Standard Plans

M 21-01

August 1, 2011
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Washington State Department of Transportation
Administrative and Engineering Publications
PO Box 47304
Olympia, WA 98504-7304
Foreword

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

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

Contact the Design Standards Team at:

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

Design Standards
Transportation Building
Olympia, WA 98504-7329.

Further information, as well as Bentley MicroStation (.dgn) CAD files, Adobe Acrobat (.pdf) files, and some AutoCAD (.dwg) CAD files, can be found on the Design Standards website at:

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Pasco Bakotich III
State Design Engineer
**Comments**

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**Subject:** Standard Plans Manual Comment

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<td>6/3/11</td>
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<tr>
<td>M-24.20-01</td>
<td>Symbol Markings: Traffic Arrows for High Speed Roadways</td>
<td>5/31/06</td>
<td>3 Sheets</td>
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<tr>
<td>M-24.40-01</td>
<td>Symbol Markings: Traffic Arrows for Low Speed Roadways</td>
<td>5/31/06</td>
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<td>M-24.50-00</td>
<td>Roundabout Traffic Arrows</td>
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<tr>
<td>M-24.60-03</td>
<td>Symbol Markings: Miscellaneous</td>
<td>5/11/11</td>
<td>2 Sheets</td>
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<tr>
<td>M-40.10-02</td>
<td>Guide Posts and Barrier Delineators</td>
<td>5/11/11</td>
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<tr>
<td>M-40.20-00</td>
<td>Guide Post Placement: Interchanges</td>
<td>10/12/07</td>
<td></td>
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<tr>
<td>M-40.30-00</td>
<td>Guide Post Placement: Grade Intersections</td>
<td>9/20/07</td>
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<tr>
<td>M-40.40-00</td>
<td>Guide Post Placement: Horizontal Curves</td>
<td>9/20/07</td>
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<tr>
<td>M-40.50-00</td>
<td>Guide Post Placement: Bridges</td>
<td>9/20/07</td>
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<td>M-40.60-00</td>
<td>Guide Post Placement: Miscellaneous</td>
<td>9/20/07</td>
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<tr>
<td>M-60.10-01</td>
<td>Shoulder Rumble Strip Type 1, for Divided Highways</td>
<td>6/3/11</td>
<td>4 Sheets</td>
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<tr>
<td>M-60.20-02</td>
<td>Shoulder Rumble Strip, Types 2, 3, and 4, for Undivided Highways</td>
<td>6/27/11</td>
<td>2 Sheets</td>
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<td>M-65.10-02</td>
<td>Center Line Rumble Strip</td>
<td>5/11/11</td>
<td>2 Sheets</td>
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<tr>
<td>M-80.10-01</td>
<td>Traffic Letter and Numeral Applications</td>
<td>6/3/11</td>
<td>2 Sheets</td>
</tr>
<tr>
<td>M-80.20-00</td>
<td>Traffic Letters and Numerals (High Speed Roadways)</td>
<td>6/10/08</td>
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<td>M-80.30-00</td>
<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
<td></td>
</tr>
</tbody>
</table>
SURVEY STAKES

STANDARD PLAN A-10.10-00

LATTICE FOR SLOPE REFERENCES

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. The Brass Disc will be furnished by the State.
2. The text in the shaded area (see TOP VIEW) shall be 3/16" high and will be stamped by WSDOT personnel prior to setting the cap. Only the assigned identification letters and numbers are to be placed on the Brass Disc.
3. The hole shall be 32" minimum in depth or 6" below the deepest recorded frost line. All loose material shall be removed from the bottom of the hole so that the concrete is placed on firm undisturbed earth.
4. The top of the concrete shall be troweled smooth and the Brass Disc set in the center with top flush and level. The top of the monument may be recessed or protruding, depending on conditions.
5. The Brass Disc shall be rotated so it can be read while the observer is facing north.
6. When the concrete is set, cover the entire monument with moist earth and leave for three days.
7. To replace a Public Land Survey System (PLSS) corner, consult a licensed Professional Land Surveyor (PLS).
Dimensions may vary according to manufacturer.

Base to be placed on a well-compacted foundation.

Monument case to be installed by contractor.

See Standard Plan A-10.20 for Monument (brass disc) type to place in 2" O.D. galvanized pipe.
Slope treatment shall be constructed simultaneously with the roadway excavation. Hand trimming will not be required if satisfactory results are obtained with mechanical equipment.

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

2. Slope treatment is not required if:
   - The slope is steeper than 5:1.
   - The slope is a natural slope.
   - The slope is a stable slope.
   - The slope is a cut slope.

The table below provides the recommended dimensions for various slope angles and classes:

<table>
<thead>
<tr>
<th>Cut Slope (H:V)</th>
<th>Ground Line (H:V)</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5:1</td>
<td>1.5:1</td>
<td>1.5:1</td>
<td>1.5:1</td>
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<tr>
<td>2:1</td>
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<td>2:1</td>
<td>2:1</td>
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<tr>
<td>3:1</td>
<td>3:1</td>
<td>3:1</td>
<td>3:1</td>
</tr>
<tr>
<td>4:1</td>
<td>4:1</td>
<td>4:1</td>
<td>4:1</td>
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<tr>
<td>5:1</td>
<td>5:1</td>
<td>5:1</td>
<td>5:1</td>
</tr>
<tr>
<td>6:1</td>
<td>6:1</td>
<td>6:1</td>
<td>6:1</td>
</tr>
</tbody>
</table>

- Slope treatment is not required if:
  - The slope is steeper than 5:1.
  - The slope is a natural slope.
  - The slope is a stable slope.
  - The slope is a cut slope.

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

The table below provides the recommended dimensions for various slope angles and classes:

<table>
<thead>
<tr>
<th>Cut Slope (H:V)</th>
<th>Ground Line (H:V)</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5:1</td>
<td>1.5:1</td>
<td>1.5:1</td>
<td>1.5:1</td>
</tr>
<tr>
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<td>2:1</td>
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<tr>
<td>3:1</td>
<td>3:1</td>
<td>3:1</td>
<td>3:1</td>
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<tr>
<td>4:1</td>
<td>4:1</td>
<td>4:1</td>
<td>4:1</td>
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<tr>
<td>5:1</td>
<td>5:1</td>
<td>5:1</td>
<td>5:1</td>
</tr>
<tr>
<td>6:1</td>
<td>6:1</td>
<td>6:1</td>
<td>6:1</td>
</tr>
</tbody>
</table>

- Slope treatment is not required if:
  - The slope is steeper than 5:1.
  - The slope is a natural slope.
  - The slope is a stable slope.
  - The slope is a cut slope.
EMBANKMENT SLOPE PROTECTION 6" BEYOND OUTER EXTREMITY OF BRIDGE

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

10 GAUGE 6" × 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE (SEE STD. SPEC. 9-07.7)

BOTTOM EDGE OF SLOPE PROTECTION FOLLOWS BOTTOM OF DITCH EDGE OF SHOULDER

TYPICAL SECTION (SHOWN ON LOWER ROADWAY)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

EXISTING SOIL

BOTTOM EDGE OF SLOPE PROTECTION FOLLOWS BOTTOM OF DITCH

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

EXISTING SOIL

10 GAGE 6" × 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE (SEE STD. SPEC. 9-07.7)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

EXISTING SOIL

TYPICAL SECTION (SHOWN ON LOWER ROADWAY)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

EXISTING SOIL

10 GAGE 6" × 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE (SEE STD. SPEC. 9-07.7)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

EXISTING SOIL

TYPICAL SECTION (SHOWN ON LOWER ROADWAY)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

EXISTING SOIL

10 GAGE 6" × 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE (SEE STD. SPEC. 9-07.7)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

EXISTING SOIL

TYPICAL SECTION (SHOWN ON LOWER ROADWAY)
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 Curb Section shall be used only when the lower roadway cross section requires a curb.
### Notes:

1. Minimum anchor spacing \((A)\) for debris and impact loads required as portable for a minimum allowable anchor capacity of 20,000 lbs. Systems subjected to snow loads may require narrower maximum spacing.

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

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

4. All wire rope loops shall include a standard weight thimble.

---

**Wire Mesh Slope Protection**

**Standard Plan A-30.30-01**

<table>
<thead>
<tr>
<th>Maximum Anchor Spacing ((A))</th>
<th>(H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 50'</td>
<td>20</td>
</tr>
<tr>
<td>50'  - 100'</td>
<td>30</td>
</tr>
<tr>
<td>100'  - 200'</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Length of Top Horizontal Support Rope ((B))</th>
<th>(H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 400'</td>
<td>50</td>
</tr>
<tr>
<td>400'  - 500'</td>
<td>60</td>
</tr>
</tbody>
</table>

---

**Key Details**

- **3" Fabric Overlap**
  - overlapped seams with fasteners
  - overlapped seams with lacing

- **Seam Alternatives**

- **Wire Rope Clips**
  - 3" Fabric Overlap

- **Wire Rope Detail**
  - Distances \(X, Y, Z\) and torque to comply with manufacturers specifications.

- **Anchor Wire Rope Clips**
  - 3" Fabric Overlap

- **Slope Protection Anchor**
  - see standard plan A-30.30.01

---

**Effective:** August 1, 2011 to August 5, 2012

---

**Pasco Bakotich III**

06-16-11
## Typical Isolation Joint Guidelines

<table>
<thead>
<tr>
<th>Condition</th>
<th>Feature</th>
<th>Minimum Distance to Pavement Edge</th>
<th>Distance From Nearest Transverse Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Catch Basin or Combination Grate</td>
<td>Line</td>
<td>–</td>
</tr>
<tr>
<td>B</td>
<td>Catch Basin or Combination Grate</td>
<td>Line</td>
<td>–</td>
</tr>
<tr>
<td>C</td>
<td>Catch Basin or Combination Grate</td>
<td>Line</td>
<td>–</td>
</tr>
<tr>
<td>D</td>
<td>Grate Inlet – Catch Basin or Concrete Inlet</td>
<td>–</td>
<td>&gt; 4 ft from Joint</td>
</tr>
<tr>
<td>E</td>
<td>Grate Inlet – Catch Basin or Concrete Inlet</td>
<td>–</td>
<td>&gt; 4 ft from Joint</td>
</tr>
<tr>
<td>F</td>
<td>Grate Inlet – Catch Basin or Concrete Inlet</td>
<td>–</td>
<td>&gt; 4 ft from Joint</td>
</tr>
<tr>
<td>G</td>
<td>Manhole or Catch Basin Type 2</td>
<td>Line</td>
<td>–</td>
</tr>
<tr>
<td>H</td>
<td>Manhole or Catch Basin Type 2</td>
<td>Line</td>
<td>–</td>
</tr>
<tr>
<td>I</td>
<td>Manhole or Catch Basin Type 2</td>
<td>Line</td>
<td>–</td>
</tr>
<tr>
<td>J</td>
<td>Manhole or Catch Basin Type 2</td>
<td>Line</td>
<td>&gt; 4 ft from Joint</td>
</tr>
</tbody>
</table>

* With rectangular grate cast into adjustment section.
1. Use the 1/2" joint details for bridges with a length less than 100' and for bridges with L type abutments. Use the 1" joint details for other applications. Use DETAIL 8 on steel trusses and timber bridges with concrete deck panels.

2. Sawcut shall be filled with hot-poured compound in accordance with Standard Specification 9-04.2(1) and sealed in accordance with Standard Specification 5-05.3(8B).

3. The contractor shall avoid sawing existing concrete. The construction tolerance to locate the saw cut is 35/64" (0 min. to 1/2" max.) from the existing concrete (DETAILS 1 and 5).
NOTICE

Paint the metal components of the approach expansion anchor with one coat of medium gray and two coats of primer to either standard specification section B-68 or B-148 or be galvanized in accordance with AASHTO M 232.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
A typical bridge overlay will remove 0.07 feet of Asphaltic Concrete Pavement (ACP) and place 0.15 feet of new Hot Mixed Asphalt (HMA). Depth of removal and placement will vary for each bridge. Total depth of HMA on the bridge shall not exceed 0.25 feet, unless shown otherwise in the plans.

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

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

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

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

NOTES

1. HMA OVERLAY WITHOUT BRIDGE APPROACH SLAB

2. HMA OVERLAY WITH BRIDGE APPROACH SLAB

3. SEE BRIDGE PLANS FOR JOINT DETAILS, OR STD. PLAN A-40.20, JOINT DETAIL 8.

4. STANDARD PLAN A-60.30-00

5. EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTES

1. If a zone has rebar section loss or full depth repairs, then the concrete deck repair in each zone shall achieve 3000 psi before progressing to the adjacent zone.

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

3. For tension zones of continuous structures, when a longitudinal reinforcement bar has greater than 20% section loss (or damage), remove concrete a minimum of 3'-6" on each side of section loss and place 2 supplemental reinforcement bars, adjacent and parallel to the deficient bar, extending 3'-6" beyond each side having 30% section loss. Mechanical splices may be used to facilitate placement of the reinforcement bars.

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

LEGEND

CONCRETE REMOVAL AREA

DELAMINATION AND FULL DEPTH REPAIR

1/2" DEEP SAWCUT (TYP.)

TOP OF EXISTING BRIDGE DECK

TRANSVERSE REBAR (TYP.)

EXISTING DELAMINATION

CONCRETE REMOVAL AREA

LONGITUDINAL REBAR (TYP.)

TOP TRANSVERSE REINFORCEMENT (TYP.)

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
**NOTES**

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

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

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

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

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

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

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

---

**PIPE MATERIAL**

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR NON COMMERICAL</td>
<td>10&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>18&quot;</td>
</tr>
<tr>
<td>CORRUGATED POLYETHYLENE</td>
<td>15&quot;</td>
</tr>
<tr>
<td>STORM SEWER PIPE</td>
<td>15&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>12&quot;</td>
</tr>
<tr>
<td>SOLID WALL PVC</td>
<td>15&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>

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

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

2. The knockout shall not be greater than 26" in any direction. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.

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

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

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

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

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

---

**PIPE ALLOWANCES**

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENHANCED OR NO REDUCING SECTION</td>
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<tr>
<td>ALL METAL PIPE</td>
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<tr>
<td>CORRUGATED POLYETHYLENE STORM</td>
<td>24&quot;</td>
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<td>SEWER PIPE</td>
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<td>SOLID WALL PVC</td>
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<td>PROFILE WALL PVC</td>
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<td>(SEE NOTE 6)</td>
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**FRAME AND VANED GRATE**

ONE #3 BAR FOR EACH 6" HEIGHT INCREMENT, SPACED EQUALLY

---

**RECTANGULAR ADJUSTMENT SECTION**

---

**REDUCING SECTION**

---

**PRECAST BASE SECTION**

---

**ALTERNATIVE PRECAST BASE SECTION**

---

**CATCH BASIN TYPE 1L**

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**STANDARD PLAN B-5.40-01**

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**EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012**

---
NOTES

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

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

3. The maximum depth from the finished grade to the lowest pipe invert shall be 6'.

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

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

6. All pickup holes shall be grouted full after the basin has been placed.
CATCH BASIN DIMENSIONS

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>WALL THICKNESS</th>
<th>BASE REINFORCING STEEL</th>
<th>MAXIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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<td>48&quot;</td>
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<td>54&quot;</td>
<td>4.5&quot;</td>
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<td>42&quot;</td>
<td>5&quot;</td>
<td>0.19</td>
<td>0.15</td>
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<td>5&quot;</td>
<td>6&quot;</td>
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<td>0.20</td>
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<tr>
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<td>62&quot;</td>
<td>12&quot;</td>
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<td>0.23</td>
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<td>84&quot;</td>
<td>6&quot;</td>
<td>12&quot;</td>
<td>72&quot;</td>
<td>12&quot;</td>
<td>0.30</td>
<td>0.29</td>
</tr>
</tbody>
</table>

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

PIECE ALLOWANCES

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER</th>
</tr>
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<td>CORRUGATED POLYETHYLENE</td>
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<td>POLYVINYL CLORIDE</td>
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<tr>
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<td>PROFILE</td>
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<td>WALL PVC</td>
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<td>84&quot;</td>
<td>24&quot;</td>
</tr>
</tbody>
</table>

CATCH BASIN TYPE 2

STANDARD PLAN E-10.20-08

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTES

1. The pipe supports and the flow restrictor shall be constructed of the same material and be anchored to the ground using 3/8" stainless steel expansion bolts or embed the supports into the manhole wall 2".

2. The vertical rear stem of the flow restrictor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 3".

3. The flow restrictor shall be fabricated from one of the following materials:
   - 0.062" Corrugated Aluminum Alloy Drain Pipe
   - 0.062" Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.062" Corrugated Aluminum Alloy Drain Pipe
   - 0.062" Aluminum alloy flat sheet, in accordance with ASTM B 206, B662 H32 or EPF
     High Density Polyethylene Storm Sewer Pipe

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

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

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

7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 206 and ASTM B 275, designation ZG32A; or cast iron in accordance with ASTM A 48, Class 30B.

8. The lift handle shall be made of a similar metal to the gate (to prevent galvanic corrosion), it may be of solid rod or hollow tubing, with adjustable hook as required. A neoprene rubber gasket is required between the riser mounting flange and the gate flange.

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

10. All shear gate bolts shall be stainless steel.

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

12. Alternative 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 at 12” spacing each way.
3. Precast baffle shall be keyed and grouted in place.
4. Bottom orifice plates shall be galvanized steel with a minimum thickness of 1/4”. Attach orifice with 1/2” stainless steel bolts.
5. Upper flow orifice plates and elbows shall be aluminum, aluminized steel or galvanized steel. Galvanized steel shall have Treatment 1.

CATCH BASIN TYPE 2
WITH BAFFLE TYPE FLOW RESTRICTOR
STANDARD PLAN B-10.60-00

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

Harold J. Peterfeso
06-08-06

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EXPIRES JULY 1, 2007
NOTE

Knockout shell have a wall thickness of 2" minimum to 2.5" maximum.

### MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM</th>
<th>WALL THICKNESS</th>
<th>BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>BASE REINFORCING STEEL</th>
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</thead>
<tbody>
<tr>
<td>48&quot;</td>
<td>4&quot;</td>
<td>6&quot;</td>
<td>36&quot;</td>
<td>5&quot;</td>
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<td>6&quot;</td>
<td>48&quot;</td>
<td>5&quot;</td>
<td>0.25</td>
</tr>
</tbody>
</table>

**SEPARATE BASE**: 0.15
**INTEGRAL BASE**: 0.30
NOTE
Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM</th>
<th>WALL THICKNESS</th>
<th>BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT DIAM.</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>SEPARATE BASE REINFORCING STEEL No. &amp; IN EACH DIRECTION</th>
<th>INTEGRAL BASE REINFORCING STEEL No. &amp; IN EACH DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>72&quot;</td>
<td>6&quot;</td>
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<td>64&quot;</td>
<td>12&quot;</td>
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<td>0.28</td>
</tr>
</tbody>
</table>

Harold J. Petersen 06-01-06

MANHOLE TYPE 2
STANDARD PLAN B-15.40-00
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

EXPIRES JULY 1, 2007
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Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
1. Precast cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
1. The asymmetry of the Combination Inlet shall be considered when calculating the offset distance for the catch basin. See SECTION A.

2. The dimensions of the Frame and Hood may vary slightly among different manufacturers. The Frame may have cast features intended to support a grate guard. Hood units shall mount outside of the Frame. The methods for fastening the Safety Bar / Debris Guard Rod to the Hood may vary. The top of the Hood may be cast with a pattern.

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

4. When bolt-down grates are specified in the contract, provide two holes in the frame that are vertically aligned with the grate slots. Tap each hole to accept a 5/8" × -11 NC × 2" allen head cap screw. Location of bolt-down holes varies among different manufacturers. See BOLT-DOWN DETAIL, Standard Plan B-30.10.

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

6. This plan is intended to show the installation details of a manufactured product. It is not the intent of this plan to show the specific details necessary to fabricate the castings shown on this drawing.
NOTES

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

2. The knockout diameter shall not be greater than 18". Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1-3/8" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.

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

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

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

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

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

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

2. When bolt-down grates or covers are specified in the Contract, provide two holes in the frame that are vertically aligned with the grate or cover slots. Tap each hole to accept a 5/8" - 11 NC × 2" allen head cap screw. Location of bolt down holes varies among different manufacturers.

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

GRADE FRAME
BOLT-DOWN DETAIL

SEE NOTE 2

SECTION 1/2" Recessed Allen Head Cap Screw 5/8" - 11 NC x 2"

BOLT-DOWN HOLE (TYP.)

~ 5/8" - 11 NC, SEE DETAIL & NOTE 2

RECTANGULAR FRAME
(REVERSIBLE)

STANDARD PLAN B-30.10-00

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
When bolt-down covers are specified in the Contract, provide two slots in the cover that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

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

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

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

NOTES

1. When bolt-down covers are specified in the Contract, provide two slots in the cover that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

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

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

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

1. When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

2. Refer to Standard Specification 6-06.1(2) for additional requirements.

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

When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.
1. When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

2. Refer to Standard Specification 6-06 (2) for additional requirements.

3. For frame details, see Standard Plan B-30.40.
NOTE:
1. When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.
2. Refer to Standard Specification 9-05.15(2) for additional requirements.
3. For Frame details, see Standard Plan B-30.10.
4. The thickness of the grate shall not exceed 1 5/8".

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

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

3. Weather shall be neoprene (Detail "B").

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

5. Proprietary manhole covers without bottom ribs are acceptable.

6. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1.5 times the horizontal scale (1H:1.5V).
For use with Circular Frames (rings) detailed in Standard Plan B-30.70.

1. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-30.30 and B-20.60.
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.

Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 136.
NOTE:
1. The flange angles shall be set so that each bearing bar of prefabricated grate shall have full
   bearing on both ends. The finished top of concrete shall be even with the grate surface.
2. All exposed concrete shall be finished with a 1/2" radius.
3. The grade line of the top inside of any pipe shall enter no lower than the grade line of the
top inside of the outlet pipe.
4. Pipes may enter through the knockouts on any side at any reasonable angle, provided the
outside of the pipe can be contained between two opposite walls.
5. See contract for type of grate specified. See Standard Plan B-40.20 and B-40.40 for grate
details.
NOTES:
1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.
2. Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section.
3. All exposed concrete edges shall be finished with a 1/2" radius.
4. Pipes may enter the inlets on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.
5. The flow line of the outlet pipe shall be 18" minimum above the inside bottom of the inlet structure.
6. The grade line of the top inside of any inlet pipe shall enter no lower than the grade line of the top inside of the outlet pipe.
7. Unit "H" and optional extension units "J" and "K" shall be grouted in place to the satisfaction of the Engineer.
8. All pickup holes shall be grouted full after the basin has been placed.

See Standard Plan B-35.40-00 for details.

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

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.

Pipes may enter the inlets 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 no lower than 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.


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GRATE INLET TYPE 2
STANDARD PLAN B-35.40-00
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION

EXPIRES JULY 1, 2007

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

HAROLD J. PETERFESO

05-06-06
GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

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

3 1/2" × 3/8" STEEL PLATE (TYP.)

SIDE

TOP

END

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)

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

3 1/2" × 3/8" STEEL PLATE (BOTH SIDES)

3 1/2" × 3/4" STEEL PLATES

SIDE

TOP

END

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Harold J. Peterfeso
06-01-06

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTES
1. The Contract may specify a rotated inlet installation. Orient the Grates in the Frame as they interrupt flow.
2. When bolt-down grates are specified in the Contract, provide two slots in the grate that are centered with the holes in the frame. Location of bolt-down slots varies among different manufacturers.
3. Refer to Standard Specification 9-05.15(2) for additional requirements.
4. Frames and Grates shall be Ductile Iron.
The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.

Bevel or round exposed concrete edges 1/2".

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

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.

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

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

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

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

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

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

Bevel or round exposed concrete edges 1/2".

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

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.

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

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

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

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

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

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

**ISOMETRIC (SHOWN WITH TYPE 2 GRATE)**

**DROP INLET TYPE 2**

**STANDARD PLAN B-45.40-00**

**EFFECTIVE:** AUGUST 1, 2011 TO August 5, 2012

**DRAWN BY:** MARK SUJKA

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CONCRETE AND DUCTILE IRON PIPE

TRENCH WIDTH

PIPE ZONE BACKFILL
(SEE NOTE 1)

GRAVEL BACKFILL FOR
PIPE ZONE BEDDING
(SEE NOTE 2)

FOUNDATION LEVEL

THERMOPLASTIC PIPE

TRENCH WIDTH

PIPE ZONE BACKFILL
(SEE NOTE 2)

GRAVEL BACKFILL FOR
PIPE ZONE BEDDING
(SEE NOTE 2)

FOUNDATION LEVEL

METAL PIPE

TRENCH WIDTH

PIPE ZONE BACKFILL
(SEE NOTE 1)

GRAVEL BACKFILL FOR
PIPE ZONE BEDDING
(SEE NOTE 2)

FOUNDATION LEVEL

NOTES
1. See Standard Specifications Section 7-08.3(3) for Pipe Zone Backfill.
2. See Standard Specifications Section 9-03.12(3) for Gravel Backfill for Pipe Zone Bedding.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.

CLEARANCE BETWEEN PIPES
FOR MULTIPLE INSTALLATIONS

<table>
<thead>
<tr>
<th>PIPE</th>
<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
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</thead>
<tbody>
<tr>
<td>CIRCULAR PIPE</td>
<td>12&quot; to 24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>(DIAMETER)</td>
<td>30&quot; to 99&quot;</td>
<td>DIA. 2.4</td>
</tr>
<tr>
<td></td>
<td>102&quot; to 193&quot;</td>
<td>48&quot;</td>
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<tr>
<td>PIPE ARCH</td>
<td>18&quot; to 24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>(SPAN)</td>
<td>48&quot; to 142&quot;</td>
<td>SPAN 3</td>
</tr>
<tr>
<td>METAL ONLY</td>
<td>144&quot; to 202&quot;</td>
<td>48&quot;</td>
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</tbody>
</table>
CONCRETE COLLAR OPTION

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

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

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

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

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

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Harold J. Peterfeso
06-08-06

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTES:
1. Span and rise dimensions are nominal and are measured to the inside crests of corrugations.
2. Allowable heights of cover shall be within the limits indicated in the table included 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 naturally occurring materials available in the vicinity of the structural plate underpass installation. See Standard Specification 7-03.3(4).
4. Designed for H-20 live load and maximum allowable soil pressure of 6 kips per square foot.

INVERT TREATMENT ~ SEE NOTE 3
SIDE VIEW ~ PLACEMENT

ALLOWABLE HEIGHTS OF COVER

<table>
<thead>
<tr>
<th>SPAN</th>
<th>RISE</th>
</tr>
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<tbody>
<tr>
<td>6'-8&quot;</td>
<td>7'-1&quot;</td>
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<tr>
<td>6'-10&quot;</td>
<td>8'-2&quot;</td>
</tr>
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</table>
NOTE: Open and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.

EMBANKMENT SLOPE

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

SIDE VIEW ~ PLACEMENT

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

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

4H:1V OR STEEPER

**End Section**

**Thermoplastic Pipe**

**Concrete Pipe**

**Metal Pipe**

**Notes**

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

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

**FOR CULVERTS 32" DIAMETER OR LESS**

**Beveled End Sections**

**Standard Plan B-70.20-06**

Sheet 1 of 1 Sheet

**Effective:** August 1, 2011 to August 5, 2012

**Expiry:** July 1, 2007

**NOTES:**

- 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 at the Washington State Department of Transportation. A copy may be obtained upon request.

**Effective Date:**

- Harold J. Peterfeso 06-01-06

**Registerd Professional Engineer:**

- Christian R. Wieten

**Approval Date:**

- 06-01-06
NOTES

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

2. Skirt sections shall be made in one piece for round pipe with a diameter of 12" to 24" inclusive and for pipe arches with a base of 15" to 20" inclusive. Skirt sections for larger sizes of pipes may be multiple pieces in accordance with the isolated values shown.

3. Design A and sections for 42" thru 84" diameter and 48" x 35" thru 58" x 63" arch with annular corrugations and all helically corrugated pipe arch include one foot of pipe length as a connector section. The connector section shall be attached to the end section by welding, bolts or bolts and shall be the same thickness as the end section.

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

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

6. The reinforced edges of the following size End Sections shall be supplemented with galvanized steel offset angles:
   - 50" thru 72" diameter pipe 1 1/2" x 1 1/2" angle
   - 76" and 84" diameter pipe, and
   - 77" x 63" & 85" x 63" pipe arch 2 1/2" x 2 1/2" angle

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

7. Galvanized steel angle reinforcement will be placed under the center plate seams on the pipe arch 84" dia. pipe, and 77" x 62" pipe arch end sections.

8. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

9. For 12" thru 24" pipe and 16" & 20" thru 24" pipe arch with annular end corrugations:
   - 77" x 52" pipe arch ............. 2 1/2" x 2 1/2" x 1/4" angle
   - 60" thru 72" diameter pipe ........ 2" x 2" x 1/4" angle

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

10. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

11. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

12. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

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14. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

15. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

16. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

17. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

18. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

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20. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

21. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

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24. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

25. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

26. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

27. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

28. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

29. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

30. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

31. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

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34. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

35. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

36. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.

37. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 12 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.
NOTES

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

2. The distance between the safety bars, and between the top bar and the culvert crown, shall be equal spaces of no more than 24". The distance may vary ±5/64" between bars to facilitate placement.

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

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

The distance between the safety bars, and between the top bar and the culvert crown, shall be equal spaces of no more than 24". The distance may vary ±5/64" between bars to facilitate placement.

Slope shall match Side Slope; 6H:1V preferred, not steeper than 4H:1V.
NOTES:
1. All pipe or pipe sections shall be attached as shown in CONNECTOR DETAIL.
2. When a Toe Plate Extension is required, it shall be the same gage as the End Section. The dimensions shall be 8" high, 8" less than the overall width, insted centered, and tapped 2", finished with 3/4" × 4" galvanized bolts on 12" maximum centers.
3. Cross Drainage Bar and Safety Bars shall be 3" Schedule 40 galvanized steel pipe. Cross Drainage Bars shall be placed a maximum 30" apart.
4. Slotted holes for safety bar attachment shall be provided on end sections.
5. Cross Drainage Bar and Safety Bars shall be 3" Schedule 40 galvanized steel pipe.
6. Number of Safety Bars required will vary depending upon the length of the end section.

CROSS DRAINAGE STRUCTURE

<table>
<thead>
<tr>
<th>PIPE DIAMETERS (INCHES)</th>
<th>METAL END SECTIONS FOR CIRCULAR PIPERS</th>
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</thead>
<tbody>
<tr>
<td>RISE (INCHES)</td>
<td>MINIMUM THICKNESS (INCHES)</td>
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CROSS DRAINAGE BAR DETAIL

SAFETY BAR END TREATMENT DETAIL

METAL END SECTIONS FOR ARCHED PIPES

<table>
<thead>
<tr>
<th>PIPE DIAMETERS (INCHES)</th>
<th>METAL END SECTIONS FOR ARCHED PIPERS</th>
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</tbody>
</table>

TAPERED END SECTION WITH TYPE 3 SAFETY BARS

STANDARD PLAN B-90.20-09

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

2. Mark location of sewer stub in accordance with Contracting Agency requirements.
FOR SANITARY SEWER USE

STANDING SIDE SEWER CONNECTION

STANDARD PLAN H-85.30-00

DRAWN BY:  ADAM COCHRAN

STANDARD PLAN B-85.30-00

EXPIRES JULY 1, 2007

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

STAND 1 OF 1 SHEET

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
FOR SANITARY SEWER USE

8 INCH SEWER CLEAN-OUT

STANDARD PLAN B-85.40-09

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

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

CAST IRON RING AND COVER

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

Harold J. Peterfeso
06-08-06
NOTES
1. Steel tile rods to be heavily coated with asphalt after installation.
2. Restrainted joints may be substituted for tie rods.
3. Surface of ground within 36" of hydrant shall be smooth.

Steel tie rods to be heavily coated with asphalt after installation.
Restrained joints may be substituted for tie rods.
Surface of ground within 36" of hydrant shall be smooth.

WATER MAIN
12" × 12" × 4" MIN.
CONCRETE BLOCK
MECHANICAL JOINT
WITH TIE ROD LUGS
6" PIPE
WATER MAIN
ELEVATION
TYPE A

WATER MAIN
12" × 12" × 4" MIN.
CONCRETE BLOCK
MECHANICAL JOINT
WITH TIE ROD LUGS
6" PIPE
WATER MAIN
ELEVATION
TYPE B

PLAN
WATER MAIN
12" × 12" × 4" MIN.
CONCRETE BLOCK
MECHANICAL JOINT
WITH TIE ROD LUGS
6" PIPE
WATER MAIN
PLAN

Property Line
Slope
12" WATER MAIN
TWO 3/4" DIAM. TIE RODS
Hydrant Setting Types A and B
Standard Plan B-90.10-00

Harold J. Peterfeso 06-28-06

Effective: August 1, 2011 to August 5, 2012
NOTES
1. Coat the pipe threads with asphaltic felt assembly.
2. All piping shall be galvanized steel.
3. Valve and piping to valve shall be 2" unless otherwise noted in the Contract.
4. Locate blowoff outlet near property corner if possible.
1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.

2. Locate at the high point of the main, tap top of main.
NOTES

1. Contractor to provide blocking adequate to withstand full test pressure.
2. Divide thrust by safe bearing load to determine required area (in square feet) of concrete to distribute load.
3. Area to be adjusted for other pressure conditions.
4. Provide two 1" 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 (PSI)</th>
<th>THRUST AT FITTINGS IN POUNDS</th>
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SOIL TYPE

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<th>SAFE BEARING LOAD (PSF)</th>
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<tr>
<td>SAND AND GRAVEL</td>
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<tr>
<td>SAND AND GRAVEL CEMENTED WITH CLAY</td>
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<td>HARD SHALE</td>
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CONCRETE THRUST BLOCK

STANDARD PLAN B-90.40.00

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-08-06

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JULY 1, 2007
**NOTE:**
Glue the rod to be heavily coated with asphalt after installation.

---

**DIMENSION TABLE**

<table>
<thead>
<tr>
<th>PIPE DIAM (IN)</th>
<th>TEST PRESSURE (PSI)</th>
<th>BEND ANG (DEG)</th>
<th>CONCRETE VOLUME (FT³)</th>
<th>CUBE SIZE (IN)</th>
<th>TIE ROD DIAM (IN)</th>
<th>TIE ROD EMBEDMENT (IN)</th>
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**Concrete Thrust Block for Convex Vertical Bends**

**Standard Plan B-90.50-08**

Sheet 1 of 1 Sheet

Approved for Publication

Harold J. Peterfeso 04-06-06

Washington State Department of Transportation

**Effective:** August 1, 2011 to August 5, 2012
INLET PLACEMENT AT BRIDGE END

STANDARD PLAN B-95.40-00

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

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

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

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

5. See Contract Plans for length of Curb.

Harold J. Peterfeso
06-08-06

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
Typical Rail Element

- 3/8" button head bolt with 7/8" oval grip and recessed hex nut
- 1 3/4" post bolt washer

Expansion Section

Beam Guardrail (Thrie Beam)

Standard Plan C-1a

Sheet 1 of 1 Sheet

Approved for Publication

Peza, Rabideau & Associates

Washington State Department of Transportation

Effective: August 1, 2011 to August 5, 2012
NOTES
1. Wood posts for all guardrail placement plans shall be 5 x 8 except where noted otherwise.
2. Lower hole is for Rub Rail of Type 2 and Type 3 Beam Guardrail.
3. W6×10 steel posts and timber blocks are alternates for 6 x 8 timber posts and blocks. W6×15 steel posts and timber blocks are alternates for 10 x 10 timber posts and blocks.
4. Holes shall be located on approaching traffic side of web.
5. When "Beam Guardrail Type - _ _ Ft. Long Post" is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" min. high and 3/4" wide at the location where the letter "H" is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4". For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor's responsibility to ensure that the stamped numbers remain visible.
6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.

Hole in foundation tube may be omitted.
NOTES

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

DETAIL A

\[ \frac{5}{16}" \text{ DIA x } 1\frac{1}{2}" \text{ hex head bolt with hex nut and } \frac{1}{4}" \text{ square x } \frac{1}{32}" \text{ washer} \]

DETAIL B

\[ \frac{5}{16}" \text{ DIA x } 1\frac{1}{2}" \text{ hex head bolt with hex nut. Guardrail rests on top of bolt.} \]
NOTES
1. For wood posts, saw top of post and block to 1" above thrie beam guardrail reducer section. For steel posts, drive post down to 1" maximum above the thrie beam guardrail reducer section.
1. Type 4 anchor required. For details, see Standard Plan C-9a.

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. Type 4 anchor required. For details, see Standard Plan C-9a.

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

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

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

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

6. When Beam Guardrail Flared Terminals are used on both ends a minimum of 25'-0" of Beam Guardrail shall be installed.
NOTES

1. For terminal type and details, see Contract and applicable Standard Plan(s).

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

3. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

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For terminal type and details, see Contract and applicable Standard Plan(s).

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

See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

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For terminal type and details, see Contract and applicable Standard Plan(s).

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

See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

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For terminal type and details, see Contract and applicable Standard Plan(s).

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

See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

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For terminal type and details, see Contract and applicable Standard Plan(s).

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

See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

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For terminal type and details, see Contract and applicable Standard Plan(s).

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

See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.
1. Varying flare rates and structure widths may require a length of Beam Guardrail Type 1 or 2 between the Beam Guardrail Type 3 or 4 and the Transition on one side, and the Beam Guardrail Type 10 on the other. For Beam Guardrail Type 2 or 3, terminate the rub rail (channel rail) at the last 6'-3" post of the Beam Guardrail Transition Section Type 16, and by lapping it behind the second 6'-3" post on the Beam Guardrail Type 10 side, or as approved by the Engineer.

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

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

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

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

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

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

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

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

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

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

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

1. SRT Terminal shown, for terminal type and details, see Contract or applicable Standard Plan(s).
2. Post spacing is 9'-0" except where noted.
3. Type 4 anchor required. See applicable Standard Plan(s).
4. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H:1V when the guardrail is within 12'-0" from the edge of the shoulder.

NOTES

1.
2.
3.
4.

SRT Terminal shown, for terminal type and details, see Contract or applicable Standard Plan(s).
Post spacing is 9'-0" except where noted.
Type 4 anchor required. See applicable Standard Plan(s).
The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H:1V when the guardrail is within 12'-0" from the edge of the shoulder.
NOTES

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

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

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

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

5. Guardrail post spacing for Beam Guardrail Type 11 past the end of the structure shall be spaced at 6' - 3" maximum with 6×8 post and standard block.

6. Attach the standard wood block to the rail using two 5/8" × 4" lag bolts.
GUARDRAIL PLACEMENT
WEAK POST INTERSECTION
DESIGN (8'-6" MAX RADIUS)

CASE 12_D
(see Note 7)

CASE 12_C
(see Note 7)

CASE 12_A
(see Note 8)

CASE 12_B
(see Note 7)

NOTES
1. See Contract for guardrail connection to bridge rail and concrete barrier.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Attach to rail with 5/16" x 9" long bolt, nut and 1 1/2" washer on back of post.
4. For terminal type and details, see Contract and applicable Standard Plans.
5. Radius dimensions shall be etched into plate replacing the letters "HH", shown on the Identification Plate Detail. Digits shall be 1 1/2" MIN height and 3/4" MAX width. The plate shall be galvanized after etching.
6. The guardrail radius Identification Plate shall be mounted on the back side of the Rail Element using the lowest splice bolt at the P.C. of the guardrail radius.
7. First letter of case designation placement indicates end treatment on side 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, five CRT posts are required including the CRT post at point B.
9. For CRT post details, see Standard Plan "Beam Guardrail Posts and Blocks".

IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 6)

IDENTIFICATION PLATE
(see Note 5)

SECTION A-A

LENGTH = 25'

6'-3" Post spacing (TYP)

3/4" Hole with snug fitting insert, 3/8" ID, 7 1/2" long

MOUNTING DETAIL
(see Note 6)

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

PC

Bridge end

Terminal pay limit (SRT shown) see Note 4

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. See Contract Plans 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. Fewer CRT posts are required for smaller radii; include CRT Post at Point B. Attach guardrail to post with a 5/16" x 9" long bolt, a 3/8" I.D. x 7 1/2" snug fitting insert, and a 1 1/2" washer with nut on back of post.

4. For terminal types and details, see Contract and applicable Standard Plan(s).

5. Radius dimensions shall be etched into plate replacing the letters "HH", shown on the GUARDRAIL RADIUS IDENTIFICATION PLATE DETAIL. Digits shall be 1 1/2" minimum height and 3/4" maximum width. 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 nearest the PC of the guardrail radius (See View A).

7. The first letter of the Case Designation indicates the end treatment on the side road. The second letter indicates the end treatment on the main road. For example, a Type 5 Anchor on the side road with a bridge connection on the main road would be Case 13 AC, the combination shown.

8. For CRT post details, see Standard Plan C-1b.
NOTES

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

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

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

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

---

**CASE 14**

---

**GUARDRAIL PLACEMENT**

---

**STANDARD PLAN C-2h**

---

Donald K. Nelson

3/28/97
NOTES

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

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


CASE 15

Terminal pay limit (see Note 1)  Beam Guardrail pay limit  Terminal pay limit (see Note 1)

Modified Beam Guardrail (see Detail and Note 3)

Spaces at 6'- 3"

0 Spaces MIN (TYP)

Box culvert

Direction of Traffic

25' (see Note 4)

See Note 2

See Note 2

6'- 3"  6'- 3"  6'- 3"  6'- 3"

See Note 3

See Note 3

See Note 3

See Note 3
NOTES

1. Type 4 anchor required. For details, see applicable Standard Plan(s).

2. For terminal type and details, see contract and applicable Standard Plan(s).

3. Post spacing is 6'-3" except where noted.

4. For guardrail to bridge rail connection see applicable Standard Plan(s) or Contract.

5. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1 when the guardrail is within 12'-0" from the edge of the shoulder. Beyond 12'-0", the slope shall not be steeper than 6:1.

GUARDRAIL PLACEMENT

STANDARD PLAN C-2j

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
BEAM GUARDRAIL PAY LIMIT

32'-0" NESTED W-BEAM

GROUND LINE

ELEVATION

CASE 20

SECTION A

SECTION B

GUARDRAIL PLACEMENT
18'-9" SPAN

STANDARD PLAN C-2n

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

APPROVED FOR PUBLICATION

Clifford E. Mansfield  07-27-01
Washington State Department of Transportation

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
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.

---

ONE WAY TRAFFIC LAYOUT

CASE 21

ELEVATION

PLAN

NOTES:

- 107 CP HIDDEN W-BEAM RAIL ELEMENTS
- BEAM GUARDRAIL PLACEMENT - 25' SPAN PAY LIMIT
- TYPE 1 GUARDRAIL POSTS AND BLOCKS
- CONTROLLED RELEASE TERMINAL (CRT) POSTS WITH TWO WOOD BLOCKS
- TYPE 1 GUARDRAIL POSTS AND BLOCKS

WOOD BLOCKS

- 6' x 8' x 14''
- 5/8" x 25" BUTTON HEAD BOLT WITH 7/32" OVAL GRIP, CUT WASHER, AND HEX NUT

---

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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 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 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.

IDENTIFICATION PLATE DETAIL

IDENTIFICATION PLATE MOUNTING DETAIL
1. Install Extruded Curb at face of Guardrail. See Standard Plan F-10.40 for details.

NOTE
BEAM GUARDRAIL TRANSITION SECTION TYPE 2 ~ PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

12'-3" MAX. 4 SPACE @ 3'-1 1/2" MAX.

6×8 Post with Standard Block (TYP.)

EIGHT SPACES @ 3' - 1 1/2" MAX.

TOTAL LENGTH = 25' - 0"

TYPE 6

BEAM GUARDRAIL TRANSITION SECTION TYPE 5 ~ PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

1' - 3" MAX. 4 SPACE @ 1' - 6 3/4"

3 SPACE @ 3' - 1 1/2"

TOTAL LENGTH = 38'-8"

TYPE 8

BEAM GUARDRAIL TRANSITION SECTION TYPE 4 ~ PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

8'-9" Long, 6×8 Post with Standard Block (TYP.)
1. If the distance from the end of the bridge to the end of the thrie beam bridge rail section exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" section of thrie beam bridge rail to reduce the length to less than 6'-3".

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

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

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

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

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

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

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

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

1. See Contract for the number of thrie beam sections for Beam Guardrail Type 11.

2. If the distance from the end of the Beam Guardrail Type 11 to the column/structure exceeds 6'-3", using 12'-6" thrie beam sections, add a 6'-3" nested section of thrie beam to reduce the distance to less than 6'-3".

3. Install Extruded Curb (See Standard Plan F-10.40) at face of Guardrail.

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

See Contract for the number of thrie beam sections for Beam Guardrail Type 11.

If the distance from the end of the Beam Guardrail Type 11 to the column/structure exceeds 6'-3", using 12'-6" thrie beam sections, add a 6'-3" nested section of thrie beam to reduce the distance to less than 6'-3".

Install Extruded Curb (See Standard Plan F-10.40) at face of Guardrail.

Attach the standard block to the rail using two 5/8" × 4" lag bolts.
1. Unless otherwise indicated in the contract, the SRT - 350 (12.5, 8 Post) as manufactured by Trinity Industries, Inc., or a FLEAT 350 as manufactured by Road Systems Inc., shall be installed per manufacturer's recommendations. If specified in the contract, the FLEAT TL2 as manufactured by Road Systems, Inc. shall be installed per manufacturer's recommendations.

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

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

4. Offset distances:
   - FLEAT 350 ............................................... 4' - 0"
   - FLEAT TL2 ............................................... T - 8" minimum

Offset distances:
- FLEAT 350 ............................................... 4' - 0"
- FLEAT TL2 ............................................... T - 8" minimum

**Notes:**
- **FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)**
- **TANGENT LINE**
- **ELEVATION VIEW**
- **BEAM GUARDRAIL**
- **FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)**
- **TANGENT LINE**
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- **BEAM GUARDRAIL**
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- **BEAM GUARDRAIL**
- **FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)**
- **TANGENT LINE**
- **ELEVATION VIEW**
NOTES

1. An ET-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-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 reflectorized object marker shall be installed according to manufacturer's recommendations.

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

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

5. Length for ET-PLUS (TL3) and SKT-350 is 50'. Length for ET-PLUS (TL2) and SKT-TL2 is 25'.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 1

PLAN

BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 2

PLAN

BULL NOSE GRADING PLAN

NOTES

1. For W-Beam applications extend the rail from the bullnose terminal by using a "Reducer Element Type C" followed by a standard Post and Block, spaced at 3' - 1 1/2". Continue runs with standard 6' - 3" post spacing. For additional details see Standard Plans C-25.20. and C-28.40.

SHEET 1 OF 4 SHEETS

APPROVED FOR PUBLICATION

Pierce Bakotich III
06-16-11

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SLotted THReE BEAm RAIL ELEMENT #1
SEE STANDArD PlAn C-1a FOR RAIL ELEMENT DetaIlS
(RAl dimensions shown are before bending to radius shown in plan)

SLotted THReE BEAm RAIL ELEMENT #2
SEE STANDArD PlAn C-1a FOR RAIL ELEMENT DetaIlS
(RAl dimensions shown are before bending to radius shown in plan)

SLotted THReE BEAm RAIL ELEMENT #3
SEE STANDArD PlAn C-1a FOR RAIL ELEMENT DetaIlS
(RAl dimensions shown are before bending to radius shown in plan)

SLotted THReE BEAm RAIL ELEMENT #4
SEE STANDArD PlAn C-1a FOR RAIL ELEMENT DetaIlS
(RAl dimensions shown are before bending to radius shown in plan)
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts in accordance with Standard Spec. 9-06.5(4), with thin slab ferrule inserts or resin bonded anchors. See Contract Plans.

2. If the last guardrail post is 3" or less from the end of the bridge barrier, this attachment and blockout is not necessary.

3. This case is also applicable for F-shape and vertical faces with no curbs.

4. When B connection is used with Type 1A Transition, the maximum spacing between bolts is 6'-3".

5. See bridge plans for additional connection details.

**Notes:**

- [NOTE 1] See Plan for details.
- [NOTE 2] See Plan for details.
- [NOTE 5] See Plan for details.

**Effective:** August 1, 2011 to August 5, 2012

**Drawn By:** Fern Liddell
NOTES

1. Anchor plate may be constructed from 1/4" 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 5/8" x 1 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. Toe nail bearing plate with 10d nail at corners to prevent turning.

7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.
NOTES:
1. Roll section and W8 x 18 steel post shall be fabricated to receive 5/8" hex head bolts as shown.
2. All bolts shall be high strength 5/8" hex head bolts with anchor nail washers.
NOTES
1. For details, see Standard Plan C-6.
2. For end section details see Standard Plan C-7 or C-7a.
3. For details, see Standard Plan C-1b.
4. Outside nut shall be torqued against inside nut a minimum of 300 R-lbs.
5. Post and block shall match beam guardrail posts.
1. Attach W-beam to steel pipe with 5/8" x 1 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.

NOTES:

1. Attach W-beam to steel pipe with 5/8" x 1 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.

NOTES:

1. Attach W-beam to steel pipe with 5/8" x 1 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.

NOTES:

1. Attach W-beam to steel pipe with 5/8" x 1 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.

NOTES:

1. Attach W-beam to steel pipe with 5/8" x 1 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.

NOTES:

1. Attach W-beam to steel pipe with 5/8" x 1 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.
NOTES

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 pay limit (see Note 2)

Bearing plate (see Note 1)

Two 2" nuts and washers (see Note 1)

Anchor plate (see Note 1)

Standard 2" ID pipe sleeve (2½" OD)

Anchor Post Assembly (see Note 3)

Type 7 Anchor
1. End Section Design G shall be used except where noted on the plans or contract.

2. Attach guardrail to bridge rail or concrete barrier with 7/8\" diameter bolts (five minimum) Standard types, S-085-04, with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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

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

5. Attach guardrail to bridge rail or concrete barrier with 7/8\" diameter bolts (five minimum) Standard types, S-085-04, with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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

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

8. Attach guardrail to bridge rail or concrete barrier with 7/8\" diameter bolts (five minimum) Standard types, S-085-04, with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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

10. In cases where Design "F" end section is lapped on the outside of the guardrail, a galvanized 1" ID, 2" OD, 0.134" thick, narrow Type A Plain Washer or an anchor rail washer shall be placed under the splice bolt heads.
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. S-826.4(a), with thin slit female inserts or resin bonded anchors. See the Contract Plans.

2. In cases where Design F End Section is lapped on the outside of the guardrail, a galvanized 1" (3/4" OD), 0.134" thick, narrow Type A Plain Washer or an anchor rail washer will be placed under the splice bolt heads.

NOTES

Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. S-826.4(a), with thin slit female inserts or resin bonded anchors. See the Contract Plans.

In cases where Design F End Section is lapped on the outside of the guardrail, a galvanized 1" (3/4" OD), 0.134" thick, narrow Type A Plain Washer or an anchor rail washer will be placed under the splice bolt heads.

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

THERE ARE NO DRAWN DIMENSIONS FOR USE WITH DESIGN D (THRIE BEAM) (END SECTION ONLY) SEE NOTE 1

DESIGN D (THRIE BEAM) END SECTION

DESIGN D (THRIE BEAM)

DESIGN F (THRIE BEAM)

DESIGN G (THRIE BEAM)

DESIGN C (THRIE BEAM)

DESIGN G (THRIE BEAM) (END SECTION ONLY)

DESIGN G (THRIE BEAM)

DESIGN F (THRIE BEAM) (END SECTION ONLY)

DESIGN F (THRIE BEAM)

DESIGN C (THRIE BEAM)

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

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

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

4. The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).
NOTES:
1. This plan shall be used for 40' and 50' Light Standards with 16' max. length double mast arms.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 6 - 5" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
4. See the Contract Plans for conduit placement.
5. Concrete shall be Class 4000.

See Note 4: Route to Grounding Stud (see Note 3)

1.0  #4 ~ 6 SPACES @ 1' - 0" = 6' - 0" 6  #4 ~ 17 SPACES @ 6" = 8' - 6" 6  #4 ~ 6 SPACES @ 1' - 0" = 6' - 0"

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

1/4" DRAFT ALL CORNERS

SEE DETAIL "A" FOR CONDUIT AND ANCHOR BOLT PLACEMENT

4  #4 ~ FIELD BEND 2  #4 ~ 8 SPACES @ 1' - 0" = 8' - 0" 3  #4 ~ FIELD BEND 2  #4 ~ 8 SPACES @ 1' - 0" = 8' - 0"

5 SPACES @ 6" = 2' - 6"

5 SPACES @ 6" = 2' - 6"

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

CONCRETE BARRIER LIGHT STANDARD SECTION

STANDARD PLAN C-8b
SHEET 1 OF 2 SHEETS
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Pasco Bakotich III 06-27-11

APPROVED FOR PUBLICATION
NOTES

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

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

3. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.

4. For installation of Type 3 Anchors, see Standard Plan C-8.

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PRECAST CONC. BARRIER TYPE 2 EXPIRES JULY 24, 2008
The vertical locations of the Wire Rope Loops at one end compose a set that shall not vary; however, which set is applied to an end is determined by the end to which it is being connected. A set with loops 1' - 5" apart connects to a set with loops 1' - 8" apart. See Standard Plan C-8, BARRIER CONNECTION DETAIL.

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This plan is for transitions to Pre-cast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.

NOTE

Field bend as required in transition.

All bends are 2" radius.
NOTES:
1. The Terminal is used only on the tailing end of a barrier, unless otherwise shown on the Contract.
2. See Standard Plan C-14a, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details.
3. When High Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3'-0", and a minimum embedment of 3'.
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

NOTES:

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

2. For Single Slope Concrete Barrier details, see Standard Plan series C-14 (precast) or C-14 (cast-in-place).

SELECT BORROW INCL. HAUL.

SINGLE SLOPE CONCRETE BARRIER DUAL-FACED

SELECT BORROW INCL. HAUL.
1. For W-Beam Type 31 shoulder application, see Standard Plan C-26.40.
NOTES:

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

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

3. See Contract for Beam Guardrail Transition Section Type and Connection to Bridge Traffic Barrier or Concrete Barrier. See Standard Plan C-8 for details.
1. The slope from the edge of the shoulder into the Blues of the guardrail should not exceed 1:12:1 when the guardrail is within 3'-0" from the edge of the shoulder.

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

3. Beam Guardrail Anchor Type 10 (W-Beam) or Type 10 (Thick Beam) required. For details, see Standard Plan C-33-10.

4. For details, see Standard Plan C-38-10.

5. For details, see Standard Plan C-22-01.

6. For details, see Standard Plan C-22-00.
NOTE

1. For additional details not shown on this plan, refer to Standard Plan C-38.40.
2. CRT post to be wood only.
NOTES

1. See Contract for transition and connection type.

2. For additional installation requirements for Non-Flared Terminal placement see Standard Plan C-22A.40.

3. Guardrail installation shall be Beam Guardrail Type 31 with standard post and block. See Standard Plan C-23.40 for additional details.

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

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

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

---

GUARDRAIL PLACEMENT
STRONG POST - TYPE 31
INTERSECTION DESIGN
STANDARD PLAN C-20.42-02

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. Beam guardrail post spacing shall be 6'-3" on centers.
2. Use a single or combination of blocks to achieve the actual 12" offset. See Standard Specification 9-16.3(2). Wood blocks shall be toenailed to post and blocks, if block combinations are used, with 16d galvanized nails to prevent block rotation.
3. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.
4. For details not shown, see Standard Plan C-20.45-00.
5. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
Notes:

1. Posts installed on shoulder slopes steeper than 10H : 1V shall be longer.

2. The flare rate of the guardrail may be increased after crossing the ditch bottom to shorten the length of the terminal.

3. Determine the height of the W-Beam at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (S) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (S) on the edge of shoulder used to obtain the offset distance (at the same station). Add Beam Guardrail design height (27") to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION "C".

Elevation a = (Elevation of S - D (0.1)) + 27

Flare Rate Table

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<td>90 : 1</td>
<td>50</td>
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<td>9 : 1</td>
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BEAM GUARDRAIL TYPE 31
BURIED TERMINAL TYPE 2
STANDARD PLAN C-32.16-03

PLANE - SEE TABLE

FLARE RATE TABLE

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<td>45</td>
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<tr>
<td>35:1</td>
<td>40 or less</td>
</tr>
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ELEVATION = (Elevation - (0.1)) + 27

1. Posts installed on shoulder slopes steeper than 10H : 1V shall be 8' long.
2. The flare rate of the guardrail may be increased after crossing the ditch bottom to shorten the length of the terminal.
3. Determine the height of the W-Beam at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (S) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (S) on the edge of shoulder used to obtain the offset distance (at the same station). Add Beam Guardrail design height (31") to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION "C".

NOTES:
1. Posts installed on shoulder slopes steeper than 10H : 1V shall be 8' long.
2. The flare rate of the guardrail may be increased after crossing the ditch bottom to shorten the length of the terminal.
3. Determine the height of the W-Beams at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (S) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (S) on the edge of shoulder used to obtain the offset distance (at the same station). Add Beam Guardrail design height (31") to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION "C".

Elevation = (Elevation - (0.1)) + 27
**NOTES**

1. These terminals are FHWA accepted at Test Level Three (TL-3) and may be used for all posted speeds.
2. An ET-31 (Steel) as manufactured by Trinity Industries, Inc. or an SKT-6P-MG9 as manufactured by Road Systems Inc. shall be installed according to manufacturer’s recommendations.
3. A reflectorized object marker shall be installed according to manufacturer’s recommendations.
4. When snow load post washers and snow load rail washers are required by the contract, the snow load rail washers shall not be installed within the terminal limits.
5. Terminals shall be installed at a widening, ensuring that the end piece is entirely off the shoulder. While these terminals do not require an offset at the end, a pair is recommended. A minimum flare of 25 : 1, or flatter over the length of the terminal is allowed for either the ET-31 (Steel) or the SKT-6P-MG9, with a maximum offset of 34” (tn) over 60’ (ft).
6. For Terminal details, see WADOT approved manufacturer’s drawings.
NOTES

1. These Terminals are FHWA accepted at Test Level Two (TL-2) and may be used in applications with speeds of 40 MPH or less.
2. An ET-31 (TL-2) as manufactured by Trinity Industries, Inc. or an SKT-SP-MGS (TL-2) as manufactured by Road Systems Inc. shall be installed according to manufacturers' recommendations.
3. A reflectorized object marker shall be installed according to manufacturers' recommendations.
4. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the Terminal limits.
5. Terminals shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While these Terminals do not require an offset at the end, a flare is recommended. A maximum flare of 25 : 1 or flatter over the length of the Terminal is allowed for either the ET-31 (TL-2) or the SKT-SP-MGS (TL-2), with a maximum offset of 24" (in.) over 50' (ft.).
6. For Terminal details, see WSDOT approved manufacturers' drawings.
NOTES
1. For use on the end of guardrail runs when a permanent terminal is not required.
2. For additional details not shown, see Standard Plan C-6a.
3. For End Section details, see Standard Plans C-7 and C-7a.
4. For Anchor Post Assembly details, see Standard Plan C-1b. Use detail on this plan for Wood Breakaway Post. (No block on this post).
5. Fasten the Anchor Cable using two 1" nuts and washers, at both ends of cable. Outside nut shall be torqued against cable nut a minimum of 100 ft-lbs.
6. Posts shall match those of connecting run: Timber or Steel.

BEAM GUARDRAIL (TYPE 31)
ANCHOR TYPE 10

STANDARD PLAN C-23.60-01
Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION

Washington State Department of Transportation
**BEAM GUARDRAIL (TYPE 31) TRANSITION SECTION**

**NOTES**

1. For additional details not shown in this plan, refer to Standard Plan C-28.08.
2. This guardrail transition is for connection to a vertical concrete shape or single slope barrier and cannot be connected directly to a concrete safety shape.
3. Do not bolt nested W-Beam or rubrail W-Beam to posts and blocks on posts 1, 3, 5, and 6. Bolt tapered blocks directly to posts.
4. The rubrail W-Beam can be shop bent to facilitate transitions.
5. Posts 1, 3, 4, and 6 require an additional hole to attach tapered blocks and/or rubrail.
6. Posts 1 and 2 are W8×15 steel posts ~ 7' - 6" long.
7. Posts 3 through 9 are W6×9 steel posts ~ 6' - 0" long.

---

**PLAN VIEW**

**ELEVATION VIEW**

**SECTION (STEEL POST)**

**TAPERED BLOCKS FOR RUBRAIL DETAIL**

**BOLT LOCATION DETAIL FOR STEEL POST**

**EFFECTIVE:** AUGUST 1, 2011 TO August 5, 2012

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**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**SHEET 1 OF 1 SHEET**

**DRAWN BY:** FERN LIDDELL

**DATE:** 06-16-11

**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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
NOTES:


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

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

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. This Barrier/Foundation combination has been designed in accordance with AASHTO LRFD Test Level 4 requirements. The horizontal vehicle impact force at the top of the barrier is taken at 64 kips for Strength and Extreme Limit States, and 10 kips for Testing stability (overturning and sliding) in the Service Limit State.

2. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Reinforcing Grid as shown on Standard Plan C-13.

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

4. See the Contract Plans for conduit placement.

5. Install Conduit Coupling flush with top of foundation. Do not glue PVC stubout.

6. This plan shall be used for 40' and 50' Light Standards with 6" min. length double mast arms.

7. Concrete shall be Class 4000.

Concrete shall be Class 4000.

This plan shall be used for 40' and 50' Light Standards with 6" min. length double mast arms.

Concrete shall be Class 4000.
**Single-Slope Concrete Barrier**

**Sign Bridge Foundation**

**Standard Plan C-85.16-00**

**Sheet 1 of 2 Sheets**

**Notes**

1. When connecting between Cast-In-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-13.
2. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide a 3'-0" slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
3. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.
4. Concrete shall be Class 4000, unless otherwise noted.

**Dimensions**

- **94" W** and **32-6" Z**
- **ELEVATION**
- **SHAFT DEPTH** Z" IS BASED ON ALLOWABLE LATERAL BEARING PRESSURE IN EXCESS OF 1500 PSF.

**End Post Spacing**

- **W/2**
- **5 # 4, 6 # 4 AND 7 # 4**

**Shaft**

- **3" DIA. SHAFT**
- **SHAFT DEPTH** Z" IS BASED ON ALLOWABLE LATERAL BEARING PRESSURE IN EXCESS OF 1500 PSF.

**SEE SECTION "C", SHEET 2 FOR GROUNDING CONDUCTOR DETAILS (SEE NOTE 2)**

**Effective:** August 1, 2011 to August 5, 2012

**Approved for Publication:** Pasco Bakotich III 06-15-11
When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-13.

All concrete shall be class 4000.

Notes:
1. See Table 21 for horizontal bar sizes.
2. All dimensions are out to out.
3. All bends are 2" radius.

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<td>#5</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Leveling End Transition:
- From Single-Slope Dual-Faced Barrier to Monotube Sign Structure Foundation (see Bridge Plans).
- Leading End Transition:
- From Monotube Sign Support Single-Slope Barrier to Monotube Sign Structure Foundation (see Bridge Plans).

Plan:
- 24" Chamfer (Typ).
- 36" Chamfer (Typ).
- 1/2" equal spaces

Elevation:
- 24" Chamfer (Typ).
- 36" Chamfer (Typ).
- 1/2" equal spaces

Isometric View:
- Monotube Sign Structure Foundation (see Bridge Plans).

Section A:
- BARRIER ~ TOP VERTICAL # 4
- 24" BARRIER ~ BOTTOM VERTICAL # 4
- 2 1/2" CLR.
- 7 "
- 2 # 4

Section B:
- 2' - 10" MIN.
- TOP OF ROADWAY
- 1 # 4
- 3' - 6"
- 1 1/2" CLR.
- 36' - 0"
- 2 1/2" CLR.
- 7 "
- 2 # 4

Table:
<table>
<thead>
<tr>
<th>Separation</th>
<th>Bar Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E (horizontal bar qty)</th>
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<tbody>
<tr>
<td>0 TO 5&quot;</td>
<td>#4</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>UP TO 7&quot;</td>
<td>#5</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>UP TO 10&quot;</td>
<td>#5</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
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</tr>
</tbody>
</table>

Effective: August 1, 2011 to August 5, 2012

Washington State Department of Transportation

RICHARD P. ZELDEK
DIRECTOR OF ENGINEERING

PASCO BAKOTICH III 06-16-11

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
NOTES
1. See Standard Specification 3-24, 3-5, for construction requirements.
2. Use a template to locate and secure the bolts during foundation installation.
3. When connecting between cast-in-place and precast single-slope barrier, provide a connection blockout and rebar grid as shown in Standard Plan C-13.
4. Grounding conductor shall be non-insulated #4 AWG stranded copper, provide a 3'-0" - 5' stake. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
5. Install conduit coupling flush with top of barrier. Do not glue PVC stubout.

MATERIAL SPECIFICATIONS

ANCHOR RODS

<table>
<thead>
<tr>
<th>CLASS</th>
<th>TYPE</th>
<th>GRADE</th>
</tr>
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<tr>
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<td></td>
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ANCHOR NUTS

<table>
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<th>GRADE</th>
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<tbody>
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<td></td>
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ANCHOR WASHERS

<table>
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<th>CLASS</th>
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<th>GRADE</th>
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<tbody>
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<td></td>
<td></td>
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ANCHOR PLATES

<table>
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</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

EXPANSION JOINT WITH 3/4" PREMOLDED JOINT FILLER (TYP.)

9" CHAMFER (TYP.)

TOTAL SIGN AREA (SF)

ALLOWABLE LATERAL BEARING PRESSURE (PSF)

1500 AND UP

1000 ~ 1499

13' - 0"

16' - 0"

18' - 0"

22' - 0"

25470
ANCHOR ROD - 1 3/16" GALV THREADED 2' 4" LONG, EXPOSED ANCHOR ROD END 1'-6" LMT (TYP).

CONDUIT COUPLING - SEE NOTE 3

FOUR HEAVY HEX NUTS AND TWO WASHERS - GALV.

ANCHOR PLATE - SEE STANDARD PLAN G-60.10, SHEET 4

B&B CONDUCTOR - ROUTE TO GROUNDING STUD (SEE NOTE 4)

CONCRETE CLASS C30

ANCHOR PLATE - SEE STANDARD PLAN G-60.10

SECTION A

SECTION B

SECTION C

TABLE

<table>
<thead>
<tr>
<th>SPACE</th>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td>0 TO 3'</td>
<td>3' - 6&quot;</td>
<td>6&quot;</td>
<td>2' - 6&quot;</td>
<td>4' - 7&quot;</td>
<td>2' 4&quot;</td>
<td>50</td>
</tr>
<tr>
<td>UP TO 3'</td>
<td>4' - 0&quot;</td>
<td>7 1/2&quot;</td>
<td>2'- 4 1/2&quot;</td>
<td>4' - 1/4&quot;</td>
<td>5 1/2&quot;</td>
<td>50</td>
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<tr>
<td>UP TO 3'</td>
<td>4' - 0&quot;</td>
<td>8&quot;</td>
<td>2' - 4&quot;</td>
<td>4' - 1/4&quot;</td>
<td>6&quot;</td>
<td>50</td>
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BAR LIST

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<tr>
<th>MARK NO.</th>
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<th>CNT.</th>
<th>LENGTH</th>
<th>DIA.</th>
<th>TYPE</th>
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<tbody>
<tr>
<td>1</td>
<td>BARRIER - TOP VERTICAL</td>
<td>12</td>
<td>VARIOUS</td>
<td># 4</td>
<td></td>
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<tr>
<td>2</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>12</td>
<td>VARIOUS</td>
<td># 4</td>
<td></td>
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<tr>
<td>3</td>
<td>BARRIER - HORIZONTAL</td>
<td>2</td>
<td>25'- 0&quot;</td>
<td>8&quot;</td>
<td>STL</td>
</tr>
<tr>
<td>4</td>
<td>BARRIER - HORIZONTAL</td>
<td>2</td>
<td>3'- 6&quot;</td>
<td>8&quot;</td>
<td>STL</td>
</tr>
<tr>
<td>5</td>
<td>BARRIER - TOP VERTICAL</td>
<td>8</td>
<td>VARIOUS</td>
<td># 4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>8</td>
<td>VARIOUS</td>
<td># 4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GAP - TOP</td>
<td>5</td>
<td>18'- 0&quot;</td>
<td>5&quot;</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>GAP - VERTICAL, EACH CORNER</td>
<td>4</td>
<td>3'- 6&quot;</td>
<td>4&quot;</td>
<td>STL</td>
</tr>
<tr>
<td>9</td>
<td>SHAFT - SPIRAL</td>
<td>13</td>
<td>AS REQUIRED</td>
<td># 4</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SHAFT - VERTICAL</td>
<td>13</td>
<td>2&quot; SQUARE COMPACT</td>
<td># 8</td>
<td></td>
</tr>
</tbody>
</table>

CONSTRUCTION JOINT WITH BARRIER END BURIED

BENDING DIAGRAM

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SINGLE-SLOPE CONCRETE BARRIER CANTILEVER SIGN STRUCTURE FOUNDATION

STANDARD PLAN C-62.30-00

SHEET 2 OF 2 SHEETS

PASCO BAKOTICH III 06-15-11

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

ALL DIMENSIONS ARE OUT TO OUT

ALL BENDS ARE 2" RADIUS

PASS BAKOTICH II
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING AT RIP

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL TYPE 3
STANDARD PLAN D-2.06-01
SHEET 3 OF 3 SHEETS
APPROVED FOR PUBLICATION
NOTES:
1. Wall to be designated Noise Barrier Wall Type SA, SB, SC or SD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panel shall have at least 3 feet of level ground on each side.
4. Construction joints in the foundation shall be spaced at 120 feet maximum.

CAST-IN-PLACE CONCRETE WALL W/ TRAFFIC BARRIER ON SPREAD FOOTING

FOOTING WIDTH TRANSITION DETAIL
(FOR LOCATIONS WITHOUT FOOTING STEP)
NOTES

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

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

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

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

5. Panels to be designated Noise Barrier Wall Type 7A, 7B, 7C or 7D.

WALL REINFORCEMENT TABLE

<table>
<thead>
<tr>
<th>WALL HT (H)</th>
<th>TYPE 7A</th>
<th>TYPE 7B</th>
<th>TYPE 7C</th>
<th>TYPE 7D</th>
</tr>
</thead>
<tbody>
<tr>
<td>8'-0&quot;</td>
<td>#4 @ 10&quot;</td>
<td>#4 @ 12&quot;</td>
<td>#4 @ 14&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>#4 @ 10&quot;</td>
<td>#4 @ 12&quot;</td>
<td>#4 @ 14&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
<tr>
<td>12'-0&quot;</td>
<td>#4 @ 10&quot;</td>
<td>#4 @ 12&quot;</td>
<td>#4 @ 14&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
<tr>
<td>14'-0&quot;</td>
<td>#4 @ 10&quot;</td>
<td>#4 @ 12&quot;</td>
<td>#4 @ 14&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
<tr>
<td>16'-0&quot;</td>
<td>#4 @ 10&quot;</td>
<td>#4 @ 12&quot;</td>
<td>#4 @ 14&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
<tr>
<td>18'-0&quot;</td>
<td>#4 @ 10&quot;</td>
<td>#4 @ 12&quot;</td>
<td>#4 @ 14&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
</tbody>
</table>

CAST-IN-PLACE CONCRETE WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION
NOTE:
1. Wall to be designated Noise Barrier Wall Type 7SSA, 7SSB, 7SSC or 7SSD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. The Contract specifies actual foundation requirements D1 or D2.

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

CAST-IN-PLACE CONC. WALL
W/ SINGLE SLOPE TRAFFIC BARRIER ON SHAFT FOUNDATION

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
**Joint and Corner Detail**

- **Panel 1**: 2' - 0" BAR "D"
  - **Bar G**: Spiral
  - **Joint Hole**: 2" I.D. with roughened surface, corrugated steel pipe
  - **Fill Void**: With grout using ducts

- **Panel 2**: 1' - 0" MIN. (TYP.)
  - **Bar H**: SPIRAL
  - **Joint Hole**: 2" I.D. with roughened surface, corrugated steel pipe
  - **Fill Void**: With grout using ducts

- **Notes**:
  - **Fill Joint Hole**: With grout using ducts.
  - **Ducts**: Shall be located on panel face opposite traffic.
  - **Transverse Bars**: Not shown.

---

**Precast Concrete Wall on Spread Footing**

- **Design Engineer**: Washington State Department of Transportation

---

**Noise Barrier Wall Type 9**

**Standard Plan D-2.32-00**

**Effective**: August 1, 2011 to August 5, 2012
<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 96A</th>
<th>SPIRAL</th>
<th>BARS</th>
<th>BARS</th>
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<tbody>
<tr>
<td>0'-6&quot;</td>
<td>2'-6&quot;</td>
<td>22 Air 11/16&quot;</td>
<td>22 Air 11/16&quot;</td>
<td>22 Air 11/16&quot;</td>
</tr>
<tr>
<td>0'-9&quot;</td>
<td>5'-6&quot;</td>
<td>44 Air 3/4&quot;</td>
<td>44 Air 3/4&quot;</td>
<td>44 Air 3/4&quot;</td>
</tr>
<tr>
<td>0'-12&quot;</td>
<td>8'-6&quot;</td>
<td>66 Air 1-1/4&quot;</td>
<td>66 Air 1-1/4&quot;</td>
<td>66 Air 1-1/4&quot;</td>
</tr>
<tr>
<td>2'-6&quot;</td>
<td>10'-6&quot;</td>
<td>88 Air 1-1/4&quot;</td>
<td>88 Air 1-1/4&quot;</td>
<td>88 Air 1-1/4&quot;</td>
</tr>
<tr>
<td>4'-6&quot;</td>
<td>12'-6&quot;</td>
<td>110 Air 1-1/4&quot;</td>
<td>110 Air 1-1/4&quot;</td>
<td>110 Air 1-1/4&quot;</td>
</tr>
<tr>
<td>6'-6&quot;</td>
<td>14'-6&quot;</td>
<td>142 Air 1-1/4&quot;</td>
<td>142 Air 1-1/4&quot;</td>
<td>142 Air 1-1/4&quot;</td>
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<tr>
<td>8'-6&quot;</td>
<td>16'-6&quot;</td>
<td>174 Air 1-1/4&quot;</td>
<td>174 Air 1-1/4&quot;</td>
<td>174 Air 1-1/4&quot;</td>
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<tr>
<td>10'-6&quot;</td>
<td>18'-6&quot;</td>
<td>206 Air 1-1/4&quot;</td>
<td>206 Air 1-1/4&quot;</td>
<td>206 Air 1-1/4&quot;</td>
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<tr>
<td>12'-6&quot;</td>
<td>20'-6&quot;</td>
<td>238 Air 1-1/4&quot;</td>
<td>238 Air 1-1/4&quot;</td>
<td>238 Air 1-1/4&quot;</td>
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<tr>
<td>14'-6&quot;</td>
<td>22'-6&quot;</td>
<td>270 Air 1-1/4&quot;</td>
<td>270 Air 1-1/4&quot;</td>
<td>270 Air 1-1/4&quot;</td>
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<td>16'-6&quot;</td>
<td>24'-6&quot;</td>
<td>302 Air 1-1/4&quot;</td>
<td>302 Air 1-1/4&quot;</td>
<td>302 Air 1-1/4&quot;</td>
</tr>
</tbody>
</table>

**Wind Exposure & Velocity**

- **High Exposure**
  - Full Width
  - 85 MPH

- **Medium Exposure**
  - 75 MPH

- **Low Exposure**
  - 65 MPH

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 10A, 10B, 10C or 10D. The Contractor shall specify actual wall designation.

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

3. Panels shall have at least 3'-0" of level ground on each side.

4. Concrete panels in the footing shall be spaced at least 1'-0" minimum.

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

**Precast Concrete Wall**

**Type 10**

**Standard Plan D-2.34-01**

Sheet 1 of 2 sheets

**Approved for Publication**

Puca Bankovich M. 01-06-00

Washington State Department of Transportation
### Noise Barrier Wall

#### Type 11

**Standard Plan D-2.39-02**

**WALL HIGHT**

<table>
<thead>
<tr>
<th>WALL HIGHT</th>
<th>TYPE 11A</th>
<th>TYPE 11B</th>
<th>TYPE 11C</th>
<th>TYPE 11D</th>
</tr>
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<tbody>
<tr>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>2'-6&quot;</td>
<td>2'-6&quot;</td>
<td>2'-6&quot;</td>
<td>2'-6&quot;</td>
<td>2'-6&quot;</td>
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<tr>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
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<td>3'-6&quot;</td>
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<td>3'-6&quot;</td>
<td>3'-6&quot;</td>
<td>3'-6&quot;</td>
</tr>
</tbody>
</table>

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 11A, 11B, 11C or 11D. The Contractor 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 Contractor specifies actual foundation requirements P1 or P2.
5. Minimum Panel length shall be 12 feet.

---

**Figure**

- **Section A**: Hole dia = Bolt dia + 1/2 (Refer Table)
- **Section B**: Anchor Bolt Alternative
- **Section C**: Reinforcement

---

**Diagram**

- Shaft & Planter
- Precast Concrete Panel on Planter
- Wall to be wet plumb
- Shaft & Planter
- Precast Concrete Panel on Planter
- Wall to be wet plumb

---

**Specifications**

- **Panel Length**: 12'-0" Max.
- **Wall Height**: 2'-0" to 3'-6"

---

**Signatures**

- **Ben Khalil, PE**
- **Washington State Department of Transportation**

---

**Effective Dates**

- Effective: August 1, 2011 to August 5, 2012
NOTES

1. Wall to be designated Noise Barrier Wall Type 14SSA, 14SSB, 14SSC or 14SSD. The Contract specifies actual wall designations.

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

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

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

5. Anchor Bolts, Nuts, Washers, Base Plate, and Bar B shall have a Protective Coating of one of the following: Hot Dipped Galvanizing AASHTO M 232 for Hardware; AASHTO M 111 for Washers and Plates, Mechanical Galvanizing AASHTO M 284 CL 65, or Zinc Rich Paint, Paint threads and nuts after installation.

6. The bottom 9" of Bar B shall be painted with one coat of Formula A-8-88 Zinco Dust Oxide Primer OR, one coat of Formula A-11-89 Primer.

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

---

<table>
<thead>
<tr>
<th>WALL HT H</th>
<th>TYPE 14SSA</th>
<th>TYPE 14SSB</th>
<th>TYPE 14SSC</th>
<th>TYPE 14SSD</th>
<th>WALL HT H</th>
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<td>6' - 0&quot;</td>
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<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>6' - 0&quot;</td>
</tr>
<tr>
<td>14' - 0&quot;</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>14' - 0&quot;</td>
</tr>
<tr>
<td>16' - 0&quot;</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>16' - 0&quot;</td>
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<tr>
<td>18' - 0&quot;</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>18' - 0&quot;</td>
</tr>
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<td>9' - 0&quot;</td>
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<td>84 x 16</td>
<td>84 x 16</td>
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<td>9' - 0&quot;</td>
</tr>
<tr>
<td>11' - 0&quot;</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>11' - 0&quot;</td>
</tr>
<tr>
<td>12' - 0&quot;</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>12' - 0&quot;</td>
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<td>10' - 0&quot;</td>
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<td>84 x 16</td>
<td>84 x 16</td>
<td>84 x 16</td>
<td>10' - 0&quot;</td>
</tr>
</tbody>
</table>

---

**Aluminum Siding**

**Concrete Barriers**

**Noise Barriers**

---

**Wind Exposure & Velocity**

**Wind Exposure & Velocity**

---

**Specifications**

---

**Design Engineer**

---

**State Design Engineer**

---

**NOTES**

---

**EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012**

---

**APPRECIATION FOR PUBLICATION**

---

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

---

**APPROVED FOR PUBLICATION**

---

**SHEET 1 OF 2 SHEETS**
The Contract specifies actual foundation requirements effective: August 1, 2011 to August 5, 2012.
TYPICAL EXPANSION JOINT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

TYPICAL EXPANSION JOINT

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

EXPANSION JOINT AT WIDTH STEP

8" OR 12" CMU

TRAFFIC SIDE

TRAFFIC SIDE

PLAN VIEW

BOND BEAM DETAIL

8" (TYP.)

BACKER ROD

POLYURETHANE SEALANT

BOND BEAM GROUTING LIMIT

SEE DETAIL A

TYPICAL BOTH SIDES OF WALL

#5 (TYP.)

MASONRY WALL ON TRENCH FOOTING

NOISE BARRIER WALL
TYPE 16

STANDARD PLAN D-3.60-00
SHEET 2 OF 2 SHEETS

BOND BEAM DETAIL

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

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### Notes:

1. Walls in line designated Noise Barrier Wall Type 10A, 10B, 10C, or 10D. The Contract specifies actual wall designations.

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

3. All masonry shall be hollow unit and installed as running bond.

4. All masonry is to be specially inspected.

5. All Concrete Masonry Unit (CMU) cells the 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 shaft cap shall be spaced 120 feet minimum.

8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, stones and beyond.

9. The contract specifies actual foundation requirements D1 or D2.

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### Diagram:

- **Masonry Wall on Shaft**
  - W/ Grade Beam Foundation
  - Diagonal bars reinforcement
  - Expansion joints
  - Construction joint for locations

---

**Harold J. Peterfeso**

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

EXPIRES AUGUST 23, 2006
**Bond Beam Detail**

- **Shaft Diameter:** 9" (max. typ.)
- **Shaft Length for Payment:** #4 @ 1'-0"
- **EVEN Multiples of 8"**

**Step Detail**

- **3'-0" STEP DETAIL**
- **Concrete Shaft**
- **8" or 10" CMU Cells with Vertical Reinforcing and Bond Beam**
- **Expansion Joint Filler Placed in Block Recesses.**

**Bond Beam Units**

- **4'-0" Max. (Typ.)**
- **Vertical Reinforcing and Bond Beam Placement.**
- **Traffic Side Expansion Joint Filler Placed in Block Recesses.**

**Traffic Side Expansion Joint**

- **9" (Typ.)**

**Plan View**

- **Typical Expansion Joint**
- **9" CMU Cells with Vertical Reinforcing and Bond Beam.**
- **Expansion Joint Filler Placed in Block Recesses.**

**Typical Both Sides of Wall**

- **1/2" Joint**
- **Polystyrene Sealant**
- **Backer Rod**

**Noise Barrier Wall Type 19**

- **Standard Plan D-2.66-00**
- **Masonry Wall on Shaft W/ Grade Beam Foundation**

**Effective:** August 1, 2011 to August 5, 2012
### Notes

1. Walls to be designated Noise Barrier Wall Type 2A, 2B, 2C, or 2D. The Contract specifies actual wall designs.
2. For intermediate wall heights, use the next higher h.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be spallcement 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 5 feet of level ground on each side.
7. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
8. The Contract specifies each foundation requirements D1 or D2.

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### Diagram

- **Noise Barrier Wall Type 2D**
- **Standard Plan D-3.66-00**
- **Sheet 1 of 2 sheets**
- **Approved for publication**
- **Hildi, J. Peden**
- **Approved August 23, 2006**
- **Washington State Department of Transportation**

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**Elevation**

- **Plaster**
- **Plaster Spacing**
- **Expansion Joint Spacing**
- **TOP of WALL**
- **FINAL GROUND LINE**
- **BOTTOM of WALL**

**Section at Plaster and Shaft**

- **Anchor Splices**
- **Two Turnings**
- **Top and Bottom**

**Notes**

- **Expansion Joint**
- **Dowel Reinforcement**
- **3 blocks max.**

---

**Effectiveness:**

- **August 1, 2011 to August 5, 2012**
NOTES

1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.02 for door and frame details.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

PLAN VIEW

CONCRETE SLAB DETAIL

FOR CAST-IN-PLACE WALL ON OFFSET SPREAD FOOTING

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.02 for door and frame details.
EXPANSION JOINT

ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

3' (TYP.)

SEE NOTE 2

VARIES

5''

2' - 0"

2' - 3"

6"

1' - 9"

11"

3' - 0"

8"

BAR "A" (TYP.)

#6 x 11' - 0" (TYP.)

BAR "A" (BAR 7 BARS PER SIDE EQUALLY SPACED)

#5 x 4' - 0" (TYP.)

ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

48" DOOR OPENING

4" CONCRETE SLAB

TOP OF ROADWAY

FINISHED GRADE

WALL

TRAFFIC SIDE

CONCRETE SLAB DETAIL

BENDING DIAGRAM

4" CONCRETE SLAB

4" CONCRETE SLAB

VARIES

6"
NOTES

1. All rebars shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.35 for wall reinforcement not shown.

CONCRETE SLAB

WALL

CONCRETE SLAB

DOOR DETAIL (SEE NOTE 2)

CONCRETE SLAB NOT SHOWN

48" DOOR OPENING

EXPANSION JOINT

DOOR FRAME (SEE NOTE 2)

A BENDING DIAGRAM

-4 CONCRETE SLAB

2' - 0"

4 1/2"

#4 BAR

#5 x 6' - 8" (TYP.)

#6 x 11' - 0" (TYP.)

STANDARD PLAN D-2.64-00

FOR PRECAST WALL ON SHAFT FOUNDATION

FINISHED GRADE

BAR "A" (7 BARS PER SIDE)

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

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NOTES

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

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NOTES

1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.68 for wall reinforcement not shown.

CONCRETE SLAB DETAIL

FRONT VIEW

NOISE BARRIER WALL
ACCESS DOOR TYPE 5

STANDARD PLAN D-3.85-00

SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 1, 2011 TO AUGUST 5, 2012

APPROVED FOR PUBLICATION

HAROLD J. PETERSEN
ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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DRAWN BY: ADAM COCHRAN

EXPIRES AUGUST 23, 2006

BAR "A"

CONCRETE SLAB

DOOR FRAME ANCHOR (TYP.)

BAR "A" (7 BARS PER SIDE)

GROUND LINE

DOOR OPENING

CONCRETE SLAB DETAIL

BENDING DIAGRAM

4" CONCRETE SLAB

WALL

SOLID GROUT CAP

CONCRETE SLAB

5' - 0" x 4' - 0"

5" CONCRETE SLAB

5' - 0" x 4' - 0"

DOOR OPENING

48" DOOR OPENING

FOR MASONRY WALL (SHAFT FOUNDATION SHOWN)

SOLID GROUT CAP

BAR "A"

8" OR 10"

3" OR 5"

EFFECTIVE: AUGUST 1, 2011 TO AUGUST 5, 2012

EFFECTIVE: AUGUST 1, 2011 TO AUGUST 5, 2012

EFFECTIVE: AUGUST 1, 2011 TO AUGUST 5, 2012

EFFECTIVE: AUGUST 1, 2011 TO AUGUST 5, 2012

EFFECTIVE: AUGUST 1, 2011 TO AUGUST 5, 2012
Noise Barrier Wall
Access Door & Frame

Alternate Access Door and Frame for Cast-In-Place and Precast Walls

3" 3" 4 1/2" Stainless Steel Hinge (Typ.)
1/2" Tie Bar
1/2" Tie Bar
1 1/2" Doorstop
6" x 16" S.S. Plate W/ 10" x 1" Dia. S.S. Handle
4" x 9" Door Frame W/ 1/2" x 1 1/2" Door Stop
1 1/2" Doorstop

Weld anchor pin to hinge reinforcement plate (Typ.)

Anchor reinforcement plate (Typ.) - Channel Width x 2 1/2" x 1/4", welded to frame

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

NOTES

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Effective: August 1, 2011 to August 5, 2012
**Noise Barrier Wall Access Door & Frame**

**Standard Plan D-3.92-00**

**Effective:** August 1, 2011 to August 5, 2012

**Drawn by:** Adam Cochran

**Signed by:** Harold J. Petersen

**Approved for Publication:**

**Washington State Department of Transportation**

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---

**ISOMETRIC VIEW**

- 1 1/2" DOORSTOP
- 16 GAGE STEEL DOOR FRAME
- 5" x CHANNEL WIDTH x 1/4" REINFORCEMENT PLATE W/ 1/2" HOLE FOR ANCHOR PIN
- 4 1/2" STAINLESS STEEL HINGE (TYP.)
- 6" x 16" S.S. PLATE W/ 10" x 1" DIAM. S.S. HANDLE

**FRONT VIEW**

- 1 1/2" DOORSTOP
- 16 GAGE STEEL DOOR FRAME
- 5" x CHANNEL WIDTH x 1/4" REINFORCEMENT PLATE W/ 1/2" HOLE FOR ANCHOR PIN
- 4 1/2" STAINLESS STEEL HINGE (TYP.)
- 6" x 16" S.S. PLATE W/ 10" x 1" DIAM. S.S. HANDLE

**SIDE VIEW**

- 1 1/2" DOORSTOP
- 16 GAGE STEEL DOOR FRAME
- 5" x CHANNEL WIDTH x 1/4" REINFORCEMENT PLATE W/ 1/2" HOLE FOR ANCHOR PIN
- 4 1/2" STAINLESS STEEL HINGE (TYP.)
- 6" x 16" S.S. PLATE W/ 10" x 1" DIAM. S.S. HANDLE

---

**COUNTERSINK DETAIL**

- Weld Hinge & Anchor Pin Reinforcement Plate (Typ.) ~ (CHANNEL WIDTH) x 12" x 1/4", Welded to Frame
- Grind smooth exterior surfaces before painting if needed.

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APPROXIMATE FINAL BATTER FOR FACE OF GEOSYNTHETIC LAYERS

GEOTEXTILE FOR UNDERGROUND DRAINAGE CLASS A, MODERATE SURVIVABILITY

1. For the values of "L," see sheet 3, and for the values of "S," see sheet 2.
2. For Geosynthetic Wall Construction Sequence, see sheet 4.
3. "A" is the peak seismic ground acceleration as defined and applied in the AASHTO LRFD Bridge Design Specifications, Articles 3.10.4.1 and 11.6.5.
4. The long-term geosynthetic design strength "T" shall be determined in accordance with WSDOT Standard Practice 1033, See Qualified Products List (QPL), Appendix "D" for products in which "T" has been determined. "T" and "H" are graphically defined. "T" is the distance from the top of the wall to a geosynthetic layer, and is used to determine "L" for that layer.
5. "L" the geosynthetic reinforcement length behind the wall face, is graphically defined. The maximum factored bearing stress acts in the vertical direction at the base of the wall. The load factors used are as specified in the AASHTO LRFD Bridge Design Specifications for each specified limit state.
6. Fascia or facing type shall be selected from Standard Plans D-3.10 or D-3.11 and called out in the Contract Plans. Region is to coordinate with the Geotechnical Services and Bridge & Structures offices.

For Geosynthetic Wall Construction Sequence, see sheet 4.

region is to coordinate with the Geotechnical Services and Bridge & Structures offices.

normal 0 0 0 0 0 0 0 0 0 false false false /* Style Definitions */ table.MsoNormalTable 

PERMANENT GEOSYNTHETIC WALL

STANDARD PLAN D-3

SHEET 1 OF 4 SHEETS

Drawing by: Lisa Cy Ford

1. Geotextile for Underground Drainage Class A, Moderate Survivability (Only needed if a geogrid is used for geosynthetic reinforcement)
2. 1'-0" min. Geotextile overlap, top & bottom

FINISHED GRADE
AFTER CONSTRUCTION OF WALL FACINGS

GEOSYNTHETIC WALL WITH 2 FT TRAFFIC SURCHARGE

TYPE 1, A < 0.51g
TYPE 2, A < 0.51g
TYPE 3, A < 0.51g
TYPE 4, A < 0.51g
TYPE 5, A < 0.20g
TYPE 6, A < 0.20g
TYPE 7, A < 0.20g
TYPE 8, A < 0.20g

For the values of "L," see sheet 3, and for the values of "S," see sheet 2.

NOTES

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
### WALL GEOMETRY AND REINFORCEMENT LAYER LOCATION

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**NOTE:** See Note 4, sheet 1.
### Permanent Geosynthetic Wall - External Stability Design

#### Geosynthetic Wall Type 3

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**Note**: The given values are for the **Permanent Geosynthetic Wall - External Stability Design**, excluding seismic design for large earthquakes.
1. Set form on completed lift.
2. Unroll geosynthetic and position it so that a 4'-0" tail drapes over the form. If a geogrid is used for the geosynthetic reinforcement position geotextile to prevent backfill from spilling through geogrid openings.
3. Place the backfill until the backfill is up to half of the required vertical geosynthetic layer spacing.
4. Place a windrow to slightly greater than full lift height against the form.
5. Place the geosynthetic "tail" over the windrow and lock into place with backfill.
6. Complete backfilling until the compacted backfill layer thickness is equal to the required vertical geosynthetic layer spacing.
7. The form may be left in place while constructing the next layer (see note 2) otherwise remove the form from the lower layer and reset it for the next layer. See below.

**Temporary Form System Detail**

1. Use of the Temporary Form System, as detailed in this plan, is optional.
2. To help maintain the wall face better, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

**BARRIER EXPANSION JOINT SPACING**
- 4' - 0" MIN. TO 8' - 0" MAX. O.C.

**MOMENT SLAB CONSTRUCTION JOINT SPACING**
- 1' - 0" MAX.
- 3/4" MIN. CLR.

**REINFORCING STEEL BENDING DIAGRAM**
- EPOXY COATED
- MAX 4"

**TYPICAL SECTION**
- SHOWN AT GRADE

**KEY NOTES**
- The barrier geometry reference line (B.G.R.L.) is perpendicular to the transverse roadway slope (T.R.S.). The B.G.R.L. on the low side of the roadway shall be paralleled to the T.R.S. up to a maximum of 5% super-elevation. The B.G.R.L. on the high side shall always be perpendicular to the T.R.S.
- Junction box & pull box: 8" × 8" × 1' - 6" NEMA 4
- Rustication ~ SEE RUSTICATION DETAIL
- Junction box, detailed by these dimensions and specifications, is required only if the barrier is on wall facing.
- For structural details below the match line, see standard plan D-3.10 or D-3.11.
- 6" expansion joint with premolded joint filler
- Install barrier dummy joints on traffic side only when architectural features are specified.

**CONTACT BRIDGE OFFICE**
- F - SHAPE BARRIER
- STANDARD PLAN D-3.16-00

**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 at the Washington State Department of Transportation.
REINFORCING STEEL BENDING DIAGRAM

ALL REINFORCING BARS SHOWN ON THIS PLAN SHALL BE AASHTO M 31 UNLESS OTHERWISE NOTED.
ALL DIMENSIONS ARE OUT TO OUT"

L = 7"
L = 8 7/8"
L = 10 3/4"

EPOXY COATED"
BACKFILL AND DRAINAGE FOR RETAINING WALLS
STANDARD PLAN D-4

CONDITION A

ASPHALT CONCRETE PAVEMENT
SUBGRADE
3" DIA. WEEP HOLE
GRAVEL BACKFILL FOR WALLS
UNDERDRAIN PIPE
1-1/2" MIN

CONDITION B

GRAVEL BACKFILL FOR WALLS
3" DIA. WEEP HOLE
GRAVEL BACKFILL FOR DRAINS
UNDERDRAIN PIPE
1-1/2" MIN

ALTERNATE DETAIL
TYPICAL FOR CONSTRUCTION WITH SHORING

NOTES
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.

CONDITION A OR CONDITION B
WITH GEOTEXTILE

CONSTRUCTION GEOTEXTILE
FOR UNDERGROUND DRAINAGE, MODERATE SURVIVABILITY.

GRAVEL BACKFILL FOR DRAINS.

CONDITION A OR CONDITION B
WITH GEOTEXTILE
One cell
Overall Length

Unit A - 2 cell gabion = 6'
Unit B - 3 cell gabion = 9'
Unit C - 4 cell gabion = 12'

TYPICAL GABION

FASTENING ADJACENT BASKETS

LACING DETAIL

TWISTED FABRIC

WELDED FABRIC

CROSS CONNECTING WIRE
PLACEMENT, END CELLS

CROSS CONNECTING WIRE
PLACEMENT, INTERIOR CELLS
OF FRONT GABIONS
Reinforcement Note:

1. If trapped bar(s) is used, add 0.042 cy/ft³ of concrete class A4000 for barrier alternate 1.
   Add 0.038 cy/ft³ of concrete class A4000 for barrier alternate 2. See Standard Plan D-10.10.

2. Add 25% of reinforcing steel for barrier alternate 1 or 50% of reinforcing steel for barrier alternate 2. See Standard Plan D-10.10.

Vertical Face Wall Design with a 250 lb/sf Surcharge or Traffic Barrier

Reinforced Concrete Retaining Wall
Type 1 and 1BW
Standard Plan D-10.10-01
Sheet 2 of 2 sheets

Approved for Publication
Pamela Baldeck, P.E.
Washington State Department of Transportation
12-23-08
**Reinforcement Notes:**

1. If Trumpo barrier is used, add 6115 CY of concrete class A520 for barrier alternate 5.
2. Add 6185 CY for concrete class A520 for barrier alternate 2. See standard Plan D-10.15.01.

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**Sloping Face Wall Design**

A 250 PFP SURCHARGE

**Reinforced Concrete Retaining Wall Type 2 and 28W**

STANDARD PLAN D-10.15.01

| SHEET 2 OF 2 SHEETS |

**Approved for publication:**

Pevee Balkrishna 12-03-09

Washington State Department of Transportation

- **Effective:** August 1, 2011 to August 5, 2012
1. All concrete shall be Class 4000, except as noted.

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

3. Concrete in the top 45 ft wall sections shall be placed separately than expansion joints with a minimum 24-hour period before placing concrete in the adjacent section.

4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 6th Edition 2007 and Interims through 2009. The seismic design of these walls has been completed using an effective PGA of 0.20 g.
### Reinforced Concrete Retaining Wall

**Type 6**

**Standard Plan D-10.35-00**

**Sheet 2 of 2**

**APPROVED FOR PUBLICATION**

*Peace Yelavich III 07-06-00*

**Washington State Department of Transportation**

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

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

**Reinforcement Details**

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**Notes:**
- **Effective:** August 1, 2011 to August 5, 2012
- Design and specifications subject to change.
### Footings Reinforcement

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### Reinforced Concrete Retaining Wall

**Type 7**

**Standard Plan D-16.46-01**

*Sheet 2 of 5 sheets*

**Approved For Publication**

**Washington State Department of Transportation**

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**Effective:** August 1, 2011 to August 5, 2012

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**Effective:** August 1, 2011 to August 5, 2012
NOTES:

1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. Concrete in the 48 foot wall sections shall be placed separately on opposite joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Intermine through 2008. The seismic design of these walls has been completed using an effective PGA of 0.30 g.

REINFORCED CONCRETE RETAINING WALL TYPE 8
STANDARD PLAN D-16.4E-01
SHEET 1 OF 2 SHEETS
APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
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</thead>
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<tr>
<td></td>
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</table>

### Effective: August 1, 2011 to August 5, 2012

### Reinforcement Notes:
1. If truss barrier is used, add 0.110 cy of concrete, Class AA, for barrier alternate 1.
2. Add 0.110 cy of concrete, Class AA, for barrier alternate 2. See Standard Plan D-3A.10

### Sloping Face Wall Design
- With a 250 PSF Surcharge

### Reinforced Concrete Retaining Wall
- Type B
- Standard Plan D-10.4B-01
NOTES

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

DATE NUMERAL DETAILS

ALIGN THE NUMERALS PARALLEL TO TOP OF TRAFFIC BARRIER

TYPICAL DATE NUMERALS

TYPICAL SECTION VIEW

NUMERAL "1"

DATE NUMERAL PLACEMENT ON BRIDGE TRAFFIC BARRIER

STANDARD PLAN E-1

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 26, 2007

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
3. All piling shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, ungalvanized.
6. Each deck plate shall be nailed to each stringer with two 7" spikes, number 1 or larger.
7. On 17' spans, stringers shall be 6x16 S1E. On 15' spans, stringers shall be 5x16 S1E. Two-lane bridges shall use thirteen lines of stringers, one-lane bridges shall use seven lines of stringers.
8. Overlay thickness must be sufficient to cover bolts.

**NOTES**

1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
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8. Overlay thickness must be sufficient to cover bolts.
<table>
<thead>
<tr>
<th>PILE TYPE</th>
<th>D (in.)</th>
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<th>AREA</th>
<th>MOMENT OF INERTIA</th>
<th>RADIUS OF GYRATION</th>
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<td>12</td>
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<td>32</td>
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<td>12</td>
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<td>34</td>
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<td></td>
<td>18</td>
<td>12</td>
<td>34</td>
<td>5.4</td>
<td>32</td>
</tr>
</tbody>
</table>

**NOTES**

1. Spiral shall be spaced so that the end of the spiral is 10" from the center of the pile. The spiral shall be installed by using a mechanical connector that develops 105% of the minimum yield strength of the spiral. Installation shall meet the requirements of Standard Specification 6-02.3(24)E.

2. For pile lengths greater than 100 ft, the spiral shall be terminated at the top of the pile with a lap splice equal to or greater than 10% of the pile length. The spiral shall be terminated at the bottom of the pile with a lap splice equal to or greater than 10% of the pile length.

3. All prestressing strands are 1/2" or 0.6" diameter (A615), Grade 270, uncoated strands, AASHTO M-620, except for strand length no. 10, which is 0.75 Fpu maximum.

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

5. AASHTO M203, jack to 0.75 Fpu maximum.

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


8. Dimensions shall be the lesser of D/5, 6d, or 8".


**PRECAST Prestressed Concrete Piles**

**STANDARD PLAN E-4**

**DRAWN BY:** Mark Sujka

**DATE:** 08-27-03

**EXPIRES AUGUST 23, 2004**

**NOTE:** This plan is not a legal engineering document but an electronic duplicate. The original is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.
For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.

For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.

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

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

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

The Prestressed piles shall have at least the minimum number of strands shown on Std Plan E4.

Pile stored on the ground should be bunked on level dunnage at no more than 20' on center, with a maximum overhang of 10'.

They shall be handled in accordance with Standard Plan E-4, Note 1.

Piles stored on the ground should be bunked on level dunnage at no more than 20' on center, with a minimum overhang of 10'.
The intent of this design is to facilitate the compaction of Hot Mix Asphalt pavement adjacent to a drainage structure. The centerline of the drainage structure may differ from the centerline of the frame and grate.

1. The centerline of the drainage structure may differ from the centerline of the frame and grate.

2. The centerline of the drainage structure may differ from the centerline of the frame and grate.

NOTES

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

2. The centerline of the drainage structure may differ from the centerline of the frame and grate.
NOTE

JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.
PRECAST CONCRETE SLOPED MOUNTABLE CURB

STANDARD PLAN F-10.62-01

ISOMETRIC VIEWS

TOP VIEW

18" RADIUS BLOCK

TOP VIEW

30" RADIUS BLOCK

INSIDE CORNER BLOCK

OUTSIDE CORNER BLOCK

18" RADIUS BLOCK

30" RADIUS BLOCK

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### Curb Radius Table

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<th>DIMENSION C</th>
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<tr>
<td>2'</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>4' TO 8'</td>
<td>12&quot;</td>
<td>1 1/2&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>8'</td>
<td>12&quot;</td>
<td>1&quot;</td>
<td>10&quot;</td>
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</tr>
<tr>
<td>5'</td>
<td>10&quot;</td>
<td>1 1/6&quot;</td>
<td>16 3/4&quot;</td>
</tr>
<tr>
<td>3'</td>
<td>10&quot;</td>
<td>1&quot;</td>
<td>18&quot;</td>
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<tr>
<td>1'</td>
<td>10&quot;</td>
<td>7/8&quot;</td>
<td>22 1/4&quot;</td>
</tr>
<tr>
<td>14' TO 18'</td>
<td>18&quot;</td>
<td>1 1/2&quot;</td>
<td>23&quot;</td>
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<td>22' TO 26'</td>
<td>20&quot;</td>
<td>1&quot;</td>
<td>28 1/4&quot;</td>
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<tr>
<td>26' TO 28'</td>
<td>20&quot;</td>
<td>1/4&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>OVER 28'</td>
<td>20&quot;</td>
<td>1/4&quot;</td>
<td>30 1/8&quot;</td>
</tr>
</tbody>
</table>

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The dual faced curb may be constructed by using two precast concrete sloped mountable curbs (longitudinal fields) as long as the installation is consistent with the dimensions shown in the plan.
NOTES


2. Provide Supplemental Plaques and install on Mileposts where indicated in the Contract.

3. See the Contract for the width of the Single-Faced Milepost Signs required (10" or 12").

4. For lateral installations behind traffic barrier, 6" high curbs, and ditches, see Standard Plan G-20.10.

5. Install at the locations shown in the Contract. Installation may be moved 50 feet or less (longitudinally) before or after the contract location if obstructions are encountered, or to utilize the post of another sign. Mileposts that cannot be placed within this degree of accuracy shall be omitted entirely.
1. Refer to the Sign Specification Sheet of the Contract for the V and W distances.

2. The minimum vertical distance from the bottom of the sign to the ground shall not be less than 7' for signs located within the Design Clear Zone.

Refer to the Sign Specification Sheet of the Contract for the 'V' and 'W' distances.
The minimum vertical distance from the bottom of the sign to the ground shall not be less than 7' for signs located within the Design Clear Zone.
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

2. For Steel Sign Support Foundation, see Standard Plan G-25.10.

3. For "H1" refer to the Sign Specification Sheet in the Contract.

4. Mounting brackets with steel straps shall be the stainless steel one-bolt, flared leg bracket and 3/4" wide, 0.030" thick strap "Band-it" products or an approved equal.

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NOTE:
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2. For Steel Sign Support Foundations, see Standard Plan G-25.10.

3. For "H1" refer to the Sign Specification Sheet in the Contract.
STEEL SIGN SUPPORT

NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

2. For Steel Sign Support Foundations, see Standard Plan G-25.10.

3. For "X", "Y", "H1", and "H2", refer to the Sign Specification Sheet in the Contract.

4. Sign post shall be 2 1/2" nominal I.D. galvanized schedule 80 steel pipe.

5. Do not tighten any slip plate bolt to the recommended torque before pre-tightening the other bolts. Progressively tighten the three slip plate bolts in 10 ft-lbs increments, alternately, to a final torque of 38 ft-lbs on each bolt.

For Steel Sign Support Foundations, see Standard Plan G-25.10.

For "X", "Y", "H1", and "H2", refer to the Sign Specification Sheet in the Contract.

Sign post shall be 2 1/2" nominal I.D. galvanized schedule 80 steel pipe.

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STEEL SIGN SUPPORT
TYPES PL, PL-T, & PL-U
INSTALLATION DETAILS

STANDARD PLAN G-24.30-00

X" SIGN WIDTH

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<td>2'-0&quot;</td>
</tr>
<tr>
<td>10'</td>
<td>1'-0&quot;</td>
<td>4'-0&quot;</td>
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</table>

Y" SIGN HEIGHT

<table>
<thead>
<tr>
<th>Height</th>
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<th>B</th>
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<tbody>
<tr>
<td>6'</td>
<td>1'-0&quot;</td>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>8'</td>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
</tr>
</tbody>
</table>

A, B, C, D, E, F, MAY BE INTERPOLATED FOR INTERMEDIATE SIGN SIZES

ELEVATION
TYPE PL SIGN SUPPORT
DUAL POST INSTALLATION

ELEVATION
TYPE PL-U SIGN SUPPORT

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EXPIRES AUGUST 9, 2009

Pasco Bakotich III 11-8-07
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

For "H1" refer to the Sign Specification Sheet in the Contract.

STEEL SIGN SUPPORT

TYPES ST-1 ~ ST-4

INSTALLATION DETAILS

STANDARD PLAN G-24.50.00

SHEET 1 OF 1 SHEET

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2. For "H1" refer to the Sign Specification Sheet in the Contract.

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2. For Steel Sign Support Foundations, see Standard Plan G-25.10.

ELEVATION

MAJOR AND SECONDARY SIGN SUPPORT INSTALLATION

WIDE FLANGE STEEL SIGN POST (UPPER SECTION)

WIDE FLANGE STEEL SIGN POST (LOWER SECTION)

BREAKAWAY HINGE PLATE (TYPE)

BREAKAWAY HINGE PLATE (TYP.)

VIEW C

SIGN PANEL

DETAIL C

WIDE FLANGE STEEL SIGN POST

WIDE FLANGE STEEL SIGN POST

3/16" ALUMINUM RIVET

3/16" ALUMINUM RIVET

EDGE OF TRAVELED WAY

BOTTOM OF SIGN POST BRACKET (TYPE)

BOTTOM OF SIGN POST BRACKET (TYP.)

ALUMINUM WIND BEAM AND TWO POST CLIPS (TYP.) ~ SEE WINDBEAM AND SIGN POST CONNECTION

zego ONE SIDE OF EACH WIDE FLANGE STEEL SIGN POST

STANDARD PLAN G-24.60-01

STEEL SIGN SUPPORT TYPES TP-A AND TP-B INSTALLATION DETAILS

PERSPECTIVE VIEW

BREAKAWAY HINGE PLATE CONNECTION

SIGN HEIGHT

TOP OF SIGN

TOP OF SIGN POST

MAJOR SIGN

Z-BAR

WINDBEAM

HINGE PLATE

SECONDARY SIGN

SECONDARY SIGN BOTTOM OF SIGN POST BRACKET (TYP.)

3/16" RIVET

3/16" RIVET @ 4" STAGGERED SPACING (TYP.)

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

DATE:

STATE DESIGN ENGINEER:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. Mounting brackets with stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/4" wide and 0.030" thick.

2. All signs installed on mast arms or standards (poles) require windbeams. All signs shall be installed with horizontal edges level. A skewed windbeam is required only when the sign is mounted within 12" of the mast arm base (see Detail "A").

3. The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3 feet.

NOTES:

1. EQUALLY SPACED

The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3 feet.

NOTES:

1. EQUALLY SPACED
NOTES

1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be one bolt, flared leg steel strap shall be 3/4" wide and 0.030" thick.

2. Sign braces are only installed when specified in the contract.

3. Sign braces are typically necessary on large sign panels that are exposed to high wind, traffic generated wind buffeting, or when snow thrown from plows might impact the sign.

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type 3 or 4 sheeting.

MOUNTING BRACKET AND STEEL STRAP

DETAIL

FIELD DRILL 5/16" DIAM. HOLE IN SIGN PANEL (TYP.)

FOR SIGN ATTACHMENT, SEE STD. PLAN G-22.10

FOR SIGN ATTACHMENT, SEE STD. PLAN G-24.50

FOR SIGN ATTACHMENT, SEE STD. PLAN G-30.10

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)
FOUNDATION TYPE 1
STANDARD PLAN 0-60.20-01
SHEET 1 OF 2 SHEETS

NOTES
1. See Standard Specification 0-21.3(9) for construction requirements.
2. Use a template to locate and secure bolts in place during foundation installation.

VALUES OF Z

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BENDING PRESSURE (PSF)</th>
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<tr>
<td></td>
<td>1500 AND UP</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>13'-0&quot;</td>
<td>1800 AND UP</td>
</tr>
<tr>
<td>2</td>
<td>14'-0&quot;</td>
<td>1000 - 1499</td>
</tr>
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CONCRETE CLASS C60
CONCRETE GRADE 4000
CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE
FINISH GROUND LINE
5" MAX.
2"
1' - 0" MIN.
CONSTRUCTION JOINT WITH ROUGHENED SURFACE
12 - #9 CONCRETE CLASS 4000
4' - 0" CAP ~ 4 EQUAL SPACES
#4 SPIRAL ~ 1' - 0" PITCH
3"
8"
4" CLR.

ANCHOR PLATE (TYP.) ~ SEE DETAIL, SHEET 2
PROVIDE SCREEN AROUND BASE ~ SEE SCREEN DETAIL, STANDARD PLAN G-60.10, SHEET 4
GROUNDING CONDUCTOR SHALL BE NON-INSULATED #4 AWG STANDED COPPER ~ PROVIDE 3' - 0" SLACK (ROUTE TO GROUNDING STUD)
CONDUIT COUPLING ~ INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)
ANCHOR ROD ~ 1 3/4" DIAM. x 4' - 4" LONG, THREADED 8" MIN. EACH END, #9 SPIRAL & 4 HEAVY HEX NUT + WASHERS EXPOSED ANCHOR ROD END FOR 1' - 0" MIN.
1" STEEL CONDUIT OR AS PER CONTRACT ~ WHEN REQUIRED, CAP EACH END

Pasco Bakotich III 06-27-11

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
ANCHOR PLATE DETAIL

Spiral welded lap splice detail

Spiral bar detail

Welding shall meet the requirements of Std. Spec. 6-02.3(24)E for weld dimensions - see table below

COLUMN AND SHAFT SPIRAL OPTIONS

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<tr>
<th>DEFORMED BAR</th>
<th>PLAIN STEEL BAR</th>
<th>COLD DRAWN WIRE</th>
<th>DEFORMED WIRE</th>
<th>WELD DIMENSIONS (INCHES)</th>
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<tr>
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<tr>
<td>#5</td>
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<td>5/8&quot;</td>
<td>L54 1/2 1/2 6</td>
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<tr>
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MATERIAL SPECIFICATIONS

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<th>ALL OTHER COMPOSITE</th>
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<td>CLASS 4000</td>
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</table>

BENDING DIAGRAM

ANCHOR PLATE DETAIL

ANCHOR PLATE DETAIL

BENDING DIAGRAM

ANCHOR PLATE DETAIL

ANCHOR PLATE DETAIL

BENDING DIAGRAM

ANCHOR PLATE DETAIL

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BENDING DIAGRAM

ANCHOR PLATE DETAIL

ANCHOR PLATE DETAIL

BENDING DIAGRAM

ANCHOR PLATE DETAIL

ANCHOR PLATE DETAIL

BENDING DIAGRAM

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BENDING DIAGRAM

ANCHOR PLATE DETAIL

ANCHOR PLATE DETAIL
CONCRETE SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH

ANCHOR PLATE (TYP.) ~ SEE DETAIL, STANDARD PLAN G-60.20, SHEET 2

ANCHOR ROD ~ 1 3/4" DIAM. x 4' - 4" THREADED 8" MIN. EACH END; W/ 2 WASHERS & 4 HEAVY HEX NUTS ~ GALVANIZE EXPOSED ANCHOR ROD END FOR 1' - 0" MIN.

3/4" CHAMFER (TYP.)

1" STEEL CONDUIT (GALV.) ~ WHEN REQUIRED ~ CAP EACH END

2. ON SLOPED GRADE (SHOWN AT REDUCED SCALE)

GROUNDING CONDUCTOR ~ ROUTE TO GROUNDING STUD (SEE NOTE 2)

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

PROVIDE SCREEN AROUND BASE ~ SEE SCREEN DETAIL, STD. PLAN G-60.10, SHEET 4

See Standard Specification 8-21.3(9) for construction requirements. Grounding Conductor shall be non-insulated #4 AWG stranded copper. Provide a 3' - 0" min. slack.

NOTES

1. See Standard Specifications 8-31.3(5) for construction requirements.

2. Grounding Conductor shall be non-insulated #4 AWG stranded copper. Provide a 3' - 0" min. slack.

FOR SLOPED GRADE

FOR LEVEL GRADE

CONDUIT COUPLING ~ INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

CONDUIT COUPLING ~ INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

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GROUNDING CONDUCTOR ~ ROUTE TO GROUNDING STUD (SEE NOTE 2)

CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

PROVIDE SCREEN AROUND BASE ~ SEE SCREEN DETAIL, STD. PLAN G-60.10, SHEET 4

See Standard Specification 8-21.3(9) for construction requirements. Grounding Conductor shall be non-insulated #4 AWG stranded copper. Provide a 3' - 0" min. slack.
### Bar List - Types 2 and 3

<table>
<thead>
<tr>
<th>Bank</th>
<th>Location</th>
<th>Bending Diagram</th>
<th>Total Sign Area</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>200 SF or Less</td>
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<tr>
<td></td>
<td></td>
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<td>CM</td>
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<td>1</td>
<td>Pedestal Hoop</td>
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<tr>
<td>2</td>
<td>Foundation Wall Ties</td>
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<td>0</td>
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<tr>
<td>3</td>
<td>Foundation Verticals</td>
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<tr>
<td>4</td>
<td>Pedestal Verticals</td>
<td></td>
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<tr>
<td>5</td>
<td>Foundation Wall Horizontals at Slope</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Foundation Wall Horizontals</td>
<td></td>
<td>Varies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Z</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Type 3</td>
</tr>
</tbody>
</table>

### Bending Diagram

- **Pedestal Hoop**: 5 bars, 64 inches each
- **Foundation Wall Ties**: 0 bars, 54 inches each
- **Foundation Verticals**: 14 bars, 54 inches each
- **Pedestal Verticals**: 10 bars, 54 inches each
- **Foundation Wall Horizontals at Slope**: 2 bars, 54 inches each
- **Foundation Wall Horizontals**: Varies, Varies

### Material Specifications

- **Concrete**: Class 4000P
- **Steel**: AASHTO M 291
- **Reinforcement Bars**: ASTM A 36
- **Anchor Rods**: AASHTO M 293
- **Anchor Nuts**: AASHTO M 291
- **Anchor Washers**: AASHTO M 291
- **Anchor Plate**: ASTM A 36

### Notes

- Effective: August 1, 2011 to August 5, 2012

- **Bending Diagram**

- **Material Specifications**

- **Conduit**: AASHTO M 291
- **Anchor Rods**: AASHTO M 293
- **Anchor Nuts**: AASHTO M 291
- **Anchor Washers**: AASHTO M 291
- **Anchor Plate**: ASTM A 36
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

TABLE

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SPAN LENGTH</th>
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<tbody>
<tr>
<td>60' OR LESS</td>
<td>61' TO 72'</td>
</tr>
<tr>
<td>DIMENSION</td>
<td>6' 9&quot;</td>
</tr>
<tr>
<td>BAR SPACES</td>
<td>2</td>
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<tr>
<td>SHAFT DEPTH</td>
<td>2</td>
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</table>

BAR LIST

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<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>SPAN LENGTH</th>
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<tbody>
<tr>
<td>1</td>
<td>SHAFT-ERTICAL</td>
<td>11 11 11 11 11 11</td>
</tr>
<tr>
<td>2</td>
<td>SHAFT-ERTICAL</td>
<td>1 1 1 1 1 1</td>
</tr>
<tr>
<td>3</td>
<td>CAP-TOP AND BOTTOM</td>
<td>9 9 9 9 9 9</td>
</tr>
<tr>
<td>4</td>
<td>CAP-ROOPES</td>
<td>5 5 5 5 5 5</td>
</tr>
<tr>
<td>5</td>
<td>CAP-ROOPES</td>
<td>5 5 5 5 5 5</td>
</tr>
</tbody>
</table>

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

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. U-Bolts, Washers and Nuts shall be stainless steel, except as noted.
2. See standard Plan G-80.16 for Overhead Sign Lighting details.
3. Galvanize all non-stainless steel parts.
4. For VAMS mounting, the contractor may substitute W8 x 12 steel or W12 x 13 steel sections for the Vertical Support W16 x 13 Steel.
5. 3" - 10" MAX Vertical Brace spacing for Wedge-In Connect Type VAMS Involution.

OVERHEAD SIGN MOUNTING (TRUSS STRUCTURE)
STANDARD PLAN G-80.30-01
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pezzo Baldasich 99 08-23-11
WSDOT ARCHITECTURE

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

**Material Specifications**

<table>
<thead>
<tr>
<th>Material</th>
<th>Grade/Type</th>
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</thead>
<tbody>
<tr>
<td>Pipe</td>
<td>ASTM A 36 or ASTM A 53 Grade B, Type E or E, or ASTM A 106 Grade B</td>
</tr>
<tr>
<td>Plate and Shapes</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>Structural Tubing</td>
<td>ASTM A 413 Grade B</td>
</tr>
<tr>
<td>Galvanized for Pipe Plates and Shapes</td>
<td>ALUMZINO M111</td>
</tr>
<tr>
<td>High Strength Bolts</td>
<td>STD SPCC, 410~1200 ksi</td>
</tr>
<tr>
<td>All Other Bolts</td>
<td>STD SPEC. BOLTS</td>
</tr>
<tr>
<td>Painted</td>
<td>ALUMZINO M232</td>
</tr>
<tr>
<td>Steel Grating</td>
<td>ASTM A 36</td>
</tr>
</tbody>
</table>
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

MAINTENANCE WALKWAY INSTALLED ON MONOTUBE SIGN BRIDGE

PLAN | ELEVATION

MAINTENANCE WALKWAY MAY BE USED WITH OTHER LAYOUT THAN THAT SHOWN ABOVE

1. REMOVE TIMES AHEAD OF USE.
2. USE MAINTENANCE WALKWAY BASED ON DIAMETER OF OR USE.-2011 TO August 5, 2012

NOTES

1. NOT INTENDED FOR USE IN FRONT OF OR IN GATE BRIDGE.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE Details, SEE STANDARD PLAN M-147.
3. UNIT LAYARD THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. WIRE ROPE WILL BE USED INSTEAD OF WIRE ROPE. THE WIRE ROPE SHALL BE PLACED WITH AN L-12, E-7, AND WITH A "A" OF END UP ADJUSTMENT.
5. BINDERS STAYS WITH WIRE DOORS OPENING IS THE RESPONSIBILITY OF THE CONTRACTOR.
LIVE STAKE INSTALLATION IN RIPRAP

LIVE STAKE INSTALLATION IN QUARRY SPALLS

LIVE STAKE INSTALLATION ON SLOPES

TYPICAL LIVE STAKE INSTALLATION

NOTES:
1. See Plant Material List for size and type of live stakes.
2. Do not use new or engineered guy wires for live stakes.
3. In hard ground use an iron bar or steel drill to prepare the holes for the stakes.
4. Avoid stripping bark or bruising stems during installation.
5. Fill void around cutting with soil.
NOTES

1. All Angle Irons and Steel Straps shall be galvanized in accordance with AASHTO M 222.

2. Pipe, Caps, and T-Adapter shall be 1" I.D. white PVC, or Primed Steel, except the water intake pipe shall be white PVC. Pipe shall be Sch. 40. All pipe joints shall be threaded.

3. Gage assembly pipe, fiberglass rod, and angle iron can be extended as needed to fit site requirements. Extra Pipe Clamps shall be added for security.

4. Score the water intake pipe 1/4" deep, 1/32" wide (width of saw blade), every 1/2", alternating cuts on top and bottom for drainage. Place at lowest water level.

5. Water level may vary, depending on season.

6. Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.

CREST GAGE

STANDARD PLAN H-30.10-00

Sheet 1 of 1 Sheet

DRAWN BY: LISA CYFORD

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
CERTIFICATE NO. 000860

SANDRA L. SALISBURY

Pasco Bakotich III 10-12-07

MENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT. EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. A socket and wedge anchoring system that meets the NCHRP 350 crash test criteria may be substituted in lieu of the anti-twist plate designs shown. Anti-twist plates are not required for wood post installations.

2. The platform design shown on this plan features slots that accommodate several types of mailbox supports, only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this design, but it must fit the bracket design shown on this plan. Brackets are required for all single-post installations. Field drilling may be necessary.

3. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners (See ALIGNMENT DETAIL, Sheet 2). Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

4. Attach a newspaper box to a steel post with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Use 2 1/2" × 1/4" lag bolts to attach newspaper box to wood posts. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

5. A Type 2 Support (Standard Plan H-70.20) is required when 2 or more mailboxes are to be installed on one support.

6. 

**NOTES**

**WOOD POST FASTENERS**

<table>
<thead>
<tr>
<th>SIZE / TYPE</th>
<th>QUANTITY</th>
<th>MATERIAL</th>
<th>LOOOGHRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; × 4 3/4&quot; BOLT</td>
<td>2</td>
<td>steel</td>
<td>~ 4 SETS MIN.</td>
</tr>
<tr>
<td>3/8&quot; × 3/4&quot; BOLT</td>
<td>4</td>
<td>steel</td>
<td>~ 4 SETS MIN.</td>
</tr>
<tr>
<td>3/16&quot; × 1&quot; SCREW</td>
<td>4</td>
<td>steel</td>
<td>~ 4 SETS MIN.</td>
</tr>
</tbody>
</table>

**STEEL POST FASTENERS**

<table>
<thead>
<tr>
<th>SIZE / TYPE</th>
<th>QUANTITY</th>
<th>MATERIAL</th>
<th>LOOOGHRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; × 2 3/4&quot; BOLT</td>
<td>2</td>
<td>steel</td>
<td>~ 4 SETS MIN.</td>
</tr>
</tbody>
</table>

**ADDITIONAL WASHERS**

~ AS REQUIRED TO FILL GAP (TYP.)

**STEEL POST ASSEMBLY DETAIL**

(SEE DETAIL, SHEET 2, FOR SPECIFICATIONS NOT SHOWN)

**WOOD POST ASSEMBLY DETAIL**

(SEE DETAIL, SHEET 2, FOR SPECIFICATIONS NOT SHOWN)
**NOTES**

1. The anchoring system shall meet NCHRP 350 crash test criteria. Use a socket and wedge system, or the anchoring system supplied by or recommended by the Type 2 Support manufacturer.

2. A maximum of 5 mailboxes may be installed on a Type 2 Support.

3. The platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.10, Sheet 2. The design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this platform design. Adjustable platforms must fit the 1 7/8" M-Clamp.

4. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow for installing the fasteners (See ALIGNMENT DETAIL). Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

5. Attach a newspaper box to a Type 2 Support with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

---

**ASSEMBLY DETAIL**

**MAILBOX ~ SIZE 1, 1A, OR 2**

(SIZE 1A SHOWN) (SEE TABLE, STD. PLAN H-70.10, SHEET 2, FOR DIMENSIONS)

---

**MAILBOX SUPPORT TYPE 2**

STANDARD PLAN H-70.30-00

SHEET 1 OF 2 SHEETS

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTE

1. Post shall have sufficient strength and durability to support the fence through the life of the project.
NOTE

Durbin Excavation, minimize disturbing the ground around trench as much as is feasible and smooth surface following excavation to avoid concentrating flow.

TYPICAL SPLICE

WEIGHT (TYPICAL) 4 PER POLE

TEXTILE FOR TEMPORARY SILT FENCE

WEIGHT NOTE 2

SPLICE DETAIL

Spliced fence sections shall be close enough together to prevent silt laden water from seeping through the fence. The overlap joining sections shall not be planted in low spots or in wind locations.

DATE: 08-11-09

APPROVED FOR PUBLICATION

Approved by:

Washington State Department of Transportation

STATE OF WASHINGTON
Department of Transportation

SILT FENCE

STANDARD PLAN 1-30.15-09

SHEET 1 OF 1 SHEET

MARK W. MAUSER
CERTIFICATE NO. 005088

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTES

1. Minimize detention of stormwater by placing fence as far away from top of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.

2. Install silt fencing along contours.

3. Install the ends of the silt fence to point slightly up-slope to prevent sediment from flowing around the ends of the fence.

4. Perform maintenance in accordance with standard specifications 6.01.2(a) and 6.01.3(1).
**NOTE**

Perform maintenance in accordance with Standard Specification 8-01.3(9)A and 8-01.3(15).

---

**SILT FENCE DESIGN**

- Place sand bags as required around culvert to provide support for silt fence.
- Embed posts into sand bags as required.
- Edge of geotextile.
- Place sand bags as required around culvert to provide support for silt fence.

**Standard Plan I-30.30-00**

- Compost berm design
- Culvert, box culvert, or pipe arch - end treatment varies

**Erosion Control at Culvert Ends**

- Standard Plan I-30.30-00

---

**Mark W. Mauger**

Certified Landscape Architect

Certificate No. 000598

State of Washington

Washington State Department of Transportation

Effective: August 1, 2011 to August 5, 2012
**WATTLE SPACING TABLE**

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>10' - 0&quot;</td>
</tr>
<tr>
<td>2:1</td>
<td>10' - 0&quot;</td>
</tr>
<tr>
<td>3:1</td>
<td>9' - 0&quot;</td>
</tr>
<tr>
<td>4:1</td>
<td>40' - 0&quot;</td>
</tr>
</tbody>
</table>

**NOTES**

1. Wattles shall be in accordance with Standard Specification 9-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification 8-01.3(10).
2. Securely knot each end of Wattles. Abut adjacent Wattles tightly, end to end, without overlapping the ends.
3. Pilot holes may be driven through the Wattles and into the soil when soil conditions require.
4. Live stakes may be used for permanent installation and shall be in accordance with Standard Specification 8-01.3(10).
5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.
6. Perform maintenance in accordance with Standard Specification 8-01.3(15).

---

**WATTLE INSTALLATION ON SLOPE**

**STANDARD PLAN I-30.30-00**

**SECTION A**
Compost Sock shall be in accordance with Standard Specification 9-14.5(6). Compost Sock shall be a minimum of 8" in diameter or sized to suit conditions as specified by the Engineer or Contractor.

2. Compost material to be dispersed on site, as determined by the Engineer.


4. Always install Compost Sock perpendicular to slopes and along contour lines.

5. Remove sediment from the upslope side of the Compost Sock when accumulation has reached 1/2 of the effective height of the Compost Sock.

6. Live stakes can be used in addition to wooden stakes and shall be in accordance with Standard Specification 9-14.6(1). See plans for species selection and spacing.
Prefabricated units may be used in lieu of the design shown on this plan upon approval of the Engineer. Structure shall be constructed such that geotextile material shall be fastened to posts creating a seamless joint. Ensure that ponding height of water does not cause flooding on adjacent roadways or private property. Perform maintenance in accordance with Standard Specification 6-01.3(16).
NOTES
1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).

Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.

The BIGD shall have a built-in high-flow relief system (overflow bypass).

The retrieval system must allow removal of the BIGD without spilling the collected material.

Perform maintenance in accordance with Standard Specification 8-01.3(15).
Geotextile encased Check Dams shall meet the requirements of Standard Specifications 8-01.3(6)A and 9-14.5(4).

1. Install the sloped ends of the Check Dam a minimum of 3" higher than the top of the check dam in the channel to ensure that water flows over the dam and not around it.

2. Perform maintenance in accordance with Standard Specifications 8-01.3(15).

3. Install the steeper slope of the Check Dam a minimum of 3" higher than the top of the check dam in the channel to ensure that water flows over the dam and not around it.

4. Flat bottom ditch design shown, Check Dam installation details are similar for "V" bottom ditches.

5. Flat bottom ditch design shown, Check Dam installation details are similar for "V" bottom ditches.

Open the sewn edge of the Check Dam toward the upstream side.

Dig trench approximately 6" wide and deep, staple end of geotextile and backfill with native material.

Check Dam installation details are similar for "V" bottom ditches.

Perform maintenance in accordance with Standard Specifications 8-01.3(15).

Flat bottom ditch design shown, Check Dam installation details are similar for "V" bottom ditches.

Perform maintenance in accordance with Standard Specifications 8-01.3(15).
NOTE:
ROCK CHECK DAM SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

SPACE CHECK DAMS THE DISTANCE APART WHERE POINTS "A" AND "B" ARE THE SAME ELEVATION.

NOTE:
PLACE SACKS FIRMLY AGAINST GROUND LINE AND ADJACENT SACKS.

SACKS SHALL BE #10 BURLAP OR APPROVED ALTERNATE FILLED WITH 48 TO 55 LBS. OF GRAVEL BACKFILL FOR DRAINS.

SPACE CHECK DAMS THE DISTANCE APART WHERE POINTS "A" AND "B" ARE THE SAME ELEVATION.

PLACE ROCK CHECK DAMS OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

NOTE:
QUARRY SPALLS (STD. SPEC. 9-13.6) SHALL BE PLACED 2' - 0" MAX. BETWEEN STAKES.

SPACE CHECK DAMS THE DISTANCE APART WHERE POINTS "A" AND "B" ARE THE SAME ELEVATION.

WATTLE OR COMPOST Sock CHECK DAM

NOTE:
WATTLE OR COMPOST SOCK (TYP.) CHECK DAM

NOTE:
3/4" × 3/4" WOODEN STAKE (TYP.) PENETRATION 1' - 6" MIN. (TYP.)

NOTE:
SUPERFICS SPALLS (STD. SPEC. 9-13.6)

SPACE CHECK DAMS THE DISTANCE APART WHERE POINTS "A" AND "B" ARE THE SAME ELEVATION.

NOTE:

NOTE:
PLACE ROCK CHECK DAMS OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

NOTE:
WATTLE OR COMPOST SOCK (TYP.) CHECK DAM
EROSION CONTROL BLANKET PLACEMENT ON SLOPE

NOTES

1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and slope steepness.

2. See Standard Specification 8-01.3(3).

EROSION CONTROL BLANKET

6" MIN. END OVERLAP

FASTENER

TAMPED NATIVE SOIL

ANCHOR TRENCH

6" MAX. CTLRL (TYP)

3' - 0" MAX. CTRS. (TYP)

ANCHOR TRENCH - SECTION A

SHINGLE SPLICE

6" MAX. CTRS. (TYP)

3' - 0" MAX. CTRS. (TYP)

SHINGLE SPLICE - SECTION B

6" MAX. CTLRL (TYP)

FLOW

ANCHOR TRENCH - SECTION A

PERSPECTIVE VIEW
EROSION CONTROL BLANKET PLACEMENT IN CHANNEL

**STANDARD PLAN I-60.20-06**

**NOTES**

1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.

2. Provide Check Slots per manufacturer's recommendations.

3. Roll ends may be spliced in a check slot.


More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.

Provide Check Slots per manufacturer's recommendations.

Roll ends may be spliced in a check slot.

See Standard Specification 8-01.3(3).

**STATE DESIGN ENGINEER**
Washington State Department of Transportation

**APPROVED FOR PUBLICATION**

**DATE**

**STATEMENT**

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**CERTIFICATE**

WASHINGTON STATE LANDSCAPE ARCHITECT

**NOTE**

Effective: August 1, 2011 to August 5, 2012

**DRAWN BY:** MARK SUJKA

**STANDARD PLAN I-60.20-06**

**APPROVED FOR PUBLICATION**

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1. Fused quick disconnect - use 30 amp fuses for high mast supports.
2. When down guys are required, see Standard Plan J-7a.

Fused quick disconnect - use 30 amp fuses for high mast supports.


From ground line to 10' above ground, enclose equipment grounding conductor in galvanized steel conduit, code sized. Above 10' from ground, staple equipment grounding conductor to pole. Connect to supplemental ground per Standard Plan J-9a.

Service wedge clamp.

ACSR triplex or fourplex conductors - see Contract.

Grounding lug.

8" x 8" x 4" NEMA 3R junction box with raintight hubs and removable cover.

Weatherhead - size as required.

Copper split bolt connector.

Messenger cable.

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1. Metering arrangements may vary with different serving utilities. The contractor shall verify the requirements of the utility prior to installing the service equipment.

2. All service pole conduits shall be secured to the pole with 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 to 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 E Service."

7. See breaker schedule in contract for breaker and contactor sizes.

NOTES:

1. Metering arrangements may vary with different serving utilities. The contractor shall verify the requirements of the utility prior to installing the service equipment.

2. All service pole conduits shall be secured to the pole with conduit strap at 5' centers.

3. All risers and service equipment shall be installed on side of pole that is away from traffic.

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

7. See breaker schedule in contract for breaker and contactor sizes.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>KEY</th>
<th>POLE CLASS (Resultant Horizontal Tension)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole gauge</td>
<td>A</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>B</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>D</td>
<td>2500</td>
<td>2500</td>
<td>2500</td>
</tr>
</tbody>
</table>

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.

### STRAIN POLE STANDARDS TYPE IV AND V

#### STANDARD PLAN J-7c

**APPROVED FOR PUBLICATION**

**Clifford E. Mansfield**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**Olympia, Washington**

**EXPRESS JANUARY 17, 1999**

**DATE**

**NONE**

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**EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012**

---

**Foundation Detail**

**Cone Section Detail**

**Handhole Detail**

**Strain Clamp Detail**

**Base Plate Detail**

---

**Notes:**

2. Pole shaft shall have 0.14”/ft taper.
3. Handholes may be 6” x 4” oval or rectangle.
4. 2½” diameter weatherhead may be substituted for the elbow and nipple assembly.
NOTES
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

NOTES:
1. See Standard Specifications 8-06.15 for Breakaway Foundation details. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with MD/HP 360 crash test criteria. The base connection details are only shown on this plan to illustrate how parts are assembled.


NOTES:


2. Steel shank shall be spaced either round or hexagonal, (12-15), 11 gauge, 1-1/2" O.D. at slipfit set. Taper shall be 3.14 inches per foot. Pedestrian signal displays mounted on an octagonal (8-sided) traffic signal pole with a pole attachment angle other than 0°, 45°, 90°, 135°, 180°, 225°, 270°, or 315° shall:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.

3. All poles shall be hot-dip galvanized per AASHTO M111.

4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.


NOTES


2. Steel shaft shall be tapered either round or deccagon (12 sides), 11 gauge, 4 1/2" O.D. at alcoholic wash. Taper shall be 0.14 inches per foot.

3. All poles shall be hot dip galvanized per AASHTO M111.

4. Welding of structures shall be in accordance with the latest edition of the ANSI D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012


2. Steel shaft shall be tapered either round or diamond (12-sided), 11 gauge, 4 1/2" O.D. at a 1/4" wall. Taper shall be 0.14 inches per foot. Pedestrian signal heads are installed on the same signal pole.

   a. Type A mounting when two pedestrian heads are installed on the same signal pole.

   b. Type B mounting when only one pedestrian signal head is mounted on a signal pole.

3. All poles shall be hot dip galvanized per AASHTO M111.

4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code -steel. All built-up steel shall be ground flush with base metal.

5. Visor shall be of Poly carbonate, fully enclosed plate at bottom to reduce glare on sign. Display shall be of appropriate color needed.


---

**Flashing Beacon**

**Type 1 Signal**

**Standard Details**

**Standard Plan J-21.16-00**

**Sheet 1 of 1 Sheet**

Approved for Publication

Peaco, Number 11

10-14-00

Washington State Department of Transportation
2. See Standard Plan J-44.16 for Flashing Beacon Type 1 Signal Standard details.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with listed connector suitable for use embedded in concrete.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3" - 6" min. slack.
Clamps to steel reinforcing bar with connector suitable for use embedded in concrete.
4. Heat shrink cap all spares conductors not terminated on a terminal strip.
FOUNDATION DEPTH "D" TABLE

ALTERNATE #1 - DRILLED SHAFT-TYPE CONSTRUCTION

<table>
<thead>
<tr>
<th>BOUNDARY ELEV.</th>
<th>ALLOWABLE LATERAL</th>
<th>LATERAL EMBRacing PRESSURE = 5000 PSF &amp; D = 10', 1500 PSF &amp; D = 15', 1000 PSF &amp; D = 20'</th>
</tr>
</thead>
<tbody>
<tr>
<td>3' ROUND</td>
<td>3-5' ROUND</td>
<td>1000 PSF</td>
</tr>
<tr>
<td>4' ROUND</td>
<td>5-8' ROUND</td>
<td>1500 PSF</td>
</tr>
<tr>
<td>6' ROUND</td>
<td>8-10' ROUND</td>
<td>2000 PSF</td>
</tr>
<tr>
<td>9' ROUND &amp; GREATER</td>
<td>10-12' ROUND</td>
<td></td>
</tr>
</tbody>
</table>

SPECIAL FOUNDATION DESIGN

ALTERNATE #2 - CONSTRUCTION METHOD

METAL (MINIMURED) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal pipe form. The top of the corrugated metal form shall termate 1 foot below final grade. Continue forming to full height using paper or cardboard to achieve a smooth finish on final exposed concrete. Support the form as necessary to prevent buckling.

Place the concrete foundation.

After concrete has cured, remove the entire paper or cardboard form and insert the conduit coupling. Continue forming to full height using paper or cardboard to achieve a smooth finish on final exposed concrete. Support the form as necessary to prevent buckling.
NOTES:
1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadable conditions allow its usage. Roadable conditions may require a special design by the Bridge Office, as determined by the Project Engineer.

TAPER NOTE
End Taper (on approach from opposing traffic):
20' (longitudinal) = use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.
**CASE A**
SLOPES 3H:1V THRU 3H:1V (MAX)

**CASE B**
SLOPES FLATTER THAN 3H:1V

**EMBANKMENTS**

**CASE C**
FORE SLOPES 4H:1V OR FLATTER

**CASE D**
FORE SLOPES STEEPER THAN 4H:1V (3H:1V MAX)

**DITCH SECTIONS**

PROVIDE 3.0' MIN. LEVEL GRADE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

STEEL LIGHT STANDARD FOUNDATION

FILL MATERIAL NOT STEEPER THAN 10H:1V SLOPE (3.0' MIN.)

STEEL LIGHT STANDARD FOUNDATION

STANDARD PLAN J-28.22-00

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

- **Maximum Exposed Concrete** equals the ratio of the grade of the existing slope times the diameter of the foundation:
  \[ \text{Maximum Exposed Concrete} = \text{Grade of Existing Slope} \times \text{Diameter of Foundation} \]

- **Back Slope Steeper Than 3H:1V** (Special Design Foundation)

- **4.0' Min.**
  - **Provide 2.0' Min. Level Grade** to prevent build-up of debris around base

- **Edison Slope Steeper Than 2H:1V**

- **Slopes Steeper Than 3H:1V** (Sertec T2)

- **Provide 2.0' Min. Level Grade** to prevent build-up of debris around base

- **Steel Light Standard Foundation**

- **Effect: August 1, 2011 To August 5, 2012**

- **Steel Light Standard (Fixed Base)**

- **Effective: August 1, 2011 To August 5, 2012**
For Luminaire Pole base mounting details.

A special foundation shall be on level ground or slopes not exceeding 2H : 1V, but not exceeding 2H : 1V. Slopes steeper than 2H : 1V shall require a special design.

These foundations are designed for a minimum of 2000 PSF (TYPE A) or 1500 PSF (TYPE B) allowable lateral bearing pressure for the soil. A special foundation shall be required for soil with allowable lateral bearing pressure lower than 1500 PSF.

The Anchor Bolts shall be high-strength steel, manufactured from ASTM A449, with washers are required for Slip Base assembly. 18 heavy duty hex nuts and 6 plate washers are required for a Fixed Base assembly.

Foundations constructed within Ecology Embankments shall be increased in depth by the depth of the Ecology Embankment. Foundations constructed within Ecology Embankments shall be increased in depth by the depth of the Ecology Embankment.

Exposed portions of the foundation shall be formed to create a Class 2 surface finish. All forming shall be removed upon completion of foundation construction.

For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheets 2 of 2.

Anchors shall be high-strength steel, manufactured from ASTM A449, with heavy hex nuts and hardened washers. Galvanize the Anchor Bolts according to AASHTO M282.

The foundation shall be grounded in accordance with the requirements of Standard Specification 8-20.3(4). Exposed portions of the foundation shall be formed to create a Class 2 surface finish. 18 heavy duty hex nuts and 6 plate washers, 18 heavy duty hex nuts and 6 plate washers are required for a Fixed Base assembly.

Exposed portions of the foundation shall be formed to create a Class 2 surface finish. All forming shall be removed upon completion of foundation construction.

For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheets 2 of 2.

The Anchor Bolts shall be high-strength steel, manufactured from ASTM A449, with heavy hex nuts and hardened washers. Galvanize the Anchor Bolts according to AASHTO M282.

The foundation shall be grounded in accordance with the requirements of Standard Specification 8-20.3(4).


The Strap Templates shall be held in place by nuts, 6" from the top of the foundation and 6" from the bottom of the anchor bolts. 10 heavy duty hex nuts and 5 plate washers are required for a Slip Base assembly. 18 heavy duty hex nuts and 6 plate washers are required for a Fixed Base assembly.
**METHOD 1**

**NO SUBSURFACE FORM**

This option is only used when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

**METHOD 2**

**METAL (SUBSURFACE) FORM REQUIRED**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" diameter, corrugated metal (pipe) form. The corrugated metal form shall not extend more than 6" below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill (CDF), or with compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
1. 60 ft (17) poles with double mast arms or pole weighing in excess of 1000 lbs shall not be installed on a slip base.

2. Galvanizing shall be in accordance with AASHTO M 111.

3. See Standard Plans C-86, D-14b, and J-25.80 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.

4. See Standard Specification Section 6-52.3280 and 5-50.4 for the torque requirements for all of the Anchor Bolt installations. Install 1-inch diameter Diameter Bolts in all slip base to a torque of 30-Point-Pounds - See Standard Specification Section 6-52.3280 (H)A. DO NOT OVERTIGHTEN. After initial inspection, use a thread to prevent nut rotation.

5. For Anchor Bolt Damage * O *, See Table, Standard Plan J-25.80.

6. [Diagram showing various base plate assembly types and anchor bolt details.]

7. [Text noting final height of anchor bolts must be below the top of the anchor plate assembly to ensure proper function of the slip base.]

8. [Instructions on applying grout even with the bottom of the anchor plate after placing the light standard.]

9. [Notes on the importance of ensuring the light standard is properly seated and secured.]

10. [Final section indicating the approval for publication by the Washington State Department of Transportation.]
**NOTES:**

1. 60’ (H1) poles with double mast arm or poles weighing in excess of 1000 lbs. shall not be installed on a Slip Base.

2. The Slip and Anchor Plates shall be manufactured from ASTM A572 Gr.50 or ASTM A588. All Slip Plates notched surfaces shall be finished smooth.

3. The Clamping Bolts shall be high strength steel, manufactured from AASHTO M164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M232.


5. Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

6. Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or reusing a luminaire pole.
1. Pole Base Plate for a Slip Base design shall be 1 1/4" thick steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" thick steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" thick steel manufactured from ASTM A36. All Pole Base Plates notched surfaces shall be finished smooth.

2. Round and smooth all edges along wire-way to protect conductors. See Standard Plan J-35.79 for wiring details.

3. Galvanizing shall be in accordance with AASHTO M 111.


**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 at the Washington State Department of Transportation. A copy may be obtained upon request.

**Effective:** August 1, 2011 to August 5, 2012
Basic wind velocity is 90 MPH. Design Life/Recurrence LENGTH.

**CONCRETE, ROUTE CONDUCTOR TO**

- **(4) 1 1/4" DIAM. ANCHOR BOLTS W/ GROUNDING CONDUCTOR #4 AWG**
  - 3 PLACES, @ 9" CENTER TO CENTER, ALL 4 EDGES
  - **CAMERA POLE GROUNDING STUD.**
  - **REBAR WITH LISTED CONDUCTOR**
  - *(CONCRETE CAST DIRECTLY AGAINST UNDISTURBED EARTH)*

- **GALVANIZED WELDED CAPS ON BOTH ENDS**
- **STRANDED COPPER WITH 3' MIN.**
- **BOLT IS GALVANIZED, S.S. SCREW, ASTM F593 AND WASHER**
- **BOLT CIRCLE 2" DIAM. (ASTM A449)**
- **6 - WASHERS PER BOLT ~ 6 - HEAVY HEX NUTS AND WIRE MESH ~ OR F1554 GRADE 105)**

**FOUNDATION REINFORCEMENT DETAIL**

- **(4) HOLES @ 1'-0" ON CENTER (TYP.)**
- **CONCRETE CLASS 4000**
- **5'-0" ROUND**

**FOUNDATION REINFORCEMENT AND BACKFILL DETAIL**

- **(4) HOLES @ 1'-0" ON CENTER (TYP.)**
- **CONCRETE CLASS 4000**
- **5'-0" ROUND**
- **UNDERDUMPED SOIL (TYP.)**

**EXPANDED CENTER STRUCTURE EXCAVATION**

**FOUNDATION REINFORCEMENT DETAIL**

- **(4) HOLES @ 1'-0" ON CENTER (TYP.)**
- **CONCRETE CLASS 4000**
- **5'-0" ROUND**

**FOUNDATION REINFORCEMENT AND BACKFILL DETAIL**

- **(4) HOLES @ 1'-0" ON CENTER (TYP.)**
- **CONCRETE CLASS 4000**
- **5'-0" ROUND**
- **UNDERDUMPED SOIL (TYP.)**

**ALTERNATE #1 - CONSTRUCTION METHOD**

- Shoring or Extra Excavation as Required. Excavated area shall be compacted with Controlled-Density Fill or with soil in accordance with Standard Specification 8-803.05.2.

**ALTERNATE #2 - CONSTRUCTION METHOD**

- Shoring or Extra Excavation as Required. Excavated area shall be compacted with Controlled-Density Fill or with soil in accordance with Standard Specification 8-803.05.2.

**CAMERA POLE FOUNDATION DETAILS**

- **STANDARD PLAN J-39.10-00**
- **REPORT #4 SHEET**
- **APPROVED FOR PUBLICATION**
- **Pasco Bakotich III 06-27-11**
- **Washington State Department of Transportation**

**NOTES**

1. These Foundations are designed for a minimum of 1,500 PSF allowable lateral bearing pressure for the soil. A Special Foundation shall be required for soil with allowable lateral bearing pressure lower than 1,500 PSF.
2. These Foundations are designed for installation on level ground, or on sloping ground, not to exceed 2:1 slopes. Slopes steeper than 2:1 require a special design.
3. Foundations constructed within ecology embankments shall be increased in depth, by the depth of the ecology embankment.
4. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridges and Structures Office through the Engineer for Special Foundation Designs.
5. The top 2'-6" of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.
6. Galvanized Welded Wire mesh shall be 2 mesh per linear inch, 0.0625" diam. wire, with 0.4375" overlap. Contractor to form entire form shall be removed.

**DESIGN CRITERIA**

This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals. Basic wind velocity is 60 MPH. Design Life/Recurrence Interval 50 years and Fatigue Category III.

**WIND VELOCITY**

- **90 MPH**
  - Maximum Pole Deflection shall not exceed 0.7" in 30 MPH and 1.4" in 70 MPH wind.

**LOAD CASE #1**

- Camera (1) - EPA = 4.00 sq. ft. @ 2'-0" above pole top, and:
- Ditch (1) - 1'-0" diameter @ pole top level.

**LOAD CASE #2**

- Camera (1) - EPA = 4.00 sq. ft. @ 2'-0" above pole top, and:
- Camera (2) - EPA = 0.54 sq. ft. each @ 1'-0" and 2'-0" from pole top, and:
- NEMA Cabinet (2) - EPA = 1.33 sq. ft. each @ 3'-8" from pole top, install both NEMA cabinets back to back, and:
- Radio Equipment (1) - EPA = 3.25 sq. ft. each @ 2'-0" and 8'-0" from pole top.

**EPA** = Effective Projected Area

**EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012**
CAMERA POLE

STANDARD DETAILS

STANDARD PLAN J-29.16-00

NOTES

1. For information not shown, see Steel Light Standard Elbow detail, Standard Plan J-28.45.
   For Camera Pole Details, see Standard Plan J-29.15.

2. Round and smooth all edges along wire-way to protect conductors; see Standard Plan J-29.70.

3. The manufacturer shall verify that the Elbow Top Plate matches the Camera Pole Base, and shall submit the shop drawings for approval.

4. Galvanize after fabrication according to AASHTO M111.

5. Install galvanized steel protective band (3/16" thick × 3 1/2" high (A36)) on all four sides after truing pole, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.

For Camera Pole Details, see

Standard Plan J-29.15.

Pasco Bakotich III
06-27-11

 EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

LOCKING LID STANDARD DUTY JUNCTION BOX TYPES 1 & 2
STANDARD PLAN J-40.10-02
SHEET 2 OF 5 SHEETS

APPROVED FOR PUBLICATION
Peaco Bartoshich III 05-11-11
Washington State Department of Transportation

BRIAN J. WEAVER
MAYOR OF KANSAS CITY

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

**NEHA 3R ADJUSTABLE PLUSH MOUNT JUNCTION BOX**

**STANDARD PLAN J-46.37-00**

Sheet 2 of 2 sheets

APPROVED FOR PUBLICATION

[Signature]

Washington State Department of Transportation

[Signature Date]
1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be marked and the abandoned hole filled with concrete conforming to Standard Specification 9-29.2(4). See note 5.

2. The system identification letter on the box lid shall be 1/8" thick formed by engraving, stamping, or with a stainless steel weld bead. See Standard Plan J-40.3-00. Equipment Bonding Jumper shall be #8 AWG (min.) × 1 foot of tinned, braided copper.

3. Resin bonded anchors shall be stainless steel and shall be of 3/8" diameter. (Expansion Anchors are not allowed).

4. See Standard Plan J-40.3-00 for Stainless Steel Channel details.

5. System Identification letters on the box lid shall be 1/8" line thick-diameter. (Expansion Anchors are not allowed).

6. Equipment Bonding Jumper shall be #6 AWG (min.) × 1 foot of tinned, braided copper.

7. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be marked and the abandoned hole filled with concrete conforming to Standard Specification 9-29.2(4). See note 5.

8. The system identification letter on the box lid shall be 1/8" thick formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specification 9-29.2(4).

9. Resin bonded anchors shall be stainless steel and shall be of 3/8" diameter. (Expansion Anchors are not allowed).

10. The system identification letter on the box lid shall be 1/8" thick formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specification 9-29.2(4).

11. Equipment Bonding Jumper shall be #6 AWG (min.) × 1 foot of tinned, braided copper.
NOTES

1. For splice detail, see Standard Plan J-50.16.
2. Perform all loops shall conform to the layout, numbering details, marking requirements, and fixing diagrams of Standard Plan J-50.13 for the number and type of loops shown in the Contract Plans.
3. Loops shall be tested immediately prior to pouring concrete, per Standard Specification 8-30.2(14).
4. Lay cut loops and loop lead-in to avoid joints.
5. Construct a supplemental splice containing any series loop connections in adjacent Junction Box as required in the Plan. Supplemental splices are subject to the same requirements shown for the loop lead-in and the splice as aisle splice, as shown in Standard Plan J-50.16.
Plan View

Typical 4 Lane PTE Layout with Median

Induction Loop / PTE Axle Sensor Number Identification
Lane 1 - (Drive lane) - Loop L1, PTE P1, Loop L2
Lane 2 - (Drive lane) - Loop L3, PTE P2, Loop L4
Lane 3 - (Drive lane) - Loop L1, PTE P1, Loop L4
Lane 4 - (Drive lane) - Loop L3, PTE P2, Loop L4

Effective: August 1, 2011 to August 5, 2012
There are general installation instructions:

See specific manufacturer's installation instructions in the special provisions of the contract.

1. Using point and a straight edge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the line of traffic and that all lines are straight. Verify that the sensor cover length can reach the cabinet with a minimum of 5 ft. of cable inside the cabinet.

2. Using a wet cutting pavement saw with a 3/4 inch blade, cut the piece slot approximately 4 to 5 inches longer than the piece length. The piece slot depth must be a minimum of 1" to a maximum of 1 1/2".

3. Load-in cuts for the piece cover should be 1/4" minimum width, at a depth of 1 1/2" to 2".

4. Using a pressure washer, remove all slurry and loose material from the piece slot.

5. Completely dry piece slot. No moisture or oily residue shall be allowed in piece slot.

6. After pieces cut to dry, wire brush sides and bottom of entire piece slot. Blow out loose debris.

7. Install the pieces according to manufacturer's recommendations. Class 2 piece sensors shall be placed at bottom of piece slot. Class 1 sensors must be installed at a specific depth particular to each site location. This depth will be measured and set by statewide Traffic and Collision Data Office (formerly TTOO) inspector on site.

8. Place two pieces of 2" duct tape along the length of the sensor slot. Tape should be about 1/16" from slot edge.

9. Mix epoxy according to manufacturer's recommendations and pour in slot into small bowl. Mix arm grab pouce into slot slowly to avoid air pockets. Stir at the piece and arm pour toward the rear to piece attachment point. Repeat until the slot is completely full, at least two pieces.

10. Use a putty knife with a notched carrier to spread the epoxy smooth the length of the sensor.

11. Remove tape.

12. Class 2 sensor installation is complete after epoxy has cured. Class 1 Witt sensors shall be inserted flush with the pavement surface the entire length of the sensor. Use a ball marker with a coarse grit paper to get an even surface finish.

13. Load-in placement and saw-cut methods vary depending on Regional preference and location. Coordination between WDOT and Contractor is needed to determine method to be used prior to installation.

14. Please the installation Brackets on the sensor every 12' for class 2 sensor, and every 8' for class 1 sensor, for the length of the sensor. Use the 3/4" brackets.
1. Required to supplement equipment grounding for luminaires, luminaires with direct buried aerial feeds, or where required in the plans.

2. Required on all service and separately derived systems.

3. Type D service cabinet shown. Use this concept for Type E cabinet or transformer.

4. Type D service cabinet shall be installed on lower surface of foundation only.

5. Type B service cabinet and transformer cabinet shall be installed on raised surface of foundation only.

6. Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing.

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

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

TYPICAL GROUNDING DETAILS

STANDARD PLAN J-60.05-00

SHEET 3 OF 4 SHEETS

PAUL BAKSTICH III 06-15-11
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
**Frame Bonding Stud Plate with 1/4 NC × 1" Stainless Steel Bonding Stud.**
- Weld Bonding Stud to Frame Bonding Plate.
- Weld to lid support frame.
- 1/4" weld = 3 threads.
- Grind lid bearing surfaces flat after welding.
- All corners rounded. Corners along exposed shear or cut edges shall be broken by light grinding to achieve an approximate 1/16" (inch) chamfer or rounding.
- Protect conductors with fireproof cloth prior to welding.
- Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

Weld all around lid bonding stud ~ 1/4 NC × 1" stainless steel ~

Literally coat entire assembly w/ anti-seize compound.

---

**Frame Bonding Detail**

**Lid Bonding Detail**

**Typical Grounding Details**

**Standard Plan J-60.05-00**

Sheet 4 of 4 Sheets

**Effective:** August 1, 2011 to August 5, 2012

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

NOTES:
1. Typical view shown. Verify power source location, quantity, location of signs and sign structure fixtures in contract plans.

2. Route HABA 3D-1 3C #14 cable(s) from isolation switch along hold, bottom of the Monotube Mount Arm to the liquid-tight conduit connector(s) at hand hole(s).

3. Route separate HABA 3D-1 3C #14 cable from each side of terminal strip to each additional light fixture (where applicable) and provide sufficient slack wire per Standard Specification 8-818.26.6.

4. Label all conductors with sign light and circuit number at isolation switch, hand hole(s) and isolation enclosure(s). Labels shall be a PVC or Polyethylene wire marking sleeve per Standard Specification 8-818.26.6.

5. Install quick-disconnect fuse clips between the power supply wire and the pole and braclet cable, per Standard Specification 8-818.26.6. Fuse size shall be 200% larger than load size.

6. The conductors in the HABA 3D-1 3C #14 cable shall be black, red and white. The white conductor shall be permanently identified as an equipment grounding conductor, per the NEC.

7. All GIC cables embedded in foundation shall be terminated with Grounding End Bushing and bonded to the Foundation Grounding Bus. All GIC conductors embedded in foundations shall be terminated with End Bushing.

8. Hand hole(s) shall be installed at the site of fabrication. All additional conduit for lighting accommodations to previously non-illuminated structures may be installed in field as long as the proper receptacles are made to the structure.

9. All nuts, bolts, washers, and other hardware shall be stainless steel.

10. All boxes shall be drilled and tapped.

11. Use the Retain Details only within the following conditions apply:
- The existing 4x4.5 Luminaire Brackets are to be reused for a new Sign Lighting Luminaire.
- The span between the existing Luminaire Brackets is too wide to attach a new Sign Lighting Luminaire and Luminaire Mounting Plate.

12. If the sign structure includes a maintenance walkway, the Luminaire Mounting Plate shall be bolted to the walkway grading.

OVERHEAD SIGN
ELECTRICAL DETAILS
(MONOTUBE STRUCTURE)
STANDARD PLAN J-7E.40-00

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

MONOTUBE SIGN STRUCTURE
(SEE CONTRACT PLAN FOR ORIENTATION OF SIGN STRUCTURES)
1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder or the traveled way. Use a 7" thick lid for new Pull Box installations. Use a 7" thick Heavy Duty Lid when converting a Standard Duty Pull Box into a Heavy Duty Pull Box in the paved shoulder or the traveled way and no overlay is called for in the Contract. Otherwise, see Contract Plans for overlay depth and reductions in lid thickness to match overlay depth.

2. Use Standard Duty Pull Box and Lid shown placed in unpaved areas. Use Standard Duty Pull Box in sidewalks, walkways, and shared-use paths.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/16" thick.

4. Standard Duty Pull Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use path. The lid shall be identified with permanent marking on the lid indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

5. A 1 1/2-20 UNC x 3/4" S.S. ground stud with (2) S.S. nuts and (2) S.S. flat washers shall be attached to the Heavy Duty Lid and coated with anti-seize compound. Provide a 1/8" diameter hole in the ductile iron ground stud (Heavy Duty Lid) with 1 1/2-20 UNC x 3/4" S.S. bolt, (3) S.S. flat washers, and (2) S.S. nuts for the Bonding Jumper.

6. Connect a Bonding Jumper to the steel conduit bushing for GRB conduit and connect the steel conduit bushing to the equipment ground at the threaded brass ground insert. Connect the equipment grounding conductor to the lid ground stud. The Bonding Jumper shall be 25 mm x 4' (ft.) of threaded brass between the lid and the frame of the Heavy Duty top, and from the Heavy Duty top to the threaded brass ground insert. The Bonding Jumper shall be 0.8 mm x 4' (ft.) of threaded brass between the lid and the frame of the Heavy Duty top, and from the Heavy Duty top to the threaded brass ground insert. See Contract Plans and Standard Plan J-45-05 for Bonding Jumper requirements.

7. The system identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a stainless steel weld bead. See COVER MARGINAL DETAIL. See Standard Specification S-29.3-6.24. Double iron lid lettering shall be recessed.

8. Convert concrete shall be Class 4000.

9. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

10. Capacity - conduit diameter = 40" (in.).

11. Excavate material, place 6" crushed surfacing pad per Standard Plan J-60.05. See Bonding Jumper requirements.

12. The drawing depicts a typical Pull Box assembly. Refer to the approved manufacturer shop drawings for all dimensions and the actual arrangement.
INSTEAD OF EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

FOR TYING TO THE RE-BAR

SEE NOTE 3

SEE NOTE 7

SYSTEM (TYP. 4 PLACES)

GROUND STUD (TYP.)

5/8" DIAM. THREADED INSERT (LID NOT SHOWN)

SECTION HEAVY DUTY LID

4' - 6" (TYP.)

FOR BONDING JUMPER

S. S. BOLT ~ USE HOLE RING AND LOCK RECESSED LIFTING LOCATION WIRE

PVC Shown ~ See Contract for Conduit Type

Flat Area for Lifting Purposes (for Ductile Iron Lid Only)

See Contract for Conduct Size and Number

Equipment Bonding Jumper ~ Equipment Grounding Conductor

5 " MIN.

DIAMOND ANTI-SEIZE COMPOUND

DRILL & TAP FOR 1/2-13 COVER AND DUCTILE IRON LOCKING 38 1/2" DIAM. CAST IRON RING BONDING JUMPER ~ HINGED, SPRING ASSISTED OF LID

The Bonding Jumper shall be #8 min. x 4' (ft.) of tinned braided copper between the lid and the frame of the Heavy Duty tops and from the Heavy Duty top to the threaded brass ground insert. The Bonding Jumper shall be 30 mil. x 4' (ft.) of stranded copper between the lid on a Standard Duty vault and the threaded brass ground insert. See Contract Plan Sheets and Standard Plan J-66.03 for Bonding Jumper requirements.

The system identification letters shall be 1/8" line thickness formed by engraving, casting, or with a S. S. weld bead. See COVER MARKING DETAIL, Standard Specification 8-20.3(6) and (4 REQUIRED)

1 @ EACH CORNER

8 EACH WALL

8" DIAM. KNOCKOUT (TYP.)

2 ' - 0 " SURFACE

3' - 0"

1 " MIN.

6 " MAX.

CABLE VAULT STANDARD PLAN J-66.20-01 SHEET 1 OF 8 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III

06-27-11

Washington State Department of Transportation

STATE DESIGN ENGINEER

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NOTES

1. The Heavy Duty Lid shall be used when a Cable Vault is placed in the paved shoulder of the traveled way. Use a 5" thick lid for new Cable Vault installations. Use a 6" thick Heavy Duty Lid when converting a Standard Duty Cable Vault into a Heavy Duty Cable Vault in the paved shoulder of the traveled way and not over a utility to be called for in the Contract. Otherwise, see Contract Plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Cable Lid and Lid when placed in unpaved areas. Use Standard Duty Pull Box in sidewals, walkways, and shared-use paths.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" thick.

4. Standard Duty Cable Lids installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanently marking the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" thick and shall be installed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

5. A 1/4 - 20 UNC × 8 1/2" S. S. bolt washers shall be attached to the Standard Duty Lid and coated with anti-seize compound. Provide a 5/8" diameter cored hole in the ductile iron lid gasket (Heavy Duty Lid) with 1/2 - 13 UNC × 1 1/4" S. S. bolt, (3) S. S. flat washers, and (3) S. S. nuts for the Bonding Jumper.

6. Connect the Bonding Jumper to the steel conduit bushing for GRS and connect the steel conduit Bushing Jumper to the equipment ground at the threaded brass ground insert. Connect the equipment grounding conductors in the PVC and/or GRS conduit to the brass ground insert. The Bonding Jumper shall be 30 min. x 4' (ft.) of stranded copper between the lid and the frame of the Heavy Duty tops and from the Heavy Duty top to the threaded brass ground insert. The Bonding Jumper shall be 30 mil. x 4' (ft.) of stranded copper between the lid on a Standard Duty vault and the threaded brass ground insert.

7. The system identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a S. S. weld bead. See COVER MARKING DETAIL, Standard Specification 8-20.3(6) and (4 REQUIRED) Ductile iron lettering shall be necessary.

8. Concrete shall be Class 400.

9. Plastic plug shall be put into the lid after installation and before test.

10. Capacity ~ conduit diameter = 40" (in.)

11. Excavate material, place 6" crushed surfacing pad per Standard Specifications §-30.26B. Field bend reinforcing bars to allow conduit into the Cable Vault. Field bend reinforcing bars into place, where So in (2) places and cast to commercial concrete (concrete is only allowed for bottom/wall completion).

12. This drawing depicts a typical Cable Vault assembly. Reinforcing not shown. Each manufacturer's Cable Vault assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.
NOTES:
1. Sign sequence is the same for both directions of travel. Adjust for the direction of roadway curves.
2. Flashing Warning Lights (Type B per MUTCD) and/or flags may be used to call attention to the advance Warning Signs.
3. Existing conflicting pavement markings and signs that are no longer applicable shall be removed or obliterated. Temporary pavement markings shall be used to delineate bypass detour.
4. Raised pavement markers and/or temporary guideposts may be used on bypass as directed by the Engineer.
5. Steady Burning Warning Light (Type C per MUTCD) shall be used to mark Channelizing Devices at night.
6. Where advisory speed is 30 mph or less, reverse turn signs should be used. Other curves or turn Warning Signs may be substituted to depict roadway alignment.
7. Temporary barriers and end treatments shall be crashworthy. To improve visibility, consider use of temporary illumination at closure points.
8. Consider using a PCMS for additional advance warning.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

STANDARD PLAN K-10.20-01
SHEET 1 OF 1 SHEET

EXPIRES AUGUST 9, 2009

DRAWN BY:  ELENA BRUNSTEIN

10-12-07

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RURAL ROADS & URBAN ARTERIALS
RURAL ROADS 25 / 30 MPH 35 / 64
URBAN ARTERIALS 35 / 64
RESIDENTIAL & BUSINESS DISTRICTS 25 / 30 MPH 35 / 64

LEGEND

1. Modify Regulatory Traffic Control Devices, as needed, for the duration of the detour.
2. Two Flashing Warning Lights (Type A per MUTCD) may be used to mark each barricade at night.
3. Trail Blazers shall be installed throughout the detour, as appropriate.
4. Signing shown for the one direction only.
6. Coordinate with emergency services.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

Road Closure

For Local Agency Use Only
Not for Use on State Routes
NOTES
1. This plan is intended for use on roadways when traffic volumes create sufficient gaps for motor vehicles to yield.
2. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark Channelizing Devices at night.
3. Adequate sight distance shall be provided for drivers to see opposing traffic, otherwise use flaggers and/or Temporary Signal.
4. Extend Channelizing Device taper across shoulder ~ recommended.
5. Post mount signs when in place for 3 days or longer.
6. For speed limit 35 mph or higher replace W1-3R with W1-4R.
7. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
8. Consider using a PCMS for additional advance warning.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.

3. Extend Channelizing Device taper across shoulder ~ recommended.

4. Sign sequence is the same for both directions of travel on the roadway.

5. Channelizing Device spacing for the downstream taper option shall be 20’ O.C.

6. For signs also refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**STANDARD PLAN K-20.40-00**

**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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
Channelizing Devices are recommended along centerline to separate traffic from work operation. Devices are required at tapers to shift traffic movement between lanes and to protect all flagging stations.

Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-06.

**LONGITUDINAL BUFFER SPACE = B**

<table>
<thead>
<tr>
<th>BUFFER DATA</th>
<th>LENGTH (FEET)</th>
<th>MINIMUM TAPER LENGTH = L FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)</td>
<td>150</td>
<td>40</td>
</tr>
<tr>
<td>VEHICLE TYPE</td>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>LOADED WEIGHT</td>
<td>250</td>
<td>60</td>
</tr>
<tr>
<td>4 YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.</td>
<td>300</td>
<td>70</td>
</tr>
<tr>
<td>ROLL AHEAD STOPPING DISTANCE = 80 FEET (MM)</td>
<td>350</td>
<td>80</td>
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**MINIMUM TAPER LENGTH = L FEET**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>MINIMUM TAPER LENGTH</th>
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</thead>
<tbody>
<tr>
<td>35-39</td>
<td>40</td>
</tr>
<tr>
<td>40-46</td>
<td>50</td>
</tr>
<tr>
<td>47-50</td>
<td>60</td>
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**MINIMUM TAPER LENGTH = L FEET**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>35-39 L</th>
<th>40-46 L</th>
<th>47-50 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN TAPER (FEET)</td>
<td>40</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>IN TANGENT (FEET)</td>
<td></td>
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**SIGN SPACING = X (1)**

**RURAL HIGHWAYS**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RURAL HIGHWAYS</th>
<th>RURAL ROADS &amp; URBAN ARTERRIALS</th>
<th>RURAL ROADS &amp; URBAN ARTERRIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 / 40 MPH</td>
<td>50-65 MPH</td>
<td>80-55 MPH</td>
<td>80-55 MPH</td>
</tr>
<tr>
<td>25 / 50 MPH</td>
<td>60-70 MPH</td>
<td>80-55 MPH</td>
<td>80-55 MPH</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>45 / 65 MPH</td>
<td>75-80 MPH</td>
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**CHANNELIZING DEVICE SPACING**

**POSTED SPEED (MPH)**

<table>
<thead>
<tr>
<th>CHANNELIZING DEVICES</th>
<th>POSTED SPEED (MPH)</th>
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<tr>
<td>20 / 40 MPH</td>
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</tr>
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</table>

**NOTES**

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Existing conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary, and signs shall be posted for long term projects.

3. Flash-and-Burn Warning Lights (Type C, MUTCD) shall be used to mark Channelizing Devices at right.

4. For speed limits of 30 mph or less, sign W1-3 shall be used in lieu of sign WH-4.

5. Extend device taper (L/3) across shoulder ~ recommended.

6. Portable Changeable Message Sign (PCMS) ~ recommended.

7. Channelizing Device spacing for the downstream taper option shall be 20' C.C.

8. For signs sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual MS-02.

**FOR LOCAL AGENCY USE ONLY**

**STANDARD PLAN K-23.20-61**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DATE:**

**EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012**

**DRAWN BY:**

**ELENA BRUNSTEIN**

**POSTED SPEED (MPH)**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>LANE WIDTH</th>
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<tbody>
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<td>30 / 50 MPH</td>
<td>35 / 45</td>
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<td>35 / 60 MPH</td>
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<td>45 / 65</td>
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<td>45 / 65 MPH</td>
<td>50 / 60</td>
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**LANE WIDTH**

<table>
<thead>
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<td>45 / 65</td>
</tr>
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<td>50 / 60</td>
</tr>
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**MINIMUM TAPER LENGTH = L FEET**

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<tr>
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<td></td>
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**SIGN SPACING = X (1)**

<table>
<thead>
<tr>
<th>RURAL HIGHWAYS</th>
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<td>95-60 MPH</td>
</tr>
<tr>
<td>45 / 65 MPH</td>
<td>75-80 MPH</td>
<td>95-60 MPH</td>
</tr>
</tbody>
</table>

**CHANNELIZING DEVICE SPACING**

**POSTED SPEED (MPH)**

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<th>POSTED SPEED (MPH)</th>
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<td>40 / 65 MPH</td>
<td></td>
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<tr>
<td>45 / 65 MPH</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Existing conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary, and signs shall be posted for long term projects.

3. Flash-and-Burn Warning Lights (Type C, MUTCD) shall be used to mark Channelizing Devices at right.

4. For speed limits of 30 mph or less, sign W1-3 shall be used in lieu of sign WH-4.

5. Extend device taper (L/3) across shoulder ~ recommended.

6. Portable Changeable Message Sign (PCMS) ~ recommended.

7. Channelizing Device spacing for the downstream taper option shall be 20' C.C.

8. For signs sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual MS-02.
LONGITUDINAL BUFFER SPACE = B
POSTED SPEED (MPH) 25 30 35 40 45 50 55 60
LENGTH B (FEET) 100 200 300 400 500 600 700
MINIMUM TAPER LENGTH = L (FEET)
POSTED SPEED (MPH) 25 30 35 40 45 50 55 60
10 108 118 128 138 148 158 168 178
20 118 128 138 148 158 168 178 188
30 128 138 148 158 168 178 188 198
40 138 148 158 168 178 188 198 208
50 148 158 168 178 188 198 208 218
60 158 168 178 188 198 208 218 228
70 168 178 188 198 208 218 228 238
80 178 188 198 208 218 228 238 248
90 188 198 208 218 228 238 248 258

SIGN SPACING = X (1)

RURAL HIGHWAYS
POSTED SPEED (MPH) 85 / 65 MPH 807 ±
RURAL ROADS
POSTED SPEED (MPH) 45 / 35 MPH 697 ±
RURAL ROADS URBAN ARTESIALES
POSTED SPEED (MPH) 35 / 45 MPH 597 ±
RURAL ROADS URBAN ARTESIALES RESIDENTIAL & HIGHWAY DISTRICTS
POSTED SPEED (MPH) 35 / 40 MPH 537 ±
URBAN ARTESIALES
POSTED SPEED (MPH) 35 MPH ON 600' 106 ±

CHANNELIZING DEVICE SPACING
POSTED SPEED (MPH) 50 / 70 IN TAPER (FEET) 30 / 40 IN TANGENT (FEET)
35 / 45 30 40
30 / 60 30 40
25 / 30 40

NOTE:
1. A Protective Vehicle is recommended regardless if a Truck-Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.
2. Devices shall not encroach into adjacent lanes.
3. Extend device taper (L/3) across shoulder ~ recommended.
4. Portable Changeable Message Sign (PCMS) ~ recommended.
5. Use Traffic Safety Drums for all tapers on high speed roadway ~ recommended.
7. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.
8. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.

NOTES
1. Alternate channelizing devices may be used when not for use on state routes.
2. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.
3. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.
4. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.
5. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.
6. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.
7. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.
8. Use Traffic Safety Drums in closed lane every 1000' ~ recommended.

SINGLE LANE CLOSURE
ON MULTILEG ROADWAY
STANDARD PLAN K-34.60-00

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BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY
THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON
FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANS-
PORTATION.
**LONGITUDINAL BUFFER SPACE**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>LENGTH (FEET)</th>
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</thead>
<tbody>
<tr>
<td>20</td>
<td>15</td>
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<tr>
<td>30</td>
<td>20</td>
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<td>40</td>
<td>25</td>
</tr>
<tr>
<td>45</td>
<td>30</td>
</tr>
</tbody>
</table>

**BUFFER DATA**

- **Typical Protective Vehicle with TMA (See Note 1)**
  - **Vehicle Type**: 4 Yard Dump Truck, Service Truck, etc.
  - **Loaded Weight**: Minimum Weight 15,000 LBS. (Maximum Weight Shall be in accordance with National Highway Traffic Safety Administration recommendations).

**Note**: Roll Ahead Stopping Distance = 30 FEET Min.

**ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE**

**NOTES**

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available, or a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll Ahead distance.

2. Extend device taper (L/3) across shoulder recommended.

3. Portable Changeable Message Sign (PCMS) recommended.

4. If the lane shift is short and has minimal radius curve (30mph or less) use sign WH-3 in lieu of sign WH-1.

5. For sign sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

**SIGN SPACING**

<table>
<thead>
<tr>
<th>raphic Area</th>
<th>250</th>
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<tr>
<td>30</td>
<td>80</td>
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<tr>
<td>E</td>
<td>A</td>
</tr>
<tr>
<td>L/2</td>
<td>W</td>
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</table>

**CHANNELIZING DEVICE SPACING**

<table>
<thead>
<tr>
<th>MINIMUM TAPER LENGTH = L (FEET)</th>
<th>POSTED SPEED (MPH)</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td>40</td>
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<tr>
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<td>45</td>
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</table>

**DEVICE SPACING ~ 1/2 DISTANCE**

**CHANNELIZING DEVICE SPACING**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>CHANNELIZING DEVICES</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>30</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND**

- **WH-1**: COMPLIANCE DATE 12/23/13
- **WH-3**: L/2 IN TAPER
- **PCMS**: PORTABLE CHANGEABLE MESSAGE SIGN
- **L**:一條 SELECTED CHAINALIZING DEVICES
- **WH**: WORK AREA

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**APPROVED FOR PUBLICATION**

**DATE**: 07-01-07

**STATE DESIGN ENGINEER**

**SHEET**: 1 OF 1 Sheet

**STANDARD PLAN K-35.20-00**

**LANE SHIF ONTO TWO-WAY LEFT TURN LANE**

**FOR LOCAL AGENCY USE ONLY NOT FOR USE ON STATE ROUTES**

**EXP F R**

**EFFECTIVE**: AUGUST 1, 2011 TO August 5, 2012
**NOTES**

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Portable Changeable Message Sign (PCMS) ~ recommended.

3. Prohibit turns as necessary for traffic conditions.

4. For sign sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

**LEGEND**

- **PCMS** ~ Portable Changeable Message Sign
- **L** ~ Left Lane
- **R** ~ Right Lane
- **C** ~ Center Lane
- **X** ~ Arrow Panel
- **H** ~ Work Area

**SIGN SPACING = X**

- **L** ~ Lane Width
- **S** ~ Speed
- **T** ~ Taper Length

**MINIMUM TAPER LENGTH = L (FEET)**

- **L** ~ Lane Width
- **S** ~ Speed

**LONGITUDINAL BUFFER SPACE = B**

- **L** ~ Lane Width
- **S** ~ Speed

**PROTECTIVE VEHICLE ~ RECOMMENDED**

- **L** ~ Lane Width
- **S** ~ Speed

**ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.**
LONGITUDINAL BUFFER SPACE = B

BUFFER DATA

TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)

- YARD DUMP TRUCK
- SERVICE TRUCK
- FLAT BED, ETC.

MINIMUM TAPER LENGTH = L (FT)

LANE WIDTH (FT) | POSTED SPEED (MPH) | LOADED WEIGHT (LBS) | MAXIMUM WEIGHT (LBS)
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>10</td>
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</tr>
<tr>
<td>13</td>
<td>180</td>
<td>200</td>
<td>500</td>
</tr>
</tbody>
</table>

NOTE:
1. A Protective Vehicle is recommended if a Truck Mounted Attenuator (TMA) is not available or if a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to enter vehicles with no specific Roll-Ahead distance.
2. If an existing signal is present, the signal shall be set to "red flash mode" or turned off during flagging operations.
3. Extend device taper (L/3) across shoulder ~ recommended.
4. Law enforcement officer may be used in lieu of flaggers to control intersection traffic.
5. Closing lane in advance of flagging location when multiple lanes are on approach leg ~ recommended.
6. Maintain a minimum of one access point for each business within the Work Area limits.
7. Consider using a PCMB, field located in advance of signing, on the five lane roadway.
8. An appropriate standard warning sign shall be strategically located to shield workers, with no specific Roll-Ahead distance.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-08.

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A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) ~ recommended.

CLOSING LANE IN ADVANCE OF FLAGGING LOCATION WHEN MULTIPLE LANE ARE ON APPROACH LEG ~ RECOMMENDED.

If an existing signal is present, the signal shall be set to "red flash mode" or turned off during flagging operations.

A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) ~ recommended.

CLOSING LANE IN ADVANCE OF FLAGGING LOCATION WHEN MULTIPLE LANE ARE ON APPROACH LEG ~ RECOMMENDED.

Maintain a minimum of one access point for each business within the Work Area limits.

Consider using a PCMB, field located in advance of signing, on the five lane roadway.

An appropriate standard warning sign shall be strategically located to shield workers, with no specific Roll-Ahead distance.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-08.

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### Channelizing Device Spacing

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<thead>
<tr>
<th>Posted Speed (MPH)</th>
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<th>30 / 40</th>
<th>45 / 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>40</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>50</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>12</td>
<td>60</td>
<td>60</td>
<td>50</td>
</tr>
</tbody>
</table>

### Minimum Taper Length = L (Feet)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
<th>25 / 35</th>
<th>30 / 40</th>
<th>45 / 60</th>
<th>50 / 60</th>
<th>60 / 40</th>
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<td>10</td>
<td>100</td>
<td>140</td>
<td>180</td>
<td>210</td>
<td>235</td>
<td>265</td>
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<tr>
<td>11</td>
<td>95</td>
<td>135</td>
<td>170</td>
<td>205</td>
<td>220</td>
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<td>90</td>
<td>130</td>
<td>160</td>
<td>200</td>
<td>225</td>
<td>255</td>
</tr>
</tbody>
</table>

**NOTES:**

1. If the work space extends across a crosswalk, the crosswalk should be closed (use Standard Plan K-34.20).

2. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a right lane having significant right turning movement, then the right lane may be restricted to right turn only, as shown. This procedure increases the through capacity by eliminating right turns from the open through lane.

3. Prohibit turns as necessary for traffic conditions.

4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.

5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.

6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
NOTES
1. If the work space extends across a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).
2. The normal procedure is to close the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left turn having significant left-turning movements, the left lane may be reopened as a turn bay for left turns only, as shown.
3. Prohibit turns as necessary for traffic conditions.
4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.
5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

LEGEND
- Sign Location
- Temporary Traffic Arrow - Optional
- Arrow Panel
- Barricade - Type 3 R

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

INTERSECTION - LEFT LANE CLOSURE
FAIR SIDE
STANDARD PLAN K-33-40-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Ken L. Smith 08-15-07
Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTES

1. Prohibit turns as necessary for traffic conditions.
2. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barriers at night.
3. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
4. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-08.

SIGN SPACING = X

RURAL ROADS & URBAN ARTERIALS 25 / 30 MPH 350'
RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & SUBURBAN DISTRICTS 35 / 40 MPH 500'
URBAN ARTERIALS 35 MPH OR LESS 100'

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

MINIMUM TAPER LENGTH = L (FEET)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
<th>TAPER  (FEET)</th>
<th>IN TAN  (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20 / 25</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>20 / 25</td>
<td>30</td>
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</tr>
<tr>
<td>12</td>
<td>20 / 25</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TAN (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>30 / 40</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

INTERSECTION
~ MULTIPLE LANE CLOSURE

STANDARD PLAN K-53.60-00

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTES

1. When crosswalks or other pedestrian facilities are closed or re-located, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

2. Controls shown are for pedestrian traffic only.

3. Use Warning Lights on barricades.

4. Maintain a minimum width of 3 feet for pedestrian path.

5. For signs also refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M65-05.
### Longitudinal Buffer Space = B

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>SHOULDER WIDTH (FEET)</th>
<th>MINIMUM TAPER LENGTH = L (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 / 70</td>
<td>55 / 70</td>
<td>60 / 65 MPH</td>
</tr>
<tr>
<td>60 / 70</td>
<td>60 / 70</td>
<td>70 / 75 MPH</td>
</tr>
</tbody>
</table>

### Typical Protective Vehicle with TMA (See Note 1)

- **Vehicle Type**
  - 4 Yard Dump Truck, Service Truck, Flat Bed, etc.
- **Minimum Weight** 15,000 lbs.
- **Maximum Weight** Shall be in accordance with manufacturer recommendations

### Channelizing Device Spacing

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 / 70</td>
<td>45</td>
<td>60 / 65 MPH</td>
</tr>
<tr>
<td>80 / 70</td>
<td>80 / 65 MPH</td>
<td></td>
</tr>
</tbody>
</table>

### Buffer Data

- **Roll Ahead Stopping Distance** = 30 feet

### End Road Work

#### End Board/Downstream taper to show end of work area (see note 2)

### Road Work Ahead

#### W20-1

- **Shaped Shoulder**
- **Closed Shoulder**
- **W20-301**

### Shoulder Closure - High Speed Roadway (45 MPH or Higher)

#### Standard Plan K-40.30-60

---

**NOTES**

1. A Protective Vehicle is recommended regardless if a TMA is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Channelizing Device spacing for the downstream taper option shall be 25' O.C.

3. No Encroachment on the traveled lane is permitted. If Encroachment is necessary, the lane shall be closed (see Standard Plan K-44.20).

4. Signs to be post mounted for long term projects.

5. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
NOTES:
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.
2. Channelizing Device spacing for the downstream taper option shall be 20’ O.C.
3. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

SIGN SPACING = X (1)

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
**MINIMUM WEIGHT 15,000 LBS.**
*(MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)*

**NOTE:**
1. In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance Warning Sign and the Work Area should not exceed 6 miles.

2. In those situations where the distance between the advance signs and the Work Area is 2 to 6 miles, a Supplemental Distance plaque should be used with the ROAD WORK AHEAD sign.

3. No encroachment into traffic lane is permitted with this plan.

4. Work vehicle and Shadow vehicle shall use Warning Beacons.

5. Shadow vehicle shall maintain 600’ to 1000’ of sight distance to approaching traffic.

6. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

**ROLL AHEAD DISTANCES VARY AND SHALL BE DETERMINED IN FIELD BASED ON WORK OPERATION AND SITE SPECIFIC CONDITIONS**

**LEGEND**

- Recap: Roll Ahead Distance = R
- Typical Protective Vehicle with TMA
- Work Area
- TVB-5
- ROAD WORK AHEAD
- Shoulder Sign
- W22-1
- W21-5
- Protective Vehicle
- Protective Vehicle Mounted
- Protective Vehicle with TMA
- Supplemental Distance Plaque
- Warning Beacon
- Stationary Operation
- Work Vehicle
- Shadow Vehicle
- Road Work Ahead

**SHOULDER CLOSURE ~ SHORT DURATION**

**STANDARD PLAN K-40.60-90**

**EFFECTIVE:** AUGUST 1, 2011 TO August 5, 2012

**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 at the Washington State Department of Transportation. A copy may be obtained upon request.

**FOR LOCAL AGENCY USE ONLY**
- Not for use on state routes.
<table>
<thead>
<tr>
<th>ROAD TYPE</th>
<th>SPEED (MPH)</th>
<th>SIGN SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Roads</td>
<td>25 / 30</td>
<td></td>
</tr>
<tr>
<td>Rural Roads &amp; Urban Arterials</td>
<td>25 / 40</td>
<td>35/64 (2)</td>
</tr>
<tr>
<td>Rural Roads, Urban Arterials, Residential &amp; Business Districts</td>
<td>35 / 60</td>
<td>35/64 (6)</td>
</tr>
<tr>
<td>Urban Streets</td>
<td>35 / 60</td>
<td>35/64</td>
</tr>
<tr>
<td>RURAL ROADS &amp; URBAN ARTERIALS</td>
<td>25 / 40</td>
<td>35/64 (2)</td>
</tr>
</tbody>
</table>

**NOTES**

1. The sign shown is not required in the following cases: the work space is behind a barrier, or more than 2' behind the curb, or more than 15' from the edge of a roadway.

2. For sign sizes, refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

1. All sign spacing may be adjusted to accommodate at-grade intersections and driveways.

2. This sign spacing may be reduced in urban areas to fit roadway conditions.

**LEGEND**

- WID-1: Work Area
- X: Sign Location
- WORK BEYOND THE SHOULDER
- STANDARD PLAN K-40.60-90

FOR LOCAL AGENCY USE ONLY

NOT FOR USE ON STATE ROUTES
NOTE:

1. Implement this plan when the initial roadway assessment is complete and determined to be passable with caution.


3. Spot hazards shall be marked with barricades or channelizing devices to alert motorists.

4. For signs also refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
**NOTE:**


2. **MOTORCYCLES USE EXTREME CAUTION** signs shall be installed when the following roadway conditions exist:
   - grooved pavement
   - abrupt lane edge
   - steel plates
   - loose gravel of earth

Specific signs for each of the conditions noted shall be installed along with **MOTORCYCLES USE EXTREME CAUTION** signs.

3. For signs refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**SIGN SPACING = X (1)**

<table>
<thead>
<tr>
<th>ROADWAY TYPE</th>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
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<td>800</td>
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<td>RURAL HIGHWAYS</td>
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<td>100</td>
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**CHANNELIZING DEVICE SPACING**

<table>
<thead>
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<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
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<tbody>
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<td>55 / 75</td>
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<td>60</td>
</tr>
<tr>
<td>60 / 90</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>80 / 100</td>
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<td>200</td>
</tr>
<tr>
<td>100 / 120</td>
<td>70</td>
<td>140</td>
</tr>
</tbody>
</table>

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**MOTORCYCLE WARNING SIGN (W21-1701) SHOULD BE INSTALLED AT 1 MILE SPACING, THROUGHOUT THE WORK ZONE WHERE THE CONDITION EXISTS, AS PART OF THE SEQUENCE OF OTHER APPROPRIATE STANDARD WARNING SIGNS ON 1 MILE SPACING.**

---

**LEGAL DISCLAIMER:**

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

1. For long term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

2. For Hot Mixed Asphalt Pavement, a temporary striping tape shall be installed in conjunction with DO NOT PASS and "PASS WITH CARE" sign locations.

3. Temporary roadside delineation with Channelization Devices is optional. The appropriate taper length shall be L/2, see Standard Plan K-24.20 for minimum taper length (L).

4. For long term projects a channelization/pavement marking plan should be implemented.

5. Temporary Raised Pavement Marker (TRPM) may be used on a pattern spacing 5' O.C. to simulate a solid line.

6. For long term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
NOTE:
1. For sign installation details, see Std. Plan G-series.
2. In rural areas, the "V" Height can be a minimum of 7 feet for primary signs and 6 feet for the supplemental plaques for greater visibility, as directed by the engineer.
3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

<table>
<thead>
<tr>
<th></th>
<th>TO BOTTOM OF SIGN (NO SUPPLEMENTAL PLAQUE)</th>
<th>TO BOTTOM OF SUPPLEMENTAL PLAQUE (WHEN REQUIRED)</th>
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<tbody>
<tr>
<td>RURAL</td>
<td>6' minimum</td>
<td>4' minimum</td>
</tr>
<tr>
<td>URBAN</td>
<td>7' minimum</td>
<td>6' minimum</td>
</tr>
</tbody>
</table>

SIGN INSTALLATION
(SIGN INSTALLATION)
1. All fasteners may be zinc plated, galvanized or stainless steel. All steel angles and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.

2. Install one lightweight Type A Low-Intensity flashing warning light on the traffic side of the barricade. Install two Type A Low-Intensity flashing warning lights per barricade when the barricades are used to close a roadway. Attach the light to the barricade according to the light manufacturer's recommendations or use the details shown on this plan.

3. Stripes on barricade rails shall be alternating orange and white retroreflective stripes (sloping downward at an angle of 45 degrees in the direction traffic is to pass).

4. The Type 3 barricade design shown on this plan meets the crash test requirements of NCHRP 350. Alternative designs may be approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.

5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.

6. When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
AREA CLOSED TO TRAFFIC

USEABLE TRAFFIC LANE

ROAD CLOSURE AT INTERSECTION

WORK AREA

TYPE 3L BARRICADE

TYPE 3R BARRICADE

BARRICADE PLACEMENT

STRIpes ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2' wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.
Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2' wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrow base barrier.

Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

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

After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.

Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

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

After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.

Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

Use shims to properly fit the anchors to the barrier and roadway surfaces.

Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

**NOTES**

1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.
2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.
3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.
4. Use shims to properly fit the anchors to the barrier and roadway surfaces.
5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

**ATTACHMENT LOCATIONS**

**ATTACHMENT LOCATIONS**

**NOTES**

1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.
2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.
3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.
4. Use shims to properly fit the anchors to the barrier and roadway surfaces.
5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

**NOTES**

1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.
2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.
3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.
4. Use shims to properly fit the anchors to the barrier and roadway surfaces.
5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts which mark the angle point of any sudden change in topography. See Standard Specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2×4 lumber, 12” long minimum, and fastened with three 16d galvanized nails.

**NOTES:**

1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.
2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts which mark the angle point of any sudden change in topography.
3. See Standard specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2×4 lumber, 12’ long minimum, and fastened with three 16d galvanized nails.
NOTES
1. All concrete post bases shall be 10" minimum diameter.
2. Along the top and bottom, using Hog Rings, fasten the Chain Link Fabric to the Tension Wire within the limits of the first full fabric seams.
3. Details are illustrative and shall not limit hardware design or post selection of any particular fence type.

METHOD OF FASTENING STRETCHER BAR TO POST (SHOWN FOR ROUND POST)

POST AND RAIL SPECIFICATIONS

<table>
<thead>
<tr>
<th>POST</th>
<th>PIPE</th>
<th>ROLL FORMED</th>
<th>H-COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>END, CORNER, OR PULL POST</td>
<td>2 1/2&quot; DIAM.</td>
<td>Y</td>
<td>6.40</td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIAM.</td>
<td>Z</td>
<td>1.06</td>
</tr>
</tbody>
</table>

CHAIN LINK FENCE TYPES 3 AND 4
STANDARD PLAN L-10-10-01

Sheet 1 of 2 sheets

Approved for publication
Peaceman, Balfour
08-16-11

Washington State Department of Transportation
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

DOUBLE 14 FT. CHAIN LINK GATE - PAY LIMIT

DOUBLE 20 FT. CHAIN LINK GATE - PAY LIMIT

CHAIN LINK FENCE TYPE 1 OR 4

PAY LIMIT

FULL POINT

TENSION WIRE

FABRIC BAND (TYPE 1)

STRETCHER BAR (TYPE 1)

BOTTOM TENSION WIRE (TYPE 1) NOT REQUIRED FOR CHAIN LINK FENCE TYPE 4

CHAIN LINK FENCE PANEL

GATE POINT (TYPE 1) - 3 1/2" DIA (H.O.M., H.O.G. 40)

THE WIRE (TYPE 1) - SPACED @ 1/4" MAX

MATCH FENCE PANEL (TYPE 1)

TOP HANGING (TYPE 1)

HOE R Defender - 34" MAX (TYPE 1)

DOUBLE GATE

SINGLE GATE

CHAIN LINK FENCE TYPE 1 OR 4

PAY LIMIT

FULL POINT

TENSION WIRE

FABRIC BAND (TYPE 1)

STRETCHER BAR (TYPE 1)

BOTTOM TENSION WIRE (TYPE 1) NOT REQUIRED FOR CHAIN LINK FENCE TYPE 4

CHAIN LINK FENCE PANEL

GATE POINT (TYPE 1) - 3 1/2" DIA (H.O.M., H.O.G. 40)

THE WIRE (TYPE 1) - SPACED @ 1/4" MAX

MATCH FENCE PANEL (TYPE 1)

TOP HANGING (TYPE 1)

HOE R Defender - 34" MAX (TYPE 1)

SINGLE GATE

STANDARD PLAN L-30.10-01

SHEET 1 OF 9 SHEETS

APPROVED FOR PUBLICATION

PEACE BALINCAVICH 04-19-11

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown herein; see the Standard Plans for RPD supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

R = RAMP LANE WIDTH
L = LANE WIDTH

RAMP CHANNELIZATION
TWO LANE
STANDARD PLAN N-1.40-02

OFF-CONNECTION

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
NOTES

1. Install a minimum of 3 sets of diagonal chevrons in the gore area. A 60° spacing is standard; however, for gore areas shorter than 160' use a 26° spacing, and for gore areas greater than 400' a spacing of 100 may be used.

2. The acute angle of the diagonal shall always point in the direction of main line traffic.

GORE AREA MARKINGS WITH CHEVRONS

GORE AREA SUPPLEMENT WITH TYPE 2 RAISED PAVEMENT MARKERS

GORE AREA SUBSTITUTION WITH TYPES 1 & 2 RAISED PAVEMENT MARKERS
LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS – SYMMETRICAL WIDENING
(FOR LIMITED LANE IN URBAN AREA WITH POSTED SPEED OF 40 MPH OR LESS)

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane width.

Type 1L (9L) Traffic Arrow

NOTE:
1. The channelization shown on this plan is a standard circular, geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD Figure 2B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four lane undivided highways shall be a double centerline.
6. The lane Type 2L (9L) Traffic Arrow shown in the left-turn storage lane is optional, but recommended. Arrows may be added for longer storage lanes or divided for shorter storage terms. See Contract Plans.

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS – ASYMMETRICAL WIDENING LEFT OR CENTER LINE
(FOR LIMITED LANE IN URBAN AREA WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS – ASYMMETRICAL WIDENING LEFT OR CENTER LINE
(FOR LIMITED LANE IN URBAN AREA WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS – ASYMMETRICAL WIDENING LEFT OR CENTER LINE
(FOR LIMITED LANE IN URBAN AREA WITH POSTED SPEEDS OF 40 MPH OR LESS)
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Channelizing striping on the approach to raised channelization shall be No Paint in accordance with MUTCD figure 53-6B. Channelizing striping on the departure from raised channelization shall be determined by an engineering study.

4. Channelizing striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Channelizing striping on four-lane undivided highways shall be a double centerline.

6. The two Type 2L (6L) Traffic Arrows shown in the left-turn storage lanes are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

**LEGEND**

- **L = 12'** Typical Lane Width. See Contract for specified lane width.

- **Type 2L (6L) Traffic Arrow**

<table>
<thead>
<tr>
<th>Painted</th>
<th>Dimension</th>
<th>Approach</th>
<th>Lanes</th>
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<tr>
<td>40 MPH</td>
<td>607</td>
<td>340</td>
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<td>45 MPH</td>
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<tr>
<td>50 MPH</td>
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<td>2</td>
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<td>LOW SPEED</td>
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<tr>
<td>40 MPH</td>
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</tbody>
</table>

Can be reduced to a minimum of 60° to increase storage capacity.
NOTE

When specified in the contract plans, the HOV symbol marking shall be installed with an offset of 1 foot max. from the lane centerline.

CITY STREET SPACING = 80 FEET MIN.
HIGHWAY SPACING = 1000 FEET MAX.

HIGH OCCUPANCY VEHICLE
(HOV) LANE SYMBOL
LAYOUT
STANDARD PLAN M-7.50-01
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
APPROVED FOR PUBLICATION
Washington State Department of Transportation

DRAWN BY: MARK SUJKA

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

WASHINGTON
REGISTERED ENGINEER
1016 4TH STREET

EXPIRES AUGUST 9, 2007

01-30-07
Ken L. Smith

HIGH OCCUPANCY VEHICLE
(HOV) LANE SYMBOL
LAYOUT
STANDARD PLAN M-7.50-01
EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
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WASHINGTON
REGISTERED ENGINEER
1016 4TH STREET

EXPIRES AUGUST 9, 2007

01-30-07
Ken L. Smith
Bid Item "Bicycle Lane Symbol" includes Bike Lane Arrow and Bike Rider Symbol.

Grid is 1" square

General Note
See contract for location and material requirements.

Effective: August 1, 2011 to August 5, 2012

Approved for publication
Ken L. Smith 07-30-07
Washington State Department of Transportation
15'  16'  20'  23'

LAYOUT

EDGE LINE

1
2
3
4

DIMENSIONS SHOWN ARE APPROXIMATE. SEE CONTRACT.

DRAWN BY:  MARK SUJKA

TOTAL MARKING AREA (PER 12' WIDE LANE) = 111.59 SQ.FT.

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PORTATION.   A COPY MAY BE OBTAINED UPON REQUEST.

Ken L. Smith 01-30-07

EFFECTIVE:  AUGUST 1, 2011 TO August 5, 2012
1. See the Contract Plans for locations of crosswalk centerlines.

2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.

3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
ALTERNATIVE PARKING STALL MARKINGS
USE ONLY WHEN SPECIFIED IN THE CONTRACT

NOTES
1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.
2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.
3. All accessible stalls shall have wheelchair ramps. Wheelchair ramps in other stalls when specified in the contract. Wheelchair ramps shall be approximately 6" high and a minimum of 9 long.

LEGEND
- Reserved Parking Sign and post with 90-5x8-5/8: Please, if indicated (See Sign Fabrication Manual)
- Access Parking Space Symbol
- Manufactured wheel stop
- Detectable Warning Pattern

PARKING SPACE LAYOUTS
STANDARD PLAN N-17.10-02
Sheet 1 of 1 Sheet
APPROVED FOR PUBLICATION
Pepe Balakovich III 07-23-00
Washingto State Department of Transportation
LONGITUDINAL MARKING PATTERNS
STANDARD PLAN H-20.10-02

NOTES

1. Dotted Extension Line shall be the same color as the line it is extending.
2. Edge Line shall be white on the right edge of traveled way and yellow on the left edge of traveled way on one-way roadways. Solid Lane Line shall be white.
3. The distance between the lines of the Double Centerline shall be 12” everywhere, except 4” for bi-lane channelization and narrow roadways with lane widths of 10 feet or less. Local Agendas (on non-lane roadways) may specify a 4” distance for all locations.

The distance between the lines of the Double Lane Line shall be 4’.
1. Raised Pavement Markers Types 2YV and 2W shall be spaced at 80' intervals on tangents and on horizontal curve with a radius of 600' or more, and at 40' intervals on horizontal curves having radii of less than 600'. Center the RPM's in the gaps between the pavement marking line.

2. Type 2Y RPM's, when specified, shall be placed outside the left edge line at 80' intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL".

3. Raised pavement markers, when specified, shall be installed at the locations shown for Type 2W RPM's on multilane one-way roadways, and Type 3YV RPM's on two lane two-way roadways.

4. The Type 2W RPM's placed on multilane one-way roadways and all RPM's set in reserves shall have an abrasion resistant coating.

**LONGITUDINAL MARKING SUPPLEMENT WITH RAISED PAVEMENT MARKERS STANDARD PLAN N-30.30-02**

**SECTION A**

RECESSED PAVEMENT MARKER DETAILS

FOR USE WHERE SPECIFIED IN CONTRACT
NOTES:
1. Raised pavement markers shall be installed only when specified in the Contract Plans.
2. See the Standard Plans for marker designation.
3. The portion labeled "OPTIONAL" is only used when the Optional Marked Deceleration Taper (see Standard Plans M-3.10 and M-3.30) is specified in the Contract Plans.

Type 2L (ML) Traffic Arrow

END TWO-WAY LEFT-TURN LANE

SWITCH RUNNER OF LEFT-TURNING VEHICLES

TWO-WAY LEFT-TURN LANE

LEFT-TURN LANE

SEE DETAIL B

SEE DETAIL A

LEFT-TURN LANE

SEE DETAIL C

TWO-WAY LEFT-TURN CENTERLINE

SEE DETAIL C

WIDE LANE LINE

SEE DETAIL A

DOUBLE CENTERLINE (YELLOW)

SEE DETAIL B

DOUBLE CENTERLINE (YELLOW)

SEE DETAIL B
Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher.
SYMBOL & LANE

- ELLIPSE 'A'
- ELLIPSE 'B'

MARKING AREA
33.82 SQ.FT.

MARKING AREA
33.82 SQ.FT.

SYMMETRICAL ABOUT CENTERLINE

GRID IS 4" SQUARE

MARKING AREA
28.40 SQ.FT.

MARKING AREA
28.40 SQ.FT.

SYMBOL MARKINGS
TRAFFIC ARROWS FOR
HIGH SPEED ROADWAYS

STANDARD PLAN M-34.30-01

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

DRAWN BY: MARK SUJKA

SYMMETRICAL ABOUT CENTERLINE

MARKING AREA
33.82 SQ.FT.

MARKING AREA
33.82 SQ.FT.

SYMBOL & LANE

- ELLIPSE 'A'
- ELLIPSE 'B'

MARKING AREA
33.82 SQ.FT.

MARKING AREA
33.82 SQ.FT.

SYMMETRICAL ABOUT CENTERLINE

GRID IS 4" SQUARE

MARKING AREA
28.40 SQ.FT.

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SYMBOL MARKINGS
TRAFFIC ARROWS FOR
HIGH SPEED ROADWAYS

STANDARD PLAN M-34.30-01

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

DRAWN BY: MARK SUJKA

MARKING AREA
33.82 SQ.FT.

MARKING AREA
33.82 SQ.FT.

SYMMETRICAL ABOUT CENTERLINE

GRID IS 4" SQUARE

MARKING AREA
28.40 SQ.FT.

MARKING AREA
28.40 SQ.FT.
Symbol Markings
Traffic Arrows for High Speed Roadways
Standard Plan M-24.20-01

Type 6L (Left) Traffic Arrow

Type 6R (Right) Traffic Arrow

Mirror Image of Type 6L (Mirrored about lane centerline)
(Shown at Reduced Scale)

Marking Area 35.88 SQ. FT.

ELLIPSE "A" CENTERLINE

ELLIPSE "B" CENTERLINE

3' - 0" ELLIPSE "A" AXIS

3' - 0" ELLIPSE "B" AXIS

2' - 0" ELLIPSE "A"axis

2' - 0" ELLIPSE "B" axe

MARKING AREA 38.04 SQ. FT.

MARKING AREA 45.17 SQ. FT.

Type 7 Traffic Arrow

Symmetrical about centerline

Type 6R (Right) Traffic Arrow

Mirror Image of Type 6L (MIRRORED ABOUT LANE CENTERLINE)

Marking Area 35.88 SQ. FT.

Ellipse "A" Axis

Ellipse "B" Axis

Center Point of Ellipses

Effective: August 1, 2011 to August 5, 2012

Harold J. Peterfeso 05-31-06

Drawn by: Mark Sujka

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
SYMBOL MARKINGS
TRAFFIC ARROWS FOR
LOW SPEED ROADWAYS
STANDARD PLAN M-24.40-01

SYMBOL & LANE
MARKING AREA 7.73 SQ.FT.

8' - 0"

1' - 3"

1' - 0"

SYMBOL & LANE
MARKING AREA 8.03 SQ.FT.

8' - 0"

1' - 8"

1' - 0"

SYMMETRICAL ABOUT CENTERLINE

SYMBOL & LANE
MARKING AREA 7.73 SQ.FT.

8' - 0"

1' - 0"

SYMBOL & LANE
MARKING AREA 14.83 SQ.FT.

8' - 0"

1' - 0"

SYMBOL & LANE
MARKING AREA 14.83 SQ.FT.

8' - 0"

1' - 0"

NOTE: Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.

SYMBOL & LANE
MARKING AREA 5.30 SQ.FT.

8' - 0"

1' - 3"

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

MARKING AREA
8.03 SQ.FT.

SYMBOL & LANE
MARKING AREA 7.73 SQ.FT.

SYMBOL & LANE
MARKING AREA 14.83 SQ.FT.

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MARKING AREA 14.83 SQ.FT.
TRAFFIC ARROWS FOR LOW SPEED ROADWAYS

SYMBOL MARKINGS

TYPE 5 TRAFFIC ARROW

SYMBOL & LANE

SYMBOL MARKINGS

TYPE 6SR (RIGHT)
TRAFFIC ARROW

MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

TYPE 6SL (LEFT)
TRAFFIC ARROW

SYMMETRICAL ABOUT CENTERLINE
GRID IS 4" SQUARE
MARKING AREA
19.58 SQ.FT.

MARKING AREA
23.14 SQ.FT.

MARKING AREA
15.94 SQ.FT.

MARKING AREA
15.94 SQ.FT.

DRAWN BY: MARK SUJKA

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

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Harold J. Peterfeso 05-31-06

SYMBOL MARKINGS
TRAFFIC ARROWS FOR
LOW SPEED ROADWAYS

STANDARD PLAN M-24.40-01

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 9, 2007

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. When the context plane requires a guidepost with concurrent guardrail run, the Continuator shall either:
   
   A. Drive the flexible guidepost in line with the guardrail posts, or
   
   B. Mount the flexible guidepost onto the guardrail post.

2. Guideposts shall be fastened to the wooden guardrail post using two 2" X 3/8" lag screws with washers, along centerline of post. Also acceptable is any approved attachment method submitted by the guidepost manufacturer.

3. Guideposts shall be fastened to the steel guardrail posts using two galvanized 2" X 3/8" bolts with a washer on both sides, a lock washer, and nut. The nut shall be tightened to properly compress the lock washer. The drilled holes in the guardrail post will be filled with galvanizing repair paint as described in Standard Specifications Section B-4.1(13). Also acceptable is any approved attachment method submitted by the guidepost manufacturer.

4. When concrete barrier run occurs, the Continuator shall mount Barrier Delimiter where guideposts are required.

---

**Barrier Delimiter Requirements**

- Spacing of Barrier Delimiters shall be as shown in the Plan.
- The housing or baseplate can be flexible or rigid, molded from a durable plastic or other durable material approved by the engineer, and shall be attached to the barrier with an adhesive recommended by the manufacturer. The attachment point on the barrier surface shall be free of dirt, dust, water, snow, or any other material that would adversely affect the adhesive bond.
- Barrier Delimiters shall be one-sided for single direction traffic, or two-sided for bidirectional traffic. Color shall be white on the right of traffic, and yellow on the left of traffic.
- The reflective surface shall be rectangular or rectangular.
- Reflection Indicators: 
  - 12 square inches minimum surface area; Type III, IV, V, or VI, selected from approved manufacture listed in the Qualified Products List.
  
   Plastic Reflector: 8 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 266, reflective elements equal or exceed the following minimum values of Specified Intensity:

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Illumination Angle</th>
<th>Specified Intensity (cd/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1&quot;</td>
<td>90°</td>
<td>125</td>
</tr>
<tr>
<td>0.1&quot;</td>
<td>25°</td>
<td>83</td>
</tr>
</tbody>
</table>

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**Guideposts and Barrier Delimiters**

STANDARD PLAN M-40.10-62

Sheet 1 of 1 Sheet

Approved for publication:
Pravo Balanchik II 08-11-11

Washington State Department of Transportation

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
GUIDE POST PLACEMENT
INTERCHANGES

STANDARD PLAN M-40.20-00

NOTES

2. Guide posts shall be placed at 100' spacing on ramp tangents and tapers.
3. "S" dimension shown on Standard Plan M-40.40 or 100', whichever is smaller.
4. One half of "S" dimension shown on Standard Plan M-40.40 or 50', whichever is smaller.
5. Two spaces at 100'.
6. Three equal spaces when R < 75', four equal spaces when R ≥ 75'.
7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet maximum.

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

DRAWN BY: MARK SUJKA

STANDARD PLAN M-40.30-00

DIVIDED HIGHWAY

<table>
<thead>
<tr>
<th>TYPE</th>
<th>REFLECTIVE SHEETING APPLICATIONS</th>
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<tbody>
<tr>
<td>W</td>
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<td>Type WW</td>
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<tr>
<td>Y</td>
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</tbody>
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LEGEND

- TYPE W
- TYPE WW
- TYPE Y

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 at the Washington State Department of Transportation. A copy may be obtained upon request.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

GUIDE POST PLACEMENT
GRADE INTERSECTIONS

STANDARD PLAN M-40.30-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Pasco Bakotich III 09-20-07
GUIDE POST SPACING (FEET)

<table>
<thead>
<tr>
<th>Radius</th>
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<td>425</td>
<td>96</td>
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<tr>
<td>450</td>
<td>100</td>
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</tbody>
</table>

NOTE 1

The first guide post is positioned "S" distance from the beginning of curvature.

NOTE 2

If the last guide post beyond the curve is 1/2 "S" or more, no additional posts are required.

NOTE 3

If the last guide post beyond the curve is less than 1/2 "S", one additional post is required.

1. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

2. Locate the initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

NOTE

LEGEND

C
L
100'
100'
100'
100'
100'
100'

CROSSOVER

MIDIAN CROSSOVERS

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 AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012

Pasco Bakotich III
09-20-07
TYPICAL SHOULDER INSTALLATION

SHOULDER RUMBLE STRIP
TYPES 2, 3, AND 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN M-60.20-02

UNDIVIDED HIGHWAY
(TYPE 4 PATTERN SHOWN)

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SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN M-60.20-02

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EFFECTIVE: AUGUST 1, 2011 TO August 5, 2012
1. Centerline Rumble Strip installation requires a minimum distance of 12 feet from Centerline to edge of paved shoulder.

2. When directed by the Engineer, Rumble strips may be installed along the turn pocket taper where there is a history of rear-end collisions in the turn pocket.
NOTE
1. Typically, four times the letter or numeral height -- minimum, up to ten times -- maximum, or according to Plains.