot (Pounds)</td>
</tr>
<tr>
<td>1</td>
<td>1 1/4</td>
<td>2.27</td>
<td>1 1/4 x 1 3/4</td>
<td>0.35</td>
<td>1 1/2 x 1 3/4</td>
<td>0.35</td>
<td>2</td>
<td>3.65</td>
<td>2 1/4</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>1 1/4</td>
<td>2.27</td>
<td>1 1/4 x 1 1/4</td>
<td>0.35</td>
<td>1 1/4 x 1 1/4</td>
<td>0.35</td>
<td>1/2</td>
<td>2.72</td>
<td>1 1/4</td>
<td>2.72</td>
</tr>
<tr>
<td>4</td>
<td>1 1/4</td>
<td>2.27</td>
<td>1 1/4 x 1 1/4</td>
<td>0.35</td>
<td>1 1/4 x 1 1/4</td>
<td>0.35</td>
<td>1/2</td>
<td>2.72</td>
<td>1 1/4</td>
<td>2.72</td>
</tr>
<tr>
<td>6</td>
<td>1 1/4</td>
<td>2.27</td>
<td>1 1/4 x 1 1/4</td>
<td>0.35</td>
<td>1 1/4 x 1 1/4</td>
<td>0.35</td>
<td>2</td>
<td>3.65</td>
<td>2 1/4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**NOTES:**

All concrete post bases shall be 10" minimum diameter.

All posts shall be spaced at 10' maximum intervals unless otherwise directed by the Engineer.

Top or bottom tension wires shall be placed within the limits of the first full fabric weave.

Details are illustrative and shall not limit hardware design or post selection of any particular fence type.
1. Fence fabric shall be secured to gate frames with knuckled selvage along top edge for Types 4 & 6 chain link fence installations.

2. Minimum post lengths:
   Types 1 & 3 8'-8"'
   Types 4 & 6 5'-6"'

CHAIN LINK GATES
NOTES

1. Posts shall be 6 x 8 wood or 6 x 9 steel. See Standard Plan "Beam Guardrail Posts and Blocks".

2. Padlocked end shall be determined by the Project Engineer. Lock shall not be provided.