Standard Plans
For Road, Bridge, and Municipal Construction

M 21-01

Washington State Department of Transportation

APWA
Washington State Chapter
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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:

http://www.wsdot.wa.gov/eesc/design/designstandards

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Pasco Bakotich III
State Design Engineer
Subject: Standard Plans Manual Comment

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FINISH OUTER EDGE OF PCCP SHOULDER WITH 1/2" R. EDGER

LONGITUDINAL CONTRACTION OR CONSTRUCTION JOINT (TYP.)
(SEE SECTION VIEWS)

PCCP SHOULDER IF REQUIRED

TRANSVERSE CONTRACTION OR CONSTRUCTION JOINT (TYP.)
(SEE SECTION VIEWS)

TIE BAR ~ #5 BAR × 30" ON 36" CENTERS.

TYPICAL ALL LANES.

FINISH OUTER EDGE OF PCCP SHOULDER WITH 1/2" R. EDGER

LANE WIDTH

LANE WIDTH

LONGITUDINAL JOINT
(SEE SECTION VIEW)

LONGITUDINAL JOINT
(SEE SECTION VIEW)

EXISTING PCCP

POCP

SAWED GROOVE ~ WIDTH 3/16" MIN., 5/16" MAX.
DEPTH 1" MIN.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-05.3(8)C

LANE WIDTH

SAWED GROOVE ~ WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-05.3(8)B

TIE BAR ~ #5 BAR × 30" ON 36" CENTERS.

TYPICAL ALL LANES.

LONGITUDINAL JOINT
(SEE SECTION VIEW)

TRANVERSE CONSTRUCTION JOINT

DOWEL BAR ~ 1 1/2" DIAM. × 18" ON 12" CENTERS.
TYPICAL ALL LANES UNLESS NOTED IN THE PLANS.

1

1

1

POCP TO PCCP

LONGITUDINAL CONSTRUCTION JOINT

EXISTING PCCP

HMA

POCP TO HMA

LONGITUDINAL JOINT

HMA SHOULDER IF REQUIRED

1

1

1

FINISH OUTER EDGE OF PCCP LANE WITH 1/2" R. EDGER
IF SHOULDER SHALL BE UNPAVED

1

1

1

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.
All edges of the approach slab shall have 1/2" radii except the longitudinal edge of the preceding pour of a LONGITUDINAL CONSTRUCTION JOINT.

Longitudinal joints shall be placed on lane lines and shall be constructed and sealed in accordance with Standard Specification Section 5-05.3(8). Joints may be either a sawcut crack control joint or a construction joint. Sawcut joints shall terminate 1'-0" before reaching edge of slab and must be saw cut as soon as possible after placement of concrete.

(A) Approach slabs less than 40' wide -- no joint is required.
(B) Approach slabs wider than 40' -- one or more joints are required to divide the slab into approximately 24' wide sections.
Transition from Concrete Overlay

CASE 1
CEMENT CONCRETE PAVEMENT WITH ASPHALT
OR CEMENT CONCRETE SHOULDER

CASE 2
ASPHALT CONCRETE PAVEMENT
(Diaphragm cast on structure)
1. Plane a taper into the existing pavement and shoulders (if paved). Depth shall taper from 0” at the beginning of pavement, to 1” at end of taper. Does not apply when existing pavement has been planed.

2. Before placing overlay, remove top 2” of existing joint filler, or 3” if existing joint is fiberboard, and block out the joint. After overlay, install new premolded joint filler. Top of joint filler shall be between ⅛” and ⅜” below overlay. When a compression seal is in place, see Bridge Plans.

3. Before placing overlay, block out the joint. After overlay, install premolded joint filler or rubberized asphalt filler. Top of joint filler shall be between ⅛” and ⅜” below overlay.

4. Full depth sawed grooves between ⅛” and ¼” wide shall be placed directly over the existing sawed grooves in the cement concrete pavement and cement concrete shoulders.


LEGEND

- Concrete Overlay
- Gray: Asphalt Concrete Overlay

NOTES

- See Bridge Plans for details
- Premolded joint filler (See Note 1)
- Joint filler overlay thickness varies (See Note 4)
- Joint filler (See Note 3)
- Premolded joint filler or fiberboard (See Note 2)
Divided Highway (One Way Traffic)
Dowel Bar Retrofit

Existing Cement Concrete Pavement

Dowel Bar (Typ.)

Plan View

Section A

Section B

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UNDIVIDED HIGHWAY
(TWO WAY TRAFFIC)
DOWEL BAR RETROFIT
FOR EACH LANE

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT
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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 02-24-03

KevIn.J. DAYTON, PLANNED ENGINEER
REGISTERED IN WASHINGTON STATE

EXPIRES JULY 27, 2003

DOWEL BAR RETROFIT
FOR CEMENT
CONCRETE PAVEMENT
STANDARD PLAN A-5
SHEET 3 OF 3 SHEETS
APPROVED FOR PUBLICATION

Harold J. Peterfeso 03-31-03
Washington State Department of Transportation
1. Install tie bars along longitudinal joint between full panel replacement and existing cement concrete pavement. Tie bars are not installed between cement concrete pavement and asphalt concrete shoulders.

2. Place polyethylene film (per AASHTO M 171-00) along the longitudinal joint between partial panel replacement and existing panel.
NEW CEMENT CONCRETE PAVEMENT

SECTION

APPROVED FOR PUBLICATION

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CEMENT CONCRETE PAVEMENT REPAIR

STANDARD PLAN A-6

SAWED GROOVE

EXISTING CEMENT CONCRETE PAVEMENT

6"

6"

EXISTING LONGITUDINAL JOINT

TIE BARS NOT MORE THAN 1/2 ON CENTERS

NEW FULL CEMENT CONCRETE PAVEMENT (Dowel Bars Not Shown)

6' MIN.

6' MIN.

EXISTING TRANSVERSE JOINT (SEE NOTE 2, SHEET 1)

NEW #5 × 32" EPOXY COATED REINF. BAR (TIE BAR) (TYP.)

WHEN REQUIRED

NEW 1 1/2" DIAM. DOWEL BARS @ 12" ON CENTERS

EXISTING PARTIAL PANEL

PARTIAL PANEL REPLACEMENT

WITH TIE BARS

NEW #5 × 32" EPOXY COATED REINF. BAR (TIE BAR) (TYP.)

NEW PARTIAL PANEL REPLACEMENT

PARTIAL PANEL REPLACEMENT

WITHOUT TIE BARS

NEW 1 1/2" DIAM. DOWEL BARS @ 12" ON CENTERS

NEW #5 × 32" EPOXY COATED REINF. BAR (TIE BAR) (TYP.)

6" MIN.

6" MIN.

DRILL 7/8" - 1 1/8" DIAM. × 1'-4" LONG HOLE IN EXISTING CEMENT CONCRETE FOR NEW TIE BAR (TYP.)

NEW #5 × 32" EPOXY COATED REINF. BAR (TIE BAR) (TYP.)

NO DRILLING NECESSARY IF BOTH LANES POURED AT ONCE.

1/2 CONCRETE PAVEMENT DEPTH

PARTIAL PANEL REPLACEMENT WITHOUT TIE BARS

PARTIAL PANEL REPLACEMENT

WITH TIE BARS

NEW FULL CEMENT CONCRETE PAVEMENT (Dowel Bars Not Shown)

EXISTING CEMENT CONCRETE PAVEMENT
NOTES

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(8).

3. The contractor shall avoid sawing existing concrete. The construction tolerance to locate the saw cut is 3/32" (0 min. to 1/2" max.) from the existing concrete (DETAILs 1 and 5).
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 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 basin has been placed.

**PIPE ALLOWANCES**

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* CORRUGATED POLYETHYLENE STORM SEWER PIPE

**FRAME AND VANED GRATE**

ONE #3 BAR HOOP FOR 4' HEIGHT

TWO #3 BAR HOOPS FOR 12" HEIGHT

**RECTANGULAR ADJUSTMENT SECTION**

#3 BAR EACH CORNER

#3 BAR EACH SIDE

#3 BAR EACH WAY

#3 BAR HOOP

**PRECAST BASE SECTION**

See Note 1

**ALTERNATIVE PRECAST BASE SECTION**
PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
<td>18&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>21&quot;</td>
</tr>
<tr>
<td>CPSSP # (STD. 8/SEC. 9-08.30)</td>
<td>18&quot;</td>
</tr>
<tr>
<td>SOLID WALL PVC (STD. 8/SEC. 9-08.12(1))</td>
<td>21&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC (STD. 8/SEC. 9-08.12(2))</td>
<td>21&quot;</td>
</tr>
</tbody>
</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

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 26". 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 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 basin has been placed.
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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 1.5" 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 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 basin has been placed.

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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.

CATCH BASIN TYPE 2

STANDARD PLAN B-10.20-00

CATCH BASIN DIMENSIONS

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</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>
</tr>
</thead>
<tbody>
<tr>
<td>46&quot;</td>
<td>3&quot;</td>
<td>6&quot;</td>
<td>36&quot;</td>
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<td>45&quot;</td>
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<tr>
<td>72&quot;</td>
<td>5&quot;</td>
<td>8&quot;</td>
<td>60&quot;</td>
<td>12&quot;</td>
<td>0.36</td>
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<tr>
<td>84&quot;</td>
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<td>12&quot;</td>
<td>0.36</td>
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</table>

PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER</th>
<th>CONCRETE</th>
<th>ALL METAL</th>
<th>GRABSP</th>
<th>SOLID WALL PVC</th>
<th>PROFILE WALL PVC</th>
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<tr>
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<td>30&quot;</td>
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<td>54&quot;</td>
<td>54&quot;</td>
<td>60&quot;</td>
</tr>
</tbody>
</table>

1. Corrugated Polystyrene Storm sewer Pipe (Std. Spec. 9-05.20)
2. (Std. Spec. 9-05.13(1))
3. (Std. Spec. 9-05.13(2))
NOTES

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

2. The vertical rear stem of the flow restractor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8".

3. The flow restractor shall be fabricated from one of the following materials:
   - 0.060" Corrugated Aluminum Alloy Drain Pipe
   - 0.064" Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.060" Corrugated Aluminum Alloy Drain Pipe
   - 0.060" Aluminum alloy flat sheet, in accordance with ASTM B 206, B632 H32 or E85
   - High Density Polyethylene Storm Drain Pipe

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

5. The multi-orifice elbows may be located as shown, or 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. Restractor 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 28 and ASTM B 275, designation 2024A; 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 or hollow tubing, with adjustable hook as required.

9. A neoprene rubber gasket is required between the riser mounting flange and the gate flange.

10. Install the gate so that the level-line mark is level when the gate is closed.

11. The mating surfaces of the lid and the body shall be machined for proper fit.

12. All shear gate bolts shall be stainless steel.

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

14. Alternative shear gate designs are acceptable if material specifications are met and flange bolt pattern matches.

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

The vertical rear stem of the flow restractor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8".

The flow restractor shall be fabricated from one of the following materials:
   - 0.060" Corrugated Aluminum Alloy Drain Pipe
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   - 0.060" Corrugated Aluminum Alloy Drain Pipe
   - 0.060" Aluminum alloy flat sheet, in accordance with ASTM B 206, B632 H32 or E85
   - High Density Polyethylene Storm Drain Pipe

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

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.

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

The shear gate shall be made of aluminum alloy in accordance with ASTM B 28 and ASTM B 275, designation 2024A; or cast iron in accordance with ASTM A 48, Class 30B.

The lift handle shall be made of a similar metal to the gate (to prevent galvanic corrosion), it may be of solid or hollow tubing, with adjustable hook as required.

A neoprene rubber gasket is required between the riser mounting flange and the gate flange.

Install the gate so that the level-line mark is level when the gate is closed.

The mating surfaces of the lid and the body shall be machined for proper fit.

All shear gate bolts shall be stainless steel.

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

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, galvanized steel or galvanized steel. Galvanized steel shall have Treatment 1.
**MANHOLE TYPE 2**

**STANDARD PLAN B-15.40-00**

**MANHOLE DIMENSION TABLE**

<table>
<thead>
<tr>
<th>Diameter</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>
</tr>
</thead>
<tbody>
<tr>
<td><strong>72”</strong></td>
<td>6”</td>
<td>5”</td>
<td>60”</td>
<td>12”</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>84”</strong></td>
<td>6”</td>
<td>12”</td>
<td>72”</td>
<td>12”</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>96”</strong></td>
<td>6”</td>
<td>12”</td>
<td>96”</td>
<td>12”</td>
<td>0.26</td>
</tr>
</tbody>
</table>

**NOTE:**

- Knockouts shall have a wall thickness of 2” minimum to 2.5” maximum.
- Highlighted sections in the diagram include:
  - Channel and Shelf
  - Manhole Ring and Cover
  - Circular Adjustment Section (Typ.)
  - Eccentric Cone Section
  - Precast Inner Section
  - Flat Slab Top
  - Precast Riser Section

**INTEGRAL BASE**

- PreCast with Riser
- Gravel Backfill for Pipe Zone Bedding
- 4” RinG
- 12” Max.

**SEPARATE BASE**

- Gravel Backfill for Pipe Zone Bedding
- 8” RinG
- CIRCULAR ADJUSTMENT SECTION (TYP.)
- REINFORCING STEEL (TYP.)

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

<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>BASE REINFORCING STEEL (in. in each direction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48&quot;</td>
<td>4&quot;</td>
<td>8&quot;</td>
<td>36&quot;</td>
<td>6&quot;</td>
<td>0.23</td>
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<td>54&quot;</td>
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<tr>
<td>84&quot;</td>
<td>12&quot;</td>
<td>72&quot;</td>
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<td>0.20</td>
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<tr>
<td>96&quot;</td>
<td>12&quot;</td>
<td>84&quot;</td>
<td></td>
<td>12&quot;</td>
<td>0.20</td>
</tr>
</tbody>
</table>
NOTES
1. Precast cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. Connect inlet pipe to structure using precast hole or core drilled hole.
4. For depths over 15' use 72" x 8" Alternative Precast Footing.

CONE SECTION
48" I.D.

CRUSHED SURFACING
BASE COURSE

FLOW
2%

6" DIAM. DRAIN HOLE (TYP.)

ADJUSTMENT SECTION (TYP.)

CIRCULAR FRAME (RING) & COVER
- SEE STANDARD PLAN B-30.70

GRAVEL BACKFILL
FOR DRYWELL

4" CONCRETE SLAB
- CLASS 3000

LIMIT OF EXCAVATION
THREE BAYE (MAX.)

6" (TYP.)
10" (TYP.)

INLET PIPE
- SEE NOTE 3

SEEPAGE PORT (TYP.)
- SEE NOTE 2

CUTAWAY ELEVATION VIEW

UNDERGROUND DRAINAGE
GEOTEXTILE, MODERATE
SURVIVABILITY, CLASS A

PRECAST FOOTING DETAIL

ALTERNATIVE PRECAST
FOOTING DETAIL

DRYWELL TYPE 2
(WITH PIPE INLET)

STANDARD PLAN B-30.40-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 1 SHEET

KEVIN J. DAYTON
11-31-06

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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NOTES

1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. For depths over 15' use 72'' x 8'' Alternative Precast Footing.

ALTERNATIVE PRECAST FOOTING DETAIL

CIRCULAR GRATE ~ SEE STD. PLAN B-30.80

CIRCULAR FRAME (RING) ~ SEE STD. PLAN B-30.70

PRECAST FOOTING WITH DRAIN HOLES ~ SEE NOTE 4

SEEPAGE PORT ~ SEE NOTE 2

DRAINAGE DREDGED, MODERATE SURVIVABILITY, CLASS A

UNDERGROUND DRAINAGE DREDGED, MODERATE SURVIVABILITY, CLASS A

LIMIT OF EXCAVATION HIGH SLOPE (MAX.)

PRECAST FOOTING DETAIL

DRAWN BY: ADAM COCHRAN

EXPIRES JULY 1, 2007

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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 Hood may include casting lugs. The top of the Hood may be cast with a pattern.

3. Attach the Hood to the frame with two 3/4" x 2" hex head bolts, nuts, and oversize washers. The washers shall have diameters adequate to 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" x - 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 should 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 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.

---

**PIPE ALLOWANCES**

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<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
<td>12&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>18&quot;</td>
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<tr>
<td>CPSSP # (STD. SPEC. 9-06.30)</td>
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<td>SOLID WALL PVC (STD. SPEC. 9-08.12(1))</td>
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</tr>
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* CORRUGATED POLYETHYLENE STORM SEWER PIPE

---

**CONCRETE INLET**

STANDARD PLAN B-25.60-00

PRECAST BASE SECTION

ALTERNATIVE PRECAST BASE SECTION

---

**Frame and Vaned Grate**

**Rectangular Adjustment Section**

**One #3 Bar Hoop for # Height**

**Two #3 Bar Hoops for # Height**

**SEE NOTE 1**

**Harold J. Peterfeso**

06-01-06

EXPIRES JULY 1, 2007

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1. This frame is designed to accommodate 20" x 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.

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

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

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. Alternative reinforcing designs are acceptable in lieu of the rib design. Refer to Standard Specification 9-05.15(2) for additional requirements. 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 9-06.16(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.

Refer to Standard Specification 9-06.16(2) for additional requirements.

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. Refer to Standard Specification 6-06.16(2) for additional requirements. 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 6-06.16(2) for additional requirements.

3. For Frame details, see Standard Plan B-30.40.

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

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.

Refer to Standard Specification 6-06.16(2) for additional requirements.

For Frame details, see Standard Plan B-30.40.

The thickness of the grate shall not exceed 1 5/8".
NOTES:
1. Gasket and groove may be in the seat or underside of cover.
2. For bolt down manhole ring and covers that are not designated "Watertight", the neoprene gasket, groove and washer are not required.
3. Washer shall be neoprene (Detail "B").
4. In lieu of blind pick notch for storm sewer manhole covers, drill three 1" diameter holes at 120° spacing.
5. Proprietary manhole covers without bottom ribs are acceptable.
6. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1.5 times the horizontal scale (1H:1.5V).

SKID GROOVE PATTERN ~ SEE DETAIL

CIRCULAR FRAME (RING) AND COVER

STANDARD PLAN B-30.70-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso
06-01-06

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-30.20 and B-20.20.

For use with Circular Frames (rings) detailed in Standard Plan B-30.70. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-30.20 and B-20.20.
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.
NOTES

1. The Steel Angles shall be set so that each bearing bar of precast prestressed 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 grate line of the top inside of any pipe shall enter no lower than the grate line of the top inside of the outlet pipe.

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

Bar List:

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>WALL</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>SIDE WALL</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>UNIT H</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>UNIT J</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>UNIT K</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>UNIT K</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>SIDE WALL</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>SIDE WALL</td>
<td>4</td>
</tr>
</tbody>
</table>

Beam Diagram (All Dimensions are Out to Out):

- 1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.
- 2. Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section.
- 3. All exposed concrete edges shall be finished with a 1/2" radius.
- 4. Pipes may enter through the 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.

Grate Inlet Type 2

Notes:

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

Harold J. Peterfeso

Washington State Department of Transportation

Approved for Publication
Expiring: July 1, 2007
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.)

GRATE "B"

(Approximate weight 215 lbs)

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

3 1/2" × 3/4" STEEL PLATES

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1. The Contract may specify a rotated inlet installation. Orient the Grates in the Frame so they intercept 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.

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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 grates, see Standard Plan B-50-20.
7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.
8. The inside wall taper for form removal shall not result in any wall section thinner than 6" 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.
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 grates, see Standard Plan B-50.20.
7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.
8. The inside wall taper for form removal shall not result in any wall section thinner than 6" 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.

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, see 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.
### Pipe Zone Backfill

- **Concrete and Ductile Iron Pipe**
- **Thermoplastic Pipe**
- **Metal Pipe**

#### Trench Width

- **Pipe Zone Backfill**
  - (See Note 1)
- **Gravel Backfill**
  - (See Note 2)
- **Foundation Level**

#### Pipe ZONE BACKFILL

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 ZONE BEDDING AND BACKFILL</th>
<th>STANDARD PLAN B-55.20-00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PIPE</strong></td>
<td><strong>SIZE</strong></td>
</tr>
<tr>
<td>CIRCULAR PIPE (DIAMETER)</td>
<td>12&quot; to 24&quot;</td>
</tr>
<tr>
<td></td>
<td>30&quot; to 36&quot;</td>
</tr>
<tr>
<td></td>
<td>45&quot; to 142&quot;</td>
</tr>
<tr>
<td>PIPE ARCH (SPAN)</td>
<td>18&quot; to 36&quot;</td>
</tr>
<tr>
<td></td>
<td>48&quot; to 142&quot;</td>
</tr>
<tr>
<td></td>
<td>144&quot; to 302&quot;</td>
</tr>
</tbody>
</table>
**CONCRETE COLLAR OPTION**

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 resistances and diameters. The Concrete Collar option shall only be used to extend existing pipes.

Steel Welded Wire Fabric shall be in accordance with Standard Specification 9-07.4. Install one wrap 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)

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.

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).

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.

**NOTES**

1. Steel Welded Wire Fabric shall be in accordance with Standard Specification 9-07.7. Install one wrap 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)

2. 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.

3. 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).

4. 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.
### Coupling Band Dimension Table

<table>
<thead>
<tr>
<th>Band Type</th>
<th>Corrugation Pitch x Depth</th>
<th>Pipe Dia. (MIN)</th>
<th>MIN W</th>
<th>Gasket Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>2 2/3 x 1/2 or 3 x 1</td>
<td>12 - 84</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>3 x 1 REFORMED TO 2 2/3 x 1/2</td>
<td>30 - 144</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2 or 3 x 1</td>
<td>12 - 84</td>
<td>10 1/2</td>
<td>C-RING</td>
</tr>
<tr>
<td></td>
<td>3 x 1 REFORMED TO 2 2/3 x 1/2</td>
<td>54 - 144</td>
<td>24</td>
<td>C-RING</td>
</tr>
<tr>
<td>J</td>
<td>2 2/3 x 1/2</td>
<td>12 - 48</td>
<td>2 2/3</td>
<td>BUTYL</td>
</tr>
<tr>
<td>K</td>
<td>2 2/3 x 1/2</td>
<td>12 - 48</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>3 x 1</td>
<td>64 - 84</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>54 - 144</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2 2/3 x 1/2 or 3 x 1</td>
<td>50 - 80</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>3 x 1 REFORMED TO 2 2/3 x 1/2</td>
<td>88 ~ 108</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2</td>
<td>12 - 48</td>
<td>12</td>
<td>C-RING</td>
</tr>
<tr>
<td></td>
<td>3 x 1</td>
<td>64 - 84</td>
<td>24</td>
<td>C-RING</td>
</tr>
<tr>
<td></td>
<td>54 - 144</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>2 2/3 x 1/2</td>
<td>64 - 84</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
</tbody>
</table>

*Pipe Arch Only*

**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.
- EXPIRES JULY 1, 2007
- APPROVED FOR PUBLICATION
- STANDARD PLAN B-60.40-00

**Dimensions:**
- All dimensions are in inches
- (WS) 60-1/4-11

**Effective Dates:**
- APRIL 2, 2007 TO JANUARY 6, 2008
- EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008
- EXPIRES JULY 1, 2007

**Authors:**
- MATTHEW J. KITTEL (Professional Engineer)
- Harold J. Peterfeso
- 06-01-06

**Title:**
- COUPLING BANDS FOR CORRUGATED METAL PIPE

**Sheet Information:**
- SHEET 1 OF 1 SHEET

**Document Information:**
- APPROVED FOR PUBLICATION

**Drawing Information:**
- DOUBLE BAR & STRAP CONNECTOR DETAIL
- BAR & STRAP CONNECTOR DETAIL
- TYPE K BAND ANGLE CONNECTOR DETAIL
- TYPE J BAND ANGLE CONNECTOR DETAIL
- TYPE D BAND ANGLE CONNECTOR DETAIL
- FLANGE BAND
- FLAT BAND OR DIMPLE BAND
- SEMI-CORRUGATED BAND
- ANNULAR-CORRUGATED BAND
- REFORMED PIPE ENDS
- CORRUGATION PITCH x DEPTH
- BAND
- TYPE
- PIPE DIAM.
- MIN W
- GASKET TYPE
- BUTYL
- SLEEVE
- C-RING
Span and rise dimensions are nominal and are measured to the inside crests of corrugations.

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

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 the 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).

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

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 otherwise indicated, 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.

**Table: Allowable Heights of Cover**

<table>
<thead>
<tr>
<th>Span</th>
<th>Rise</th>
<th>52 Base Thick Corrugated Metal Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MIN.</td>
</tr>
<tr>
<td>6'-8&quot;</td>
<td>7'-1&quot;</td>
<td>4</td>
</tr>
<tr>
<td>6'-10&quot;</td>
<td>9'-2&quot;</td>
<td>5</td>
</tr>
</tbody>
</table>
Allowable Heights of Cover

<table>
<thead>
<tr>
<th>Span (in)</th>
<th>12 Gage</th>
<th>13 Gage</th>
<th>14 Gage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12'-0&quot;</td>
<td>9&quot;</td>
<td>10&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>12'-11&quot;</td>
<td>9 1/2&quot;</td>
<td>11&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>12'-12&quot;</td>
<td>10&quot;</td>
<td>11&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>12'-13&quot;</td>
<td>10 1/2&quot;</td>
<td>11&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>12'-14&quot;</td>
<td>11&quot;</td>
<td>11&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>12'-15&quot;</td>
<td>11 1/2&quot;</td>
<td>11&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>12'-16&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>12'-17&quot;</td>
<td>12 1/2&quot;</td>
<td>12&quot;</td>
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<tr>
<td>12'-18&quot;</td>
<td>13&quot;</td>
<td>13&quot;</td>
<td>13&quot;</td>
</tr>
<tr>
<td>12'-19&quot;</td>
<td>13 1/2&quot;</td>
<td>13&quot;</td>
<td>13&quot;</td>
</tr>
<tr>
<td>12'-20&quot;</td>
<td>14&quot;</td>
<td>14&quot;</td>
<td>14&quot;</td>
</tr>
</tbody>
</table>

**Notes:**
- Open and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.
- Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.
END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))

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.

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METAL PIPE

CONCRETE PIPE

THERMOPLASTIC PIPE
NOTES

1. The variable dimension indicated for the height of step for step mitered pipes shall conform to the manufacturer's recommendations unless specified differently on the plans or in the Special Provisions.

2. Reinforcing steel shall have 1 1/2" min. clear cover to all concrete surfaces.

3. Headwalls for concrete culvert pipe may omit anchor bolt attachment.

4. When steel pipe safety bars are used, headwall thickness shall be increased to 8".

ANCHOR BOLTS ~ EQUALLY SPACED, 24" MAX. CENTER TO CENTER (SEE NOTE 3)

ANCHOR BOLT (TYP.) ~ SEE DETAIL & NOTE 3

CLASS 3000 CONCRETE

HEADWALLS FOR CULVERT PIPE AND UNDERPASSES

STANDARD PLAN B-75.20-00

EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008

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Harold J. Peterfeso 06-01-06

REGISTERED ENGINEER

WASHTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JULY 1, 2007
Bevel culvert pipe to match side slope.

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

Centerline of headwall shall be normal to roadway centerline.
NOTES
1. D = Inside Diameter of Culvert Pipe, or Pipe Arch Span Width, 36" maximum.

2. The distance between the safety bars, and between the top bar and the culvert crown, shall be equal spaces of no more than 24". The distance may vary ± 1/4" between bars to facilitate placement.

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

SHEET 1 OF 1 SHEET
DRAWN BY: ADAM COCHRAN

FRONT VIEW

ISOMETRIC VIEW

SIDE VIEW

SECTION A

SECTION B

TYPE 2 SAFETY BARS FOR CULVERT PIPE OR PIPE ARCH (ON CROSS ROAD)
STANDARD PLAN B-75.60-00

EXPIRES JULY 1, 2007

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1. As an alternative connection on 16" through 24" pipe, a 1" wide strip of 18 gauge or 12 gauge galvanized steel, fastened with a 1/2" diam., 5/8" long galvanized bolt and square head nut, may be used.

2. Number of safety bars required will vary depending upon the length of the end section.
Temporary cap at edge of right of way, unless otherwise directed in contract.

DUMMY JOINT WITH 3/16" x 1 1/2" JOINT MATERIAL

WIRE MESH

DUMMY JOINT

4" DRAIN PIPE

6" MAX.

6" (TYP.)

4" DRAIN PIPE CAPPED AT EDGE OF R/W

CONCRETE CURB

TYPE MAY VARY

ROADWAY

WIRE MESH REINFORCEMENT
3 1/8" W3D x W3D (14 GAUGE)
4 x 4 W3D x W3D (10 GAUGE)

CONCRETE SIDEWALK

PLANTING STRIP

ROADWAY

(4" DRAIN PIPE SHOWN)

CONCRETE CURB

-TYPE MAY VARY

PLANTING STRIP

ROADWAY

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Harold J. Peterson 04-01-06
1. Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gasket for new sewer installations.

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

NOTES:
- **NOTE 1**: Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gasket for new sewer installations.
- **NOTE 2**: Mark location of sewer stub in accordance with Contracting Agency requirements.

**PLAN VIEW**
- **WYE CONNECTION**
- **TEE CONNECTION**

**ELEVATION VIEW**
- **WYE CONNECTION**
- **TEE CONNECTION**

**FOR SANITARY SEWER USE**

**STANDARD PLAN B-86.20-00**

**SIDE SEWER CONNECTION**

**DRAWN BY: ADAM COCHRAN**

**APPROVED FOR PUBLICATION**

**DATE:**

**STATE DESIGN ENGINEER**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**SHEET 1 OF 1 SHEET**

**NOTES**
8 INCH SEWER CLEAN-OUT
STANDARD PLAN B-85-40-09

CAST IRON RING AND COVER

FOR SANITARY SEWER USE
DUCTILE IRON DROP CONNECTION

CONCRETE ENCASED DROP CONNECTION

TYPICAL MANHOLE

MORTAR DAM OR PLUG AS REQUIRED BY ENGINEER

Cement Concrete Class 3000 Poured In Place

D.I.P. TEE

CLEARANCE 2"

ONE LENGTH OF DUCTILE IRON PIPE (CLASS 50) TO SOLID BEARING WHEN SPAN IS MORE THAN 48"

BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER

ONE LENGTH OF DUCTILE IRON PIPE (CLASS 50) TO SOLID BEARING WHEN SPAN IS MORE THAN 48"

CEMENT CONCRETE CLASS 3000 BLOCK Poured In Place

D.I.P. 90° BEND

CLEARANCE 2"

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

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

COAT THE PIPE THREADS WITH ASPHALT AFTER ASSEMBLY.

THE EXISTING METER BOX (LOCATE IN FIELD)

TEST BLOCKING 4" × 8" × 16" (TOP BLOCK NOT SHOWN)

TAPPED CAP OR PLUG

VALVE MARKER POST

2" FEMALE × IP × 2 1/2" MALE NST HOSE CONNECTION WITH CAP (BLOWOFF OUTLET)

SOLID CONCRETE BEARING BLOCK ~ 4" × 8" × 16"

VALUE BOX AND LID ~ CAST IRON

2 INCH BLOWOFF ASSEMBLY

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Harold J. Petersen
06-08-06
COMBINATION AIR RELEASE / AIR VACUUM VALVE ASSEMBLY

STANDARD PLAN B-00.30-08

Sheet 1 of 1 Sheet

NOTES

1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same sizes 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. Areas 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>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>2,130</td>
<td>1,920</td>
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<tr>
<td>6&quot;</td>
<td>7,065</td>
<td>6,295</td>
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<td>8&quot;</td>
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<td>12&quot;</td>
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</tr>
<tr>
<td>16&quot;</td>
<td>60,305</td>
<td>53,965</td>
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<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>SAFE BEARING LOAD (PSF)</th>
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<tbody>
<tr>
<td>Black, peat, etc.</td>
<td>0</td>
</tr>
<tr>
<td>Soft clay</td>
<td>5,000</td>
</tr>
<tr>
<td>Sand</td>
<td>2,000</td>
</tr>
<tr>
<td>Sand and gravel</td>
<td>2,500</td>
</tr>
<tr>
<td>Sand and gravel cemented with clay</td>
<td>7,000</td>
</tr>
<tr>
<td>Hard shale</td>
<td>10,000</td>
</tr>
</tbody>
</table>

CONCRETE THRUST BLOCK
STANDARD PLAN B-90.40-00

PLAN VIEW
PLUGGED CROSS
(USE COLUMN A)

PLAN VIEW
PLUGGED CROSS
(USE COLUMN B)

PLAN VIEW
UNBALANCED CROSS
(USE COLUMN A)

PLAN VIEW
PLUGGED CROSS
(USE COLUMN C)

PLAN VIEW
VALVE
(USE COLUMN A)

PROFILE VIEW
PLUGGED TEE
(USE COLUMN A)

PLAN VIEW
PLUGGED TEE
(USE COLUMN B)

PLAN VIEW
TEE

PLAN VIEW
DEAD END
(USE COLUMN B - E)

OFFSET
(USE COLUMN B - E)

BEND
**Blocking for 11.25° or 22.5° Vertical Bends**

- **Four tie rods with turnbuckles**
- **Thread 6"**

**Blocking for 45° Vertical Bends**

- **Two tie rods with turnbuckles**
- **Thread 6"**

---

**Dimension Table**

<table>
<thead>
<tr>
<th>Pipe Diameter (in)</th>
<th>Bend Angle (°)</th>
<th>Concrete Volume (ft³)</th>
<th>Cube Size (in)</th>
<th>Tie Rod Diameter (in)</th>
<th>Tie Rod Embedment (in)</th>
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<tbody>
<tr>
<td>4</td>
<td>11.25</td>
<td>2</td>
<td>1.8</td>
<td>5/8</td>
<td>17</td>
</tr>
<tr>
<td>6</td>
<td>22.5</td>
<td>12</td>
<td>3.8</td>
<td>5/8</td>
<td>17</td>
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<tr>
<td>6</td>
<td>45</td>
<td>50</td>
<td>3.7</td>
<td>5/8</td>
<td>17</td>
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<td>11.25</td>
<td>25</td>
<td>2.9</td>
<td>5/8</td>
<td>17</td>
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<tr>
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<td>22.5</td>
<td>46</td>
<td>3.6</td>
<td>5/8</td>
<td>17</td>
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<tr>
<td>8</td>
<td>45</td>
<td>59</td>
<td>3.4</td>
<td>5/8</td>
<td>17</td>
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<tr>
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<td>11.25</td>
<td>76</td>
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<td>17</td>
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<td>120</td>
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<td>5/8</td>
<td>17</td>
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<td>159</td>
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<td>5/8</td>
<td>17</td>
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<td>5/8</td>
<td>17</td>
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<td>108</td>
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<td>200</td>
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<td>3/4</td>
<td>24</td>
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<td>11.25</td>
<td>75</td>
<td>4.2</td>
<td>5/8</td>
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<td>22.5</td>
<td>147</td>
<td>5.3</td>
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<td>272</td>
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<td>16</td>
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<td>24</td>
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<tr>
<td>16</td>
<td>45</td>
<td>355</td>
<td>7.1</td>
<td>1 1/8&quot;</td>
<td>30</td>
</tr>
</tbody>
</table>

**Notes:**
- Block the rods to be heavily coated with asphalt after installation.
- Standard Plan B-90.50-00
- Concrete thrust block for convex vertical bends

---

**Concrete Thrust Block for Convex Vertical Bends**

**Standard Plan B-90.50-00**

**Sheet 1 of 1 Sheet**

Approved for Publication: 06-08-06

Washington State Department of Transportation
CULVERT OR DRAIN PIPE

SECTION

CONCRETE INLET

DRAIN PIPE ~ 12" DIAM. MIN. (SEE CONTRACT)

CONCRETE BARRIER TYPE 2

CATCH BASIN TYPE 1 OR 2

DRAIN PIPE ~ 12" DIA. MIN. (SEE CONTRACT)

CATCH BASIN

CONCRETE INLET

TOP OF PAVED MEDIAN

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

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

FRAME AND GRATE (TYP.)

FRAME AND VANED GRATE (TYP.)

CONCRETE INLET

TOP OF PAVED MEDIAN

CONCRETE INLET

FRAME FOR VANED GRATE

HMA OR CONCRETE CLASS 3000

HMA OR CONCRETE CLASS 3000

HMA OR CONCRETE CLASS 3000

CONCRETE BARRIER TYPE 3

CONCRETE BARRIER TYPE 3

CONCRETE BARRIER TYPE 2

CONCRETE BARRIER TYPE 2

CATCH BASIN TYPE 1 OR 2

CATCH BASIN TYPE 1 OR 2

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

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

3. With Beam Guardrail Transition Section Types 2, 4, and 5, use Extruded Curb Types 1, 2, 4a, 5, or 6.

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.

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

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

3. Beam Guardrail post spacing for Types 1 through 4 shall be 8' - 3" on centers.

4. Timber blocks shall be toe-nailed to the post with a 1 1/4" galvanized nail to prevent block rotation.

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

6. When "Beam Guardrail Type 1 - ___ Ft. Long Post" is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" min. high and 1/4" deep, at the location where the letter "H" is shown in the ASSEMBLY DETAIL. After installing a Long Post, it shall be the Contractor's responsibility to ensure that the stamped numbers are still legible and 1/4" deep.

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

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NOTES
1. Type 10 posts shall be 6x8 timber or W6x3.
   Type 11 posts shall be 10x10 timber or W6x15.
   For details, see Standard Plan "Beam Guardrail Posts and Blocks."
2. Type 10 guardrail post spacing shall be 6'-3" on center.
   Type 11 shall be a maximum of 3'-1½" on center.

See Note 1

 TYPE 10 and 11

STANDARD PLAN C-1a

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

APPROVED FOR PUBLICATION

DATE

REVISION BY

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NOTES
1. Wood posts for all guardrail placement plans shall be 6x8 except where noted otherwise.
2. Lower hole is for rub rail of Type 2 and Type 3 Beam Guardrail.
3. 6x9 steel posts and timber blocks are alternates for 6x8 timber posts and blocks. 6x10 steel posts and timber blocks are alternates for 10x10 timber posts and blocks.
4. Holes shall be located on approaching traffic side of web.
5. When contract requires "Beam Guardrail Type [__], __ Foot Long Post," the steel post length shall be marked with numbers to ensure permanent identification at the location where the letter "H" is shown on the detail. The marking shall be 1 1/2" MIN height.
6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.

CONTROLLED RELEASING
TERMINAL (CRT) POST

FOUNDATION TUBE

SOIL PLATE

G-2 POST
NOTES
1. For post details see Standard Plan, "Beam Guardrail Posts and Blocks".

5/16" DIA x 1 1/2" hex head bolt with hex nut and 1 3/4" square x .135" washer

G-2 Post
See Note 1

Type 20

See Detail A

See Detail B

5/32" DIA x 1/2" hex head bolt with hex nut and 1/2" square x .135" washer

Guardrail rests on top of bolt.

Type 21

Detail A

Detail B

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INTERMEDIATE GUARDRAIL
POST CONNECTION DETAILS
(Type A shown):

THRIE BEAM GUARDRAIL REDUCER SECTION
TYPE A
(Left section shown, right section reversed):

1" Splice bolt slots
1/8" x 1 1/4" (TYP)

1/4"

10 Gage

THRIE BEAM GUARDRAIL REDUCER SECTION
TYPE B
(Left section shown, right section reversed):

1" Splice bolt slots
1/8" x 1 1/4" (TYP)

1/4"

10 Gage

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.

ADDED 10 GAGE STEEL DESIGNATION; REV. NOTE 1

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

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

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

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

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

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

FLARE RATE TABLE

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<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE</th>
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<td>70</td>
<td>15:1</td>
</tr>
<tr>
<td>60</td>
<td>14:1</td>
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<tr>
<td>55</td>
<td>12:1</td>
</tr>
<tr>
<td>50</td>
<td>11:1</td>
</tr>
<tr>
<td>45</td>
<td>10:1</td>
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<tr>
<td>40 or less</td>
<td>9:1</td>
</tr>
<tr>
<td>35</td>
<td>8:1</td>
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<tr>
<td>30</td>
<td>7:1</td>
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<td>6:1</td>
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<td>15</td>
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<tr>
<td>10</td>
<td>3:1</td>
</tr>
<tr>
<td>5</td>
<td>2:1</td>
</tr>
<tr>
<td>2.5</td>
<td>1:1</td>
</tr>
</tbody>
</table>

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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 taping 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 nested 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 nested 6' - 3" thrie beam section in its place.

3. The Beam Guardrail Transition Section Type 16 on this end shall terminate at a 10×10 post. Place nested thrie beam with 10×10 posts at 3' - 1 1/2" equally spaced. At a 10×10 post, the Engineers may extend the second 6×8 post of the Beam Guardrail Type 10 section behind the 10×10 post. If full post depth cannot be achieved due to the structure foundation, hollow post shall be used to extend the second 6×8 post or as approved by the Engineer.

4. The Beam Guardrail Transition Section Type 16 end shall terminate at a 10×10 post. Place nested thrie beam with 10×10 posts at 3' - 1 1/2" equally spaced. The Beam Guardrail Type 11 post height shall be 2' - 9".

5. Plan view (A) 

6. Add standard block to rail with two 5/8" × 4" lag bolts (TYP.) at 6' - 3" maximum spacing. The Beam Guardrail Type 10 end shall terminate at a 10×10 post. Place nested thrie beam with 10×10 posts at 3' - 1 1/2" equally spaced. At a 10×10 post, the Engineers may extend the second 6×8 post of the Beam Guardrail Type 10 section behind the 10×10 post. If full post depth cannot be achieved due to the structure foundation, hollow post shall be used to extend the second 6×8 post or as approved by the Engineer.

7. The Beam Guardrail Transition Section Type 16 end shall terminate at a 10×10 post. Place nested thrie beam with 10×10 posts at 3' - 1 1/2" equally spaced. The Beam Guardrail Type 11 post height shall be 2' - 9".
NOTES:
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.

SEE NOTE 1

TERMINAL PAY LIMIT

TERMINAL PAY LIMIT - SEE NOTE 1

SEE NOTE 4

EDGE OF SHOULDER

TRAFFIC

VARIES - SEE CONTRACT

CASE 10A

ANCHOR PAY LIMIT

ANCHOR PAY LIMIT - SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT

BEAM GUARDRAIL PAY LIMIT

5'-0" MIN.

5'-0" MIN.

CASE 10B

EDGE OF SHOULDER

TRAFFIC

VARIES - SEE CONTRACT

CASE 10C

EDGE OF SHOULDER

TRAFFIC

VARIES - SEE CONTRACT

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.

SEE NOTE 1

TERMINAL PAY LIMIT

TERMINAL PAY LIMIT - SEE NOTE 1

SEE NOTE 4

EDGE OF SHOULDER

TRAFFIC

VARIES - SEE CONTRACT

CASE 10 A, B, or C

ANCHOR PAY LIMIT

ANCHOR PAY LIMIT - SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT

BEAM GUARDRAIL PAY LIMIT

5'-0" MIN.

5'-0" MIN.

EDGE OF SHOULDER

TRAFFIC

VARIES - SEE CONTRACT

CASE 10A

ANCHOR PAY LIMIT

ANCHOR PAY LIMIT - SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT

BEAM GUARDRAIL PAY LIMIT

5'-0" MIN.

5'-0" MIN.

EDGE OF SHOULDER

TRAFFIC

VARIES - SEE CONTRACT

CASE 10B

EDGE OF SHOULDER

TRAFFIC

VARIES - SEE CONTRACT

CASE 10C

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GUARDRAIL PLACEMENT

STANDARD PLAN C-2c

VARIES ~ SEE CONTRACT

CASE 11A

SEE NOTE 6

VARIES ~ SEE CONTRACT

EDGE OF SHOULDER

CASE 11B

SEE NOTE 8

VARIES ~ SEE CONTRACT

EDGE OF SHOULDER

CASE 11C

SEE NOTE 8

VARIES ~ SEE CONTRACT

EDGE OF 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 10x10 posts, spaced at 3'-1 1/2" maximum, and begin transition.

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

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

CASE 12 
(see Note 7)

SECTION A-A

IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 6)

CASE 12 B
(see Note 7)

IDENTIFICATION PLATE
(see Note 51)

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 3/4” x 9” long bolt, nut and 1 1/8" 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".

EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008

Donald K. Nelson
STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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1. See Contract Plans for guardrail connection to bridge rail and concrete barrier.
2. The slope from the edge of the shoulder to 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 type 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.

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**NOTES**

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

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

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

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

---

**CASE 14**

**Guardrail Placement**

**Standard Plan C-2h**

**Approved for Publication**

Donald K. Nelson

Washington State Department of Transportation

EXPIRES MAY 3, 1998
NOTES

1. SRT Terminal shown. 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 10:1.


# GUARDRAIL PLACEMENT

CASE 15

DETAIL

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
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.

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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
12'-6" SPAN

STANDARD PLAN C-2k

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CASE 20

SECTION A

SECTION B

BEAM GUARDRAIL PAY LIMIT

37'-6" NESTED W-BEAM

GROUND LINE

ELEVATION

GUARDRAIL PLACEMENT
18'-9" SPAN

STANDARD PLAN C-2n

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

CASE 21

1. See Standard Plan C-1b for additional details.
2. One-way traffic layouts are identical to the two-way layout with the exception that only the posts trailing the span need to be CRT's with double blocks.
NOTES
1. See Contract for transition and connection type.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Guardrail installation shall be Beam Guardrail Type 1 with standard post and block.
4. First letter of case designation indicates end treatment on side road. Second letter indicates end treatment on main road. For instance a terminal on the side road and a bridge connection on the main road would be Case 22 BC.
5. For terminal type and details, see Contract and applicable Standard Plan(s).
6. Radius dimensions shall be etched into plate replacing the letters "HH" shown on the Identification Plate Detail. Digits shall be 1 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.
CASE 23
CABLE BARRIER TO W-BEAM FLARED TERMINAL

NOTES
1. The Design Layout Line shall intercept the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.
2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier, and is required when the W-Beam Guardrail face is less than 12 feet from the Edge of Traveled Way.
3. For Cable Barrier Type 3 Transition to W-Beam Guardrail details, see Standard Plan C-3d.
1. The Design Layout Line shall intercept the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier, and is required when the W-Beam Guardrail face is less than 12 feet from the Edge of Traveled Way.

LEGEND

- Design Layout Line

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NOTES

1. The Design Layout Line shall intersect the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier, and is required when the W-Beam Guardrail face is less than 12 feet from the Edge of Traveled Way.

3. For Cable Barrier Type 3 Transition to W-Beam Guardrail details, see Standard Plan C-3d.

LEGEND

Design Layout Line
1. Extend the Cable Barrier Type 2 until the Design Layout Line clears the opposing Cable Barrier Type 2 and intercepts the Cable Barrier Type 3 at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier. A minimum taper is required, when the Cable Barrier Type 2 is less than 12 feet from the Edge of Traveled Way, before transitioning to Cable Barrier Type 3.
NOTE

1. Install a Type 2 Extruded Asphalt Concrete Curb (see Standard Plan F-2b) at base of guardrail.

DRAWN BY: MARK SUJKA

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

TOTAL LENGTH = 25' - 0"

BEAM GUARDRAIL PAY LIMIT

BEAM GUARDRAIL

TYPE 2

6' - 3" POST SPACING

G-2 POST (TYP.)

SEE STD. PLAN C-1b

6' - 0" LONG, 6×8 POST

WITH STANDARD BLOCK

BEAM GUARDRAIL PAY LIMIT

TYPE 3

BEAM GUARDRAIL

TOTAL LENGTH = 6' - 3"

2' - 1 1/2"

FOUR SPACES @ 3' - 1 1/2"

TWO SPACES @ 3' - 1 1/2"

TOTAL LENGTH = 8' - 3"

SEE CONTRACT PLANS

FOR SPECIFIED

CONNECTION

BEAM GUARDRAIL

TRANSITION SECTIONS

TYPE 5

BEAM GUARDRAIL PAY LIMIT

5' - 6" LONG, 6×8 POST

WITH STANDARD BLOCK

(TYP.)

SEE STD. PLAN C-1b

6' - 0" LONG, 6×8 POST

WITH STANDARD BLOCK

(TYP.)

BEAM GUARDRAIL

TRANSITION SECTIONS

TYPE 6

BEAM GUARDRAIL PAY LIMIT

TOTAL LENGTH = 6' - 3"

1' - 3"

FOUR SPACES @ 1' - 6 3/4"

TWO SPACES @ 3' - 1 1/2"

BEAM GUARDRAIL

TRANSITION SECTIONS

TYPE 4

BEAM GUARDRAIL PAY LIMIT

12' - 6" NESTED W BEAM (12 GAGE)

FOR 45 MPH AND BELOW

SEE CONTRACT PLANS

FOR SPECIFIED

CONNECTION

Harold J. Peterfeso 10-04-05

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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 a Type 2 Extruded Asphalt Concrete Curb (see Standard Plan F-2b) at face of Guardrail. Match the height of existing bridge curb with a 20:1 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 20:1 or lesser.
**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 8' - 3" using 12' - 6" thrie beam sections, add a 8' - 3" nested section of thrie beam to reduce the distance to less than 6' - 6".

3. Install a Type 2 Extruded Asphalt Concrete Curb (see Standard Plan F-2b) at face of Guardrail.

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

---

**BEAM GUARDRAIL TRANSITION SECTIONS**

**STANDARD PLAN C-3c**

**DATE**

**STATE DESIGN ENGINEER**

**Washington State Department of Transportation**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**DRAWN BY: MARK SUJKA**

**EXPIRES JULY 24, 2006**

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CABLE BARRIER TYPE 3 TRANSITION TO W-BEAM GUARDRAIL

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**Beam Guardrail**

**Buried Terminal Type 1**

**Standard Plan C-4**

**Effective:** April 2, 2007 to January 6, 2008

**Approved for Publication**

**Ken L. Smith**

**Version:** November 29, 2007

**Washington State Department of Transportation**

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**Location of Post (without block) for both beam guardrail Types 1 & 31**

**Location of Posts & blocks for beam guardrail Type 2 (typ.)**

**Location of Posts & blocks for beam guardrail Type 1 (typ.)**

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**Flare Rate Table**

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<thead>
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<th>Posted Speed (mph)</th>
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**NOTES**

1. Posts installed on shoulder slopes steeper than 10H:1V shall be 8' long.

2. The flare rate of the guardrail may be steepened 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 (H) to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Ref. to SECTION C:

\[
Elevation_{G} = \left( \frac{Elevation_{G} - D(0.1)}{H} \right) + H
\]

- \( H = 27" \) (2.25') for Beam Guardrail Type 1
- \( H = 31" \) (2.58') for Beam Guardrail Type 31

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<td>8 : 1</td>
<td>45</td>
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<tr>
<td>6 : 1</td>
<td>40 or less</td>
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</table>

**BEAM GUARDRAIL BURIED TERMINAL TYPE 2**

**STANDARD PLAN C-4a**

**Ken L. Smith**

**02-21-07**

**EXPIRES JULY 24, 2008**

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NOTES:

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: 1' - 8" minimum

Offset distances:

- 4' - 0"
- 1' - 8" minimum
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'.

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

Harold J. Peterfeso
02-20-03
SLOTTED RAIL ELEMENT #3
STANDARD THRIE BEAM RAIL ELEMENTS

PLAN
BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 1

PLAN
BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 2

SLOTTED RAIL ELEMENT #2
STANDARD THRIE BEAM RAIL ELEMENTS

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SHEET 3 OF 4 SHEETS
APPROVED FOR PUBLICATION
DATE
STATE DESIGN ENGINEER
Washington State Department of Transportation

NOSE CABLE ASSEMBLY
CABLE ANCHOR & BRACKET ASSEMBLY
ANCHOR PLATE
POST 1
POST 2
POST 3
ANCHOR
cable
2 7/8" 2 7/8"
4 1/2" 12 5/8"
1 13/16" 1 3/16"
1 3/16"
15/16" 3/16"

PLAN - THRIE BEAM NOSE
1R
2R
3R
1L
2L
3L

STANDARD PLAN C-4f
POST 1L AND 1R
CABLE BEARING PLATE
TWO 1" NUTS AND WASHER
"COLD TUFF" BUTTON
FOR 5/8" DIAM. WIRE ROPE

5/8" DIAM. STEEL WIRE ROPE
NOSE CABLE
ANCHOR PLATE
ANCHOR CABLE
(SEE STD PLAN C-6f)

"COLD TUFF"
BUTTONS
FOR ANCHOR PLATE, CABLE END PLATE, AND ANCHOR CABLE
STEEL PLATE, ASTM A36
12 5/8" x 5 7/8" x 3/16"
BEAM GUARDRAIL
BULL NOSE TERMINAL
2 1/16" 125^ 1' - 0" 15' - 0" 14' - 6 1/4"
NOSE CABLE, 2 REQUIRED
U-BOLT CABLE CLIPS, 6 REQUIRED

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SLOTTED THREE BEAM RAIL ELEMENT #1
SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)
SPLICE BOLT SLOT

SLOTTED THREE BEAM RAIL ELEMENT #2
SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)
SPLICE BOLT SLOT

SLOTTED THREE BEAM RAIL ELEMENT #3
SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS
SPLICE BOLT SLOT
POST BOLT SLOT

BEAM GUARDRAIL
BULL NOSE TERMINAL
STANDARD PLAN C-4f
SLOT A DETAIL
SLOT B DETAIL
SLOT C DETAIL
SLOT D DETAIL
(TYP)
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the 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 vertical faces with no curbs.

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

NOTES

1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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**BEAM GUARDRAIL ANCHOR**

**TYPE 1**

**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. Toenail 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.

Donald K. Nelson
05/30/97

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BEARING PLATE

ELEVATION

SECTION B-B

ANCHO PLATE
(See Note 1)

1 3/4" x 2 1/4" x 1/2" End plate

3 3/8" x 1 1/16" Hole

1 5/8" Hole

1/8" Steel plate

BEARING PLATE

BEAM GUARDRAIL ANCHOR
TYPE 1

ANCHOR CABLE

ANCHOR RAIL WASHER

ANCHOR CABLE

1" x 1" Stud
Threaded full length (TYP)

1 1/2" Stud
Swage

3/16" x 1" x 8" plate
tack welded to 5/8" plate

1/4" Hole (eight required)

3" x 2 1/4" x 1/2" End plate

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1. Rail section and W8 x 17 post shall be fabricated to receive 5/8" hex head bolts as shown.

2. All bolts shall be high strength 5/8" hex head bolts with anchor rail washers.

See Note 1

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

STANDARD PLAN C-6a

DATE

STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION

BEAM GUARDRAIL ANCHOR
TYPE 2

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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 100 ft.-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. 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.

Two 1" nuts and washers
(see Note 1)

Two 1" nuts and washers
(see Note 1)

Standard 2" ID pipe sleeve
(2 3/8 " OD)

Bearing plate
(see Note 1)

Anchor plate
(see Note 1)

Anchor Post Assembly
(see Note 3)

Anchor pay limit (see Note 2)

Beam Guardrail pay limit (see Note 2)
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 high strength bolts (Standard Specification 9-06.5(4)) 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 a anchor rail washer shall be placed under the splice bolt heads.

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. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 6-03.6.4) with thin slab ferrule inserts or sleeve bonded anchors. See the Contract Plans.

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

3. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 6-03.6.4) with thin slab ferrule inserts or sleeve bonded anchors. See the Contract Plans.

APPROVED FOR PUBLICATION

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NOTES

1. Wire rope loops shall be 3' - 8" long, except for the top loop of the Barrier Terminal, which shall be 2' - 0" long.

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

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

4. The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).

Wire rope loops shall be 3' - 8" long, except for the top loop of the Barrier Terminal, which shall be 2' - 0" long.

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.

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

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).
CONCRETE BARRIER
TYPE 2
STANDARD PLAN C-8

2' - 1"
9' - 4 3/4" FOR 10' - 0" LONG BARRIER SECTION
11' - 10 3/4" FOR 12' - 6" LONG BARRIER SECTION

1'
2'
2' - 10"
1' - 7"

# 5
2

WIRE ROPE LOOP DETAIL

WIRE ROPE LOOP DETAIL

PLATE WASHER 1/8" THICK
1 1/2" DIAM. PIN WITH ROUNDED BOTTOM EDGES

CONNECTING PINS AND DRIFT PINS

BARRIER TERMINAL

BARRIER TERMINAL

SEE NOTE 3

BARRIER CONNECTION DETAIL

WIRE ROPE LOOP DETAIL

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NOTES

1. This plan shall be used for 40' and 50' Light Standards with 16' max. length double mast arms.
3. See the Contract Plans for conduit placement.
4. Concrete shall be Class 4000.

CONCRETE BARRIER
LIGHT STANDARD SECTION
STANDARD PLAN C-8b

Harold J. Petersen 01-11-06
Washington State Department of Transportation

ELEVATION

PLAN

SECTION A

END

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.
**Bending Diagram**

```
  [Diagram showing bending details]
```

**Bar List**

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<td>2</td>
<td>Footing</td>
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<td>4'</td>
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<tr>
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<td>3'</td>
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<td>Barrier</td>
<td>4</td>
<td>3'</td>
<td>3'</td>
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<tr>
<td>5</td>
<td>Barrier</td>
<td>4</td>
<td>2'</td>
<td>2'</td>
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<tr>
<td>6</td>
<td>Barrier</td>
<td>80</td>
<td></td>
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</tr>
</tbody>
</table>

*NOTE: ALL DIMENSIONS ARE OUT TO OUT*
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.

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.

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.
NOTE:

- 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.

- The vertical locations of the Wire Rope Loops at the other end are 2" CLR.

- The Wire Rope Loops shall be as shown in Plan.

- 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.

- Drawn by: Mark Sujka

- Expires July 24, 2004

- Design: Mark Sujka

- Expiration: July 24, 2004
NOTES
1. Length of W8x35 and W6x9 shall be determined by measurement from top of ground to top of grout pad. This distance shall be verified by the contractor.
2. Attach guardrail post to box culvert with 3/4" high strength bolts with resin bonded anchors.
3. Drill 1 1/4" diameter hole in concrete slab for 7/8" high strength bolts. Length of bolt is determined by top slab of box culvert thickness which shall be verified by the contractor.
4. For details of post attachment to double box culvert see Standard Plan "Guardrail Placement," Case 15.
CABLE BARRIER

TYPE 1

CABLE BARRIER

TYPE 2

CABLE BARRIER

TYPE 3

HOLE IN OPPOSITE FLANGE ARE REQUIRED ONLY FOR ALTERNATE HOOK BOLTS (SEE DETAIL)

DETAIL "A"

DETAIL "B"

DETAIL "C"

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When installed in front of slopes steeper than 6:1, the distance between posts and slope break point shall be 1' - 0" minimum.

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

See Standard Plan C-11b for Cable Barrier Terminal details.
1. Stagger Spring Cable End assemblies for clearance between units. Installation of cable end assemblies shall be as follows:

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

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

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

NOTES:
- For Retrofit situations:
  - Install (2) 3/4" DIAM. RESIN BONDED ANCHORS WITH 8" MIN. EMBEDMENT, THREAD TOP 2" MIN.
- For New Construction:
  - Install (8) 3/4" × 24" HOOK BOLTS OR J-BOLTS OR RESIN BONDED AND PLACE (8) 1/8" BARRENS, THREAD TOP 2" MIN.

TABLE

<table>
<thead>
<tr>
<th>CABLE BARRIER</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
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<tr>
<td>TOP OF FOOTING TO TOP OF HORIZON CABLE</td>
<td>32&quot;</td>
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<tr>
<td>SUP POST DIAMETERS</td>
<td>32&quot;</td>
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<td>4 1/2&quot;</td>
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<tr>
<td>BETWEEN CABLES</td>
<td>32&quot;</td>
<td>83 = 5.7 × 32 1/4&quot;</td>
<td>4 1/2&quot;</td>
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CABLE BARRIER TERMINAL

STANDARD PLAN C-11b

SHEET 1 OF 2 SHEETS

PRECAST FOOTING

CABLE BARRIER TERMINAL

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1. An Energite III System, fabricated by Energy Absorption Systems, Inc., a Fitch System as fabricated by Roadway Safety Service, Inc., or a Traffix Sand Attenuator as fabricated by Traffix Devices, Inc. shall be installed in accordance with the manufacturer's recommendations.

2. For temporary installations, the inertial barriers may be placed on wood pallets that are 4" or less in height.

3. For Terminal Section or Concrete Barrier details see Standard Plan C-8.

NOTES:

- TYPE 1
- POSTED SPEED
- 40 MPH OR LESS

- TYPE 2
- POSTED SPEED
- 45 MPH

- TYPE 3
- POSTED SPEED
- 50 MPH

- TYPE 4
- POSTED SPEED
- 55 MPH

- TYPE 5
- POSTED SPEED
- 60 MPH

- TYPE 6
- POSTED SPEED
- 70 MPH

- TYPE 7
- POSTED SPEED
- 75 MPH

- TYPE 8
- POSTED SPEED
- 80 MPH

- TYPE 9
- POSTED SPEED
- 85 MPH

- TYPE 10
- POSTED SPEED
- 90 MPH

- TYPE 11
- POSTED SPEED
- 95 MPH

- TYPE 12
- POSTED SPEED
- 100 MPH

- TYPE 13
- POSTED SPEED
- 105 MPH

- TYPE 14
- POSTED SPEED
- 110 MPH

- TYPE 15
- POSTED SPEED
- 115 MPH

- TYPE 16
- POSTED SPEED
- 120 MPH

- TYPE 17
- POSTED SPEED
- 125 MPH

- TYPE 18
- POSTED SPEED
- 130 MPH

- TYPE 19
- POSTED SPEED
- 135 MPH

- TYPE 20
- POSTED SPEED
- 140 MPH

- TYPE 21
- POSTED SPEED
- 145 MPH

- TYPE 22
- POSTED SPEED
- 150 MPH

- TYPE 23
- POSTED SPEED
- 155 MPH

- TYPE 24
- POSTED SPEED
- 160 MPH

- TYPE 25
- POSTED SPEED
- 165 MPH

- TYPE 26
- POSTED SPEED
- 170 MPH

- TYPE 27
- POSTED SPEED
- 175 MPH

- TYPE 28
- POSTED SPEED
- 180 MPH

- TYPE 29
- POSTED SPEED
- 185 MPH

- TYPE 30
- POSTED SPEED
- 190 MPH

- TYPE 31
- POSTED SPEED
- 195 MPH

- TYPE 32
- POSTED SPEED
- 200 MPH

- TYPE 33
- POSTED SPEED
- 205 MPH

- TYPE 34
- POSTED SPEED
- 210 MPH

- TYPE 35
- POSTED SPEED
- 215 MPH

- TYPE 36
- POSTED SPEED
- 220 MPH

- TYPE 37
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- TYPE 38
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- TYPE 39
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- TYPE 40
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- TYPE 41
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- TYPE 42
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- TYPE 45
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- 270 MPH

- TYPE 47
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- 275 MPH

- TYPE 48
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- 280 MPH

- TYPE 49
- POSTED SPEED
- 285 MPH

- TYPE 50
- POSTED SPEED
- 290 MPH

- TYPE 51
- POSTED SPEED
- 295 MPH

- TYPE 52
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- 300 MPH

- TYPE 53
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- 305 MPH

- TYPE 54
- POSTED SPEED
- 310 MPH

- TYPE 55
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- 315 MPH

- TYPE 56
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- 320 MPH

- TYPE 57
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- 325 MPH

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- 335 MPH

- TYPE 60
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- 340 MPH

- TYPE 61
- POSTED SPEED
- 345 MPH

- TYPE 62
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- 350 MPH

- TYPE 63
- POSTED SPEED
- 355 MPH

- TYPE 64
- POSTED SPEED
- 360 MPH

- TYPE 65
- POSTED SPEED
- 365 MPH

- TYPE 66
- POSTED SPEED
- 370 MPH

- TYPE 67
- POSTED SPEED
- 375 MPH

- TYPE 68
- POSTED SPEED
- 380 MPH

- TYPE 69
- POSTED SPEED
- 385 MPH

- TYPE 70
- POSTED SPEED
- 390 MPH

- TYPE 71
- POSTED SPEED
- 395 MPH

- TYPE 72
- POSTED SPEED
- 400 MPH

- TYPE 73
- POSTED SPEED
- 405 MPH

- TYPE 74
- POSTED SPEED
- 410 MPH

- TYPE 75
- POSTED SPEED
- 415 MPH

- TYPE 76
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- 420 MPH

- TYPE 77
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- 425 MPH

- TYPE 78
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- 430 MPH

- TYPE 79
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- 435 MPH

- TYPE 80
- POSTED SPEED
- 440 MPH

- TYPE 81
- POSTED SPEED
- 445 MPH

- TYPE 82
- POSTED SPEED
- 450 MPH

- TYPE 83
- POSTED SPEED
- 455 MPH

- TYPE 84
- POSTED SPEED
- 460 MPH

- TYPE 85
- POSTED SPEED
- 465 MPH

- TYPE 86
- POSTED SPEED
- 470 MPH

- TYPE 87
- POSTED SPEED
- 475 MPH

- TYPE 88
- POSTED SPEED
- 480 MPH

- TYPE 89
- POSTED SPEED
- 485 MPH

- TYPE 90
- POSTED SPEED
- 490 MPH

- TYPE 91
- POSTED SPEED
- 495 MPH

- TYPE 92
- POSTED SPEED
- 500 MPH
1. PERMANENT BARRIER SHALL BE PLACED INTO THE PAVEMENT A MINIMUM OF 3". NO EMBEDMENT REQUIRED FOR TEMPORARY BARRIER.

2. USE 42" BARRIER FOR GRADE SEPARATIONS UP TO 5'. USE 48" BARRIER FOR GRADE SEPARATIONS UP TO 7'. USE 54" BARRIER FOR GRADE SEPARATIONS UP TO 10'.

3. USE ON A HORIZONTAL CURVE WITH RADII LESS THAN 2000'. REQUIRES A MODIFIED END DESIGN.

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SINGLE SLOPE BARRIER
PRE-CAST TYPE
STANDARD PLAN C-13

SHEET 1 OF 2 SHEETS
### Reinforcing Steel for One 20' Long Section

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### Bending Diagram

#### Barrier Transition Detail

- **Top of Barrier**
- **Prepared Graded Base**

#### Notes
- **This Plan is not a Legal Engineering Document but an Electronic Duplicate of the Original, Signed by the Engineer and Approved for Publication by the Washington State Department of Transportation. A Copy May be obtained upon Request.**
NOTE:
1. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slip-form construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" and adjust the steel dimensions as required.

2. When connecting between cast-in-place and precast single slope barrier, provide a slot and rebar grid as shown in Standard Plan C-13.
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

1. Field bend as required in transition.
2. All bends are 2" radius.
The Barrier Terminal is only used on the trailing end of a barrier separating two roadways with the same direction of travel.

**NOTE:**

- Every bend is 2" radius.
- Varies ~ 1'-6" max.
- 2'-0" thru 8" min.
- 5'-1/2" to 1'-8".
- 6 1/2" to 8 1/2".
- 3 1/2" to 0.

**REINFORCING STEEL BENDING DIAGRAM**

- ALL BENDS ARE 5" RADIUS
- Varies 0'-1/2" to 5'-1/2"
- Varies 0'-2 1/2" to 0
- Varies 0'-8 1/4" to 5 1/4"

**SINGLE SLOPE CONCRETE BARRIER TERMINAL**

**STANDARD PLAN C-14a**

**SECTION A**

- FIELD BEND #5 BARS
- 3/4" CHAMFER (TYP.)
- 4'-1"
- 1'-8"
- 10" MIN. TO 12" MAX.
- 2'-0"
- 8"
- 1'-0"
- 1'-0"

**SECTION B**

- EXPANSION JOINT
- DUMMY JOINT
- TOP OF ROADWAY
- 2 1/2" CLR.
- #5 (TYP.)
- 11" (TYP.)
- Varies
- 5 1/2" to 1'-8"
- 6" to 8 1/2"
- 3'-2 1/2" to 0

**SECTION C**

- SINGLE SLOPE CONCRETE BARRIER (BID ITEM)
- 1'-0" thru 1'-6"
- 3'-2 1/2" to 0
- 6 1/2" to 8 1/2"
- 10" MIN. TO 12" MAX.
- Varies ~ 1'-6" MAX.

**REDRAWN BY: MARK SUJKA**

**APPROVED FOR PUBLICATION**

**EXPIRES JULY 24, 2004**
NOTES:

1. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slip-form construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" and adjust steel dimensions as required.

2. The Vertical Back Barrier is only used in the configurations shown in Standard Plans C-14f and C-14g.

All bends are 2" radius.
When connecting between cast-in-place and precast Single Slope Barrier, provide a slot and rebar grid as shown on Standard Plan C-18.

2. See the Contract Plans for conduit placement.

3. Concrete shall be Class C400.
NOTES

1. See Standard Specification 8-21.3(9) 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 slot and rebar grid as shown in Standard Plan C-13.

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>SHUNT CONCRETE</th>
<th>CLASS 4000</th>
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</thead>
<tbody>
<tr>
<td>ALL OTHER CONCRETES</td>
<td>CLASS 4000</td>
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</tbody>
</table>

| STEEL ROD, BAR  | ASTM A 312 Grade 60 |
| ANCHOR WASHERS  | ASTM A 325 |
| ANCHOR WASHERS  | ASTM A 991 |
| ANCHOR RINGS     | ASTM A 644 Grade 100 |

ALLOWABLE LATERAL LOAD PRESSURE (PSF)

- 200 OR LESS
- 200 ~ 400

EXPIRES NOVEMBER 14, 2006

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01-11-06

Harold J. Petersen
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1. An additional width for shy distance is required when the existing roadway is to be widened.

2. The additional width for shy distance may be less than 2.0' when it, combined with the existing shoulder width, totals 2.0' or more.

NOTES

1. SEE NOTES 1 & 2

2. SEE NOTES 1 & 2

3. SEE NOTES 1 & 2

TRAFFIC BARRIER SHOULDER WIDENING - FOR SHOULDERS LESS THAN 6.0' WIDE

STANDARD PLAN C-16b

NOTES

SHOULDER

EXTEND PAVED SHOULDER TO FACE OF GUARDRAIL
UNLESS CURB IS REQUIRED
SEE STD. PLAN F-2b

PAVEMENT

HINGE-POINT

HINGE-POINT

SHOULDER

HINGE-POINT

MATCH SHOULDER

MATCH SHOULDER

HINGE-POINT

HINGE-POINT

SHOULDER

HINGE-POINT

CABLE BARRIER TYPE 1 OR 2

FACE OF BARRIER

ANCHORED PRECAST CONC. BARRIER TYPE 2

TYPE 3 ANCHORS
SEE STD. PLAN C-8e

CONC. BARRIER TYPE 2

PRECAST

CAST-IN-PLACE

SINGLE SLOPE CONC. BARRIER

HINGE-POINT

HINGE-POINT

SHOULDER

HINGE-POINT

HINGE-POINT

SHOULDER

HINGE-POINT

HINGE-POINT

SHOULDER

HINGE-POINT

HINGE-POINT

SHOULDER

HINGE-POINT

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BEAM GUARDRAIL TYPE 31

PLACEMENT

CASE "5A"

EDGE OF SHOULDER

SEE NOTES 1 & 4

ONE-WAY TRAFFIC

CASE "1A"

SEE STANDARD PLANS C-25.18 OR C-25.20

For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.

For terminal type and details, see Contract Plans and applicable drawings.

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

For component details, see Standard Plan C-23.60.

For terminal type and details, see Contract Plans and applicable drawings.

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

For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.

Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.

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

For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.

Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.
NOTE:
1. For additional details not shown, see Standard Plan C-1b.
NOTES
1. An ET-PLUS 31 as manufactured by Trinity Industries, Inc. or an SKT-MGS 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 shall not be installed within the terminal limits.
4. Terminal shall be installed at a widening, ensuring that the end piece is entirely off the shoulder.
5. While these terminals do not require an offset at the end, a flare is recommended so that the end piece does not protrude into the shoulder. A maximum flare of 25:1 over the system length of the terminal is allowed for either the ET-PLUS 31 or the SKT-MGS.

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. For use on the end of guardrail runs when a crashworthy terminal is not required.
2. For additional details not shown, see Standard Plan C-6c.
3. For End Section details, see Standard Plan C-7.
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 washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
6. Posts shall match those of connecting run: Timber or Steel.

For use on the end of guardrail runs when a crashworthy terminal is not required.
For additional details not shown, see Standard Plan C-6c.
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Posts shall match those of connecting run: Timber or Steel.
NOTES

1. This guardrail transition is for connection to a vertical concrete barrier or single slope barrier and cannot be connected directly to a concrete barrier shape.

2. Do not bolt nested W-Beam or rubrail W-Beam to posts and blocks on posts 1, 2, 3 and 5. Bolt tapered blocks directly to posts.

3. The rubrail W-Beam can be shop bent to facilitate installation.

4. Posts 1, 2, 3 and 4 require additional holes to attach tapered blocks and/or rubrail.

5. Posts 1, 2, 3, 4 and 6 require an additional hole to attach tapered blocks and/or rubrail.

6. Posts 1 and 2 are 10x10 wood or W8x13 steel posts ~ 7'-6" long. Posts 3, 4, 5, 6, 7 and 8 are 6x8 wood or W6x9 steel posts ~ 6'-0" long.

This guardrail transition is for connection to a vertical concrete barrier or single slope barrier and cannot be connected directly to a concrete barrier shape. Do not bolt nested W-Beam or rubrail W-Beam to posts and blocks on posts 1, 2, 3 and 5. Bolt tapered blocks directly to posts. The rubrail W-Beam can be shop bent to facilitate installation. Posts 1, 2, 3 and 4 require additional holes to attach tapered blocks and/or rubrail. Posts 1, 2, 3, 4 and 6 require an additional hole to attach tapered blocks and/or rubrail. Posts 1 and 2 are 10x10 wood or W8x13 steel posts ~ 7'-6" long. Posts 3, 4, 5, 6, 7 and 8 are 6x8 wood or W6x9 steel posts ~ 6'-0" long.
1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or an F-shape barrier. The toe of the F-shaped barrier shall be tapered so that it does not project past the face of the approach guardrail.
**NOTES**

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

2. Refer to Standard Plan C-25.40 for component details for Beam Guardrail Type 31 not shown on this plan.

3. Where post offset is constrained, and when the existing shoulder will not be widened and is wider than 4 feet, the existing shoulder may be reduced up to 4" to accommodate the 12" blockouts of the Beam Guardrail Type 31. See PLAN VIEW - ALIGNMENT TAPER.

4. All posts for any standard barrier run shall be of the same type: Timber or Steel.
1. Refer to Standard Plan C-1 and C-1a, for additional details not shown on this plan.

2. All posts for any standard barrier run shall be of the same type: Timber or Steel.


4. Use a single or combination of blocks to achieve the actual 12" offset. See Standard Specification 9-16.3 (2) for Wood blocks shall be toe-nailed to post (and blocks, if block combinations are utilized) with a 16d galvanized nail to prevent block rotation.

5. On steel posts, attach blockouts using bolt holes on approaching traffic side of post web.

6. On steel posts, attach blockouts using bolt holes on approaching traffic side of post web.

BLOT (TYP.)

HARDWOOD STEEL BOLT W/ HEAD (TYP.)

W20 x 11.5 STEEL POST (SEE NOTE 2)

5/8" × 14" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP
AND RECESSED HEX NUT

6×12 BLOCKOUT (TYP.)

5/8" × 22" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP (TYP.)

6×8 TIMBER POST OR W6×9 STEEL POST (TYP.)

SEE NOTE 4

5/8" × 1 1/4" BUTTON HEAD BOLT
WITH 5/32" OVAL GRIP AND
RECESSED HEX NUT

3/4" DIAM. HOLE THROUGH BLOCK
FOR STEEL POST

3/4" DIAM. HOLE THROUGH BLOCK
FOR TIMBER POST

6×12 BLOCKOUT (TYP.)

SEE NOTE 4

7/32" OVAL GRIP

5/8" RECESSED HEX NUT (TYP.)

CUT WASHER (TYP.)

SEE NOTE 4

STEEL POST

WOOD BLOCK

BLOT (TYP.)

ANTI-ROTATION NAIL (16D)

SMALL HEAD BOLT (TYP.)

CUT WASHER (TYP.)

SEE NOTE 4

16D GALVANIZED NAIL (TYP.)

3/4" DIAM. HOLE FOR ANTI-ROTATION NAIL (16D)

W6×8 TIMBER POST (SEE NOTE 2)

W6×9×6' STEEL POST (SEE NOTE 2)

6×12 BLOCKOUT (TYP.)

SEE NOTE 4

5/8" × 14" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT WITH
CUT WASHER (TYP.)

6×8×6' TIMBER POST

SEE NOTE 2

6×8×6' TIMBER POST

SEE NOTE 2

6×12 BLOCKOUT (TYP.)

SEE NOTE 4

3/4" DIAM. HOLE THROUGH BLOCK
FOR TIMBER POST

3/4" DIAM. HOLE THROUGH BLOCK
FOR STEEL POST

6×12 BLOCKOUT (TYP.)

SEE NOTE 4

5/8" × 22" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP (TYP.)

1" 6×8 TIMBER POST OR W6×9 STEEL POST (TYP.)

SEE NOTE 4
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</table>
N/A
Construction joint shall be parallel.

Surface treatment as required by contract.

Level except 1/2" open joint.

Top of wall finishes at curb line.

Pedestrian railing, when required.

Traffic barrier, joints at 8'-0" centers (dummy joints除外 1/2" open joints).

Traffic barrier at wall expansion joints.

End section not adjacent to bridge end - 5'-6" MIN to 9'-6" MAX.

Filler over hatched area (slope to drain).

Joint seal - nominal size 3/4" x 1" x 1'-3".

Elastomeric expansion joint seal - nominal size 1/4" x 1/4" x 1'-3".

1/4" open joint.

Field bend B3 #4 as required.

Poured rubber joint filler over hatched area (slope to drain).

Thoroughly clean and dry concrete surfaces before pouring rubber.

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Set top of retaining wall back 1/2" from face of wall at footing for wall heights H to 20'. For H above 20', use formula:
offset (inches) = H - 2 (h in feet) _ 8 _ 9" 1 1/2" Clearance (see Note 3)

2'-0" MIN below final grade line or roadway shoulder 1' MIN below bottom of adjacent ditch

Bars Q are #4 with 2'-0" lap splice and extended through construction joints (TYP)

Bars S are used when h > 12
Omit on walls H = 12' and lower
Add one bar 13' < H < 21'
Add two bars 22' < H < 25'
Add three bars 26' < H < 31'

Omit on walls H = 14' and lower
Add one bar 15' < H < 18'
Add two bars 19' < H < 22'
Add three bars 23' < H < 26'
Add five bars 27' < H < 30'
Add six bars H = 31'

Construction joints in footing at 120' center MAX
3" Drains at about 12' centers and 6" above final grade line at front face of wall

Gutter Detail

Provide 2" long (MIN) vertical curve at all angle (or break) points in top of wall profile

Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.
GUTTER DETAIL

SECTION - SLOPING FACE

WALL TOP DETAIL

KEY DETAIL

NOTES
1. All concrete shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-4".
3. When Wall Type 4-SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 4-SW (saltwater) is specified, concrete in the 24" column "Material Quantity" shall be increased by 0.003 x H CY/LF.
5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
APPROVED FOR PUBLICATION
DATE
DEPUTY STATE DESIGN ENGINEER
DATE
TWS

EXPIRES JUNE 29, 2000
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### Dimensions

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### Footing Reinforcement

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### Stem Reinforcement

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### Material Quantity

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### Retaining Wall

REINFORCED CONCRETE RETAINING WALL
TYPE 4 AND 4 SW
STANDARD PLAN D-1d
SHEET 2 OF 5 SHEETS

APPROVED FOR PUBLICATION
Clifford E. Mansfield 10/09/95

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1. All concrete shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-6".
3. When Wall Type 5-SW (saltwater) is specified, the concrete cover over steel in the front face and in the total wall thickness shall be increased by 1".
4. When Wall Type 5-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by 0.003 x H CY/LF.
5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12-hour period between concrete placement.

CONSTRUCTION JOINTS

- Bars S #5 at 1'-0" OC
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" OCcenters MAX - both faces
- Bars K

**Section - Vertical Face**

- Bars Q #4 with 1'-0" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Wall Top Detail**

- Set top of retaining wall back 1/2" from face of wall at footing for wall heights H to 20'. For H above 20', use formula: offset (inches) = H - 2 (H is in feet)
- 1/2" Clearance (see Notes 1)
- 3" Clearance
- See Key Detail

**Gutter Detail**

- Conc. Gutter (cl.3000, 4" Thick)
- Bars Q #4 with 1'-0" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Footings**

- Provide 24" long (MIN) vertical curve on all angle (or break) points on top of wall profile

**Elevation**

- Bars J (TYP) only for H = 21'
- Bars K (TYP) only for H = 21'
- Bars M (TYP) only for H = 21'
- Bars S (TYP) are used when h_y > 0
- Bars S (TYP) at 12" centers and 1/2" above final grade at front face of wall
- Bars J (TYP) only for H = 21'
- Bars K (TYP) only for H = 21'
- Bars M (TYP) only for H = 21'

**Notes**

- Bars S are used when h_y > 0
- See Key Detail

**Bar Splice**

- 1/2" Splice
- 1" Splice
- 2" Splice
- 2 1/2" Splice
- 3" Splice
- 4" Splice
- 5" Splice
- 6" Splice
- 7" Splice
- 8" Splice
- 9" Splice
- 10" Splice

**Key Detail**

- Not required on walls H = 5'
- Hit H = 25'

**Wall Design with Vertical Front Face and 2:1 Backslope**

- Provide 24" long (MIN) vertical curve on all angle (or break) points on top of wall profile
- Bars S #5 at 1'-0" OC
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Notes**

- Bars S are used when h_y > 0
- See Key Detail

**Construction Joint in Footing at 120" Center MAX**

- 2' - 0" MIN below final ground line or roadway shoulder
- 1' - 0" MIN below bottom of adjacent ditch
- 1 1/2" Clearance (see Note 3)
- 1 1/2" Clearance
- 2" Clearance
- 3" DIA drains
- 3" Clearance
- Omit on walls H = 14' and lower. Add one bar each layer for each 5' increment of H = 20' and greater
- Bars S are used when h_y > 0
- Bars Q #4 with 1'-0" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Gutter Detail**

- Conc. Gutter (cl.3000, 4" Thick)
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Footings**

- Provide 24" long (MIN) vertical curve on all angle (or break) points on top of wall profile
- Bars S #5 at 1'-0" OC
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Key Detail**

- Not required on walls H = 5'
- Hit H = 25'

**Notes**

- Bars S are used when h_y > 0
- See Key Detail

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- 2' - 0" MIN below final ground line or roadway shoulder
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- Bars Q #4 with 1'-0" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Gutter Detail**

- Conc. Gutter (cl.3000, 4" Thick)
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Footings**

- Provide 24" long (MIN) vertical curve on all angle (or break) points on top of wall profile
- Bars S #5 at 1'-0" OC
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K

**Key Detail**

- Not required on walls H = 5'
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**Notes**

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- See Key Detail

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**Gutter Detail**

- Conc. Gutter (cl.3000, 4" Thick)
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
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**Footings**

- Provide 24" long (MIN) vertical curve on all angle (or break) points on top of wall profile
- Bars S #5 at 1'-0" OC
- Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)
- Bars L #4 of 1'-6" centers MAX - both faces
- Bars K
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**DIMENSIONS**

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- **SIZE**
- **E**
- **F**
- **G**
- **H**
- **I**
- **J**
- **K**
- **L**
- **M**
- **N**
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- **P**
- **Q**
- **R**
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- **U**
- **V**
- **W**
- **X**
- **Y**
- **Z**

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4. When Wall Type 6-SW (saltwater) is specified, concrete in the 4'-0" column Material Quantity shall be increased by 0.003 x H CY/LF.
5. Concrete in the 24'-0" wall sections shall be placed separately between expansion joints with a minimum 24 hour period between concrete placement.

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### Stem Reinforcement

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### Wall Design with Sloping Front Face and 2:1 Backslope

**NOTE:** This plan is not a legal engineering document. A copy may be obtained upon request.
# Noise Barrier Wall

## Standard Plan D-3.02-00

### Notes

1. Walls to be designated Noise Barrier Wall Type 1A, 1B, 1C, or 1D.
2. Construction joints in the trench footing shall be spaced at 120 feet minimum.
3. Pans shall have at least 3 feet of level ground on each side.
4. For intermediate wall heights, use the next higher H.
5. The Contract specifies actual foundation requirements D1 or D2.

### Foundations

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 1A</th>
<th>TYPE 1B</th>
<th>TYPE 1C</th>
<th>TYPE 1D</th>
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<tr>
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<td>10' - 0&quot;</td>
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<tr>
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<td>16' - 0&quot;</td>
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<tr>
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<td>20' - 0&quot;</td>
</tr>
</tbody>
</table>
| 22' - 0"| 22' - 0"| 22' - 0"| 22' - 0"| 22' - 0"

**Highlights**

- **Bar "A" #4 @ 15" MAX. SPACING**
- **6" MIN. WALL ON TRENCH FOOTING**
- **2' - 2" FOR #5 BARS**
- **2' - 0" FOR #3 & #4 BARS**
- **ROUGHENED SURFACE JOINT WITH ALTERNATE AS SHOWN**
- **3/4" CHAMFER ON WALL**
- **NOISE BARRIER WALL TYPE 1**
- **CAST-IN-PLACE CONCRETE WALL ON TRENCH FOOTING**

### Footings

- **Type 1B**
- **Type 1D**
- **Type 1C**
- **Type 1A**

- **Depth**
  - 1' - 0" MIN.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

- **Wall & Trench Depth**
  - 5' - 6" MAX.
  - 6' - 0" MAX.
  - 6" MIN.
  - 6" MIN.

### Bar Details

- **Bar "D"**
  - #4 @ 6"
  - #4 @ 9"
  - #4 @ 10"
  - #4 @ 12"
  - #3 @ 9"
  - #3 @ 15"

### Joint & Corner Detail

- **Joint & Corner Detail**
- **Reinforced Per Listed Wall Section Reinforcement Table**
- **Corner Panel**
- **Traffic Side**

- **Angle Point**
- **3/4" CHAMFER (TYP.)**

### Construction Notes

1. Walls to be designated Noise Barrier Wall Type 1A, 1B, 1C, or 1D.
2. Construction joints in the trench footing shall be spaced at 120 feet minimum.
3. Pans shall have at least 3 feet of level ground on each side.
4. For intermediate wall heights, use the next higher H.
5. The Contract specifies actual foundation requirements D1 or D2.

---

**Washington State Department of Transportation**

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**APPROVED FOR PUBLICATION**

---

**STATE DESIGN ENGINEER**

---

**Harold J. Peterfeso** 11-10-05

---

**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.**
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

JOINT AND CORNER DETAIL
NOTES

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

2. For intermediate wall heights, see next column.

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

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

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

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL

TYPE 4

STANDARD PLAN D-3.08-00

Sheet 1 of 2 Sheets

APPROVED FOR PUBLICATION

Harold J. Peterfeso

STATE DESIGN ENGINEER

Washington State Department of Transportation
CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

DETAIL "B"

JOINT AND CORNER DETAIL

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

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Harold J. Peterfeso
11-10-05
DRAWN BY: ADAM COCHRAN
NOTES

1. Wall to be designated Noise Barrier Wall Type 5A, 5B, 5C or 5D. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet min. of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet max.
5. The Contract specifies actual foundation requirements D1 or D2.
NOTES:
1. Wall to be designated Noise Barrier Wall Type 5SSA, 5SSB, 5SSC or 5SSD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 5 feet min. of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet max.
5. The Contract specifies actual foundation requirements D1 or D2.
1. Construction joint with roughened surface.
2. Height may vary if required to provide a smooth profile consistent with roadway profile.
3. #4 (typ.) placed as shown with 2'-6" splice and extending thru construction joints.
4. Place as shown with 2'-0" min. 2"-2" for #3 or #4 bar.
5. Cast-in-place conc. wall with single slope traffic barrier on spread footing.
6. Joint and corner detail.

EXPIRES AUGUST 23, 2006

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Washington State Department of Transportation

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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. Panel wall to have at least 8 ft of level ground on each side.

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

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

The Contract specifies actual foundation requirements D1 or D2.

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

The Contract specifies actual foundation requirements D1 or D2.

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

The Contract specifies actual foundation requirements D1 or D2.

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

The Contract specifies actual foundation requirements D1 or D2.

Panels shall have at least 3 feet of level ground on each side.
NOTES:
1. Wall to be designated Noise Barrier Wall Type 9A, 9B, 9C, or 9D. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3'-0" of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet minimum.
5. All joints shall be in full contact and sealed.
Standard Plan D-2.33-00

Noise Barrier Wall
Type 9

Precast Concrete Wall on Spread Footing

Joint and Corner Detail

Joint hole - 2" I.D. with roughened surface, or rigid post-tensioned duct, or corrugated steel pipe

Foil the joint hole with grout using ducts. Ducts shall be located on panel face opposite traffic.

Transverse bars not shown

Footings width transition detail for locations without footing strip

Approved for publication
Harold J. Peterfeso 11-10-05
Washington State Department of Transportation

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Harold J. Peterfeso

Expiry: August 23, 2006

Drawn by: Adam Cochran
NOTE: THE BOTTOM 6" OF BAR "B" SHALL BE PAINTED WITH ONE COAT OF FORMULA A-6-86 ZINC DUST (Oxide Primer) OR ONE COAT OF FORMULA A-11-99 PRIMER.

BAR "B"
WAVER HEAD SHALL BEAR FIRMLY AND UNIFORM AGAINST BASE PLATE. BAR "B" SHALL BE HELD SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WAVER HEAD AND BASE PLATE.

ANCHOR BOLTS, NUTS, WASHERS, BASE PLATE, AND BAR "B" SHALL HAVE A PROTECTIVE COATING OF ONE OF THE FOLLOWING:
HOT DIPPED GALVANIZED AASHTO M 232 FOR HARDWARE;
MECHANICAL GALANIZING AASHTO M 298 CL 55, OR
ZINC RICH PAINT, PAINT THREADS AND NUTS AFTER INSTALLATION.

ALTITUDE CENTER THE LOCATIONS

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**ELEVATION VIEW**
**STEP DETAIL**
**PLAN VIEW**
**SHEAR-KEY DETAIL**

**BASE PLATE DETAIL**

**BENDING DIAGRAMS**

**PRECAST CONCRETE WALL ON SHAFT FOUNDATION**

**NOISE BARRIER WALL TYPE 11**

**STANDARD PLAN D-2.36-00**

**SHEET 2 OF 3 SHEETS**

**DRAWN BY: ADAM COCHRAN**

**SHEET 2 OF 3 SHEETS**

**NOTE: EXPRES AUGUST 23, 2006**

**EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008**
ANGLE POINT ~ CANTILEVERED

ANGLE POINT ~ ON SHAFT
ANGLE 20° OR LESS

ANGLE POINT ~ ON SHAFT
ANGLE 30° TO 90°

SEAL ~ 1/2" (TYP.)
SURFACE TREATMENT AS REQUIRED (TYP.)

SHAFT (TYP.)
PILASTER AND SHAFT
C SHAFT AND PANEL

#3 TIE (TYP.)

BAR "B" (TYP.)
BAR "A" (TYP.)
BAR "P" (TYP.)

TABLE

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NOTES
1. Wall to be designated Noise Barrier Wall Type 12A, 12B, 12C, and 12D. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Composition of trench height differential shall not exceed 1 foot.
4. Panels shall have at least 3 feet of level ground on each side.
5. All joints shall be in full contact and sealed.
6. The Contract specifies actual foundation requirements D1 or D2.

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<tr>
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</table>

Type 12: Noise Barrier Wall

1. Panel shall be braced laterally to prevent displacement during backfill.
2. Bar "B" and Bar "C" #4 @ 16", Bar "D" Center in Wall
3. Precast concrete wall with traffic barrier on trench footing

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
**NOTES**

1. Wall to be designated Noise Barrier Wall Type 12SSA, 12SSB, 12SSC and 12SSD. The Contract specifies actual wall designation.

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

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

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

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

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

---

**MATERIALS & VOLUME**

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<th>WALL TYPE</th>
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**MATERIAL EXPOSURE & VELOCITY**

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<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
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<td>12SSB</td>
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<tr>
<td>12SSC</td>
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<td>82</td>
</tr>
<tr>
<td>12SSD</td>
<td>D2</td>
<td>82</td>
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</tbody>
</table>

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**ANCORAGE**

- #6 @ 12"
- #4 @ 15"
- #5 @ 12"
- #4 @ 11"
- #4 @ 10"
- #5 @ 12"
- #6 @ 9"
- #4 @ 12"
- #6 @ 12"
- #6 @ 12"
- #6 @ 12"
- #5 @ 12"
- #4 @ 12"
- #6 @ 12"
- #6 @ 12"

---

**CONSTRUCTION**

- Compaction of trench height differential shall not exceed 1 foot.
- Panels shall be braced laterally to prevent displacement during backfill.
- All joints shall be in full contact and aligned.

---

**PRECAST CONCRETE WALL**

- Noise Barrier Wall Type 12SSA
- Wall Height ~ 5' - 6"
- Height may vary if required to provide a smooth profile consistent with the roadway profile.
- Joint and corner detail
- Panel height ~ 5' - 6"
- Wall to be designated Noise Barrier Wall Type 12SSA, 12SSB, 12SSC, and 12SSD. The Contract specifies actual wall designation.
- For intermediate wall heights, use the next higher H.
- Compaction of trench height differential shall not exceed 1 foot.
- Panels shall have at least 3 feet of level ground on each side.
- All joints shall be in full contact and aligned.
- The Contractor specifies actual foundation requirements D1 or D2.

---

**NOTES**

- All joints shall be in full contact and aligned.
- Joint and corner detail.
- Panels shall be braced laterally to prevent displacement during backfill.
- All joints shall be in full contact and aligned.
- The Contractor specifies actual foundation requirements D1 or D2.

---

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---

**ELEVATION**

- 1 1/2" CLR.
- 3/4" CHAMFER
- 1 1/2" CLR.
- 2" R
- 6" MIN.
- 2' - 10" MIN.
- 2' - 0" MIN.
- 1 1/2" CLR.
- 2' - 0" MIN.
- 1 1/2" CLR.
- 2' - 0" MIN.
- 1 1/2" CLR.
- 2' - 0" MIN.
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT.

PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
NOTE:
1. Wall to be designated Noise Barrier Wall Type 13SSA, 13SSB, 13SSC or 13SSD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.
5. All joints shall be in full contact and sealed.
6. The Contract specifies actual foundation requirements D1 or D2.

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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. Panel 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 28B, CL 85, or Zinc Rich Paint. Paint threads and nuts after installation.

6. The bottom 9" of Bar "B" shall be paired with one coat of Formula A-8-82 Zinc Dust Oxide Primer OR, one coat of Formula A-11-99 Primer.

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

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

For intermediate wall heights, use the next higher H.

All joints shall be in full contact and sealed.

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

For intermediate wall heights, use the next higher H.
### Noise Barrier Wall

#### Standard Plan D-3.60-00

**1. Wall to be designated Noise Barrier Wall Type 16A, 16B, 16C or 16D. The Contract specifies actual wall designations.**

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

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

**4. All masonry is to be specially inspected.**

**5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.**

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

**7. Construction joints in the trench footing shall be spaced at 120 feet maximum.**

**8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.**

**9. The Contract specifies actual foundation requirements D1 or D2.**

---

#### Table: Typical Section

<table>
<thead>
<tr>
<th>Wall Ht</th>
<th>CMU Width</th>
<th>X</th>
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<th>Depth D2</th>
<th>Bar &quot;C&quot;</th>
<th>Bar &quot;D&quot;</th>
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<tbody>
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<td>-</td>
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</tr>
<tr>
<td>0' - 0&quot;</td>
<td>8&quot;</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
</tbody>
</table>

---

#### Notes:

1. Wall to be designated Noise Barrier Wall Type 16A, 16B, 16C or 16D. The Contract specifies actual wall designations.

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

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

4. All masonry is to be specially inspected.

5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.

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

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

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

9. The Contract specifies actual foundation requirements D1 or D2.
TYPICAL EXPANSION JOINT

EXPANSION JOINT FILLED PLACED IN SASH BLOCK RECESSES.

#5 (TYP.)

MASONRY WALL ON TRENCH FOOTING

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

PLAN VIEW

BOND BEAM DETAIL

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.
**NOTE:** TRANSVERSE BARS NOT SHOWN

**STANDARD PLAN D-2.62-00**
### Table 1: Reinforcement Details

<table>
<thead>
<tr>
<th>CMU Width (W)</th>
<th>Bar Size (D)</th>
<th>Bar Type (A)</th>
<th>Embedment (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 in</td>
<td>#5</td>
<td>2 in</td>
<td>2 in</td>
</tr>
<tr>
<td>5 in</td>
<td>#5</td>
<td>2 in</td>
<td>2 in</td>
</tr>
</tbody>
</table>

### Notes
1. Wall to be designated Noise Barrier Wall Type 18A, 18B, or 18C. The contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher W.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All concrete masonry unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 5 feet of level ground on each side.
7. Construction joints in the footing shall be spaced at 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layout.

### Typical Section
- CMU = Concrete Masonry Unit
- Offset Spread Footing
- Type 18

---

**Masonry Wall on Offset Spread Footing**

**Noise Barrier Wall Type 18**

**Standard Plan D-2.64-00**

---

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

---

**STATE DESIGN ENGINEER**

---

**EXPIRES AUGUST 23, 2006**

---

**FREEDOM BY HAROLD PETERSON**

---

**SHEET 1 OF 2 SHEETS**

---

**NOTE:**

1. Wall to be designated Noise Barrier Wall Type 18A, 18B, or 18C. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher W.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All concrete masonry unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 5 feet of level ground on each side.
7. Construction joints in the footing shall be spaced at 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layout.
NOTE: TRANSVERSE BARS NOT SHOWN

3" CLR. (TYP.)

BAR "A" (TYP.)

1' - 0" MIN. (TYP.)

TYPICAL EXPANSION JOINT

BOND BEAM DETAIL

FOOTING WIDTH TRANSITION DETAIL (FOR LOCATIONS WITHOUT FOOTING STEP)
NOTE: TRANSVERSE BARS NOT SHOWN

BOND BEAM CTRING LIMIT

POLYURETHANE SEALANT

BACKER ROD

EXPANSION JOINT AT WIDTH STEP

PLAN VIEW

TYPICAL EXPANSION JOINT

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

TRAFFIC SIDE

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

TYPICAL EXPANSION JOINT

8" (TYP.)

TRAFFIC SIDE

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

EXPANSION JOINT AT WIDTH STEP

10" CMU

#5 (TYP.)

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

4' - 0" MAX.

TYPICAL BOTH SIDES OF WALL

8" OR 10" CMU

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

FILLER PLACED IN SASH BLOCK RECESSES.

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Harold J. Petersen 11-10-05

MASONRY WALL ON OFFSET SPREAD FOOTING

STANDARD PLAN D-2.64-00

NOISE BARRIER WALL TYPE 18

SPORTS AUGUST 23, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Effective: April 2, 2007 to January 6, 2008
**SHAFT LENGTH FOR PAYMENT**

- **#4 @ 1' - 0"**

**STEP DETAIL**

- **3' - 0"**

**MASONRY WALL ON SHAFT**

- **W/ GRADE BEAM FOUNDATION**
- **HOOKS PARALLEL TO WALL LAYOUT LINE**
- **#4 @ 4' - 0" MAX. (TYP.)**
- **#5 @ 4' - 0" MAX. (TYP.)**

**EXPANSION JOINT AT WIDTH STEP**

- **1' - 6"**

**DETAIL OF BOND BEAM GROUTING LIMIT**

- **1/2" JOINT**
- **#5 (TYP.)**

**PLAN VIEW**

- **TYPICAL EXPANSION JOINT**
- **CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT**
- **EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES**
- **8" CMU**
- **10" CMU**

**SECTION**

- **WITH SPIRAL REINFORCEMENT SHALL BE LAPPED AS SHOWN TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT (TOP AND BOTTOM)**
- **TYPICAL BOTH SIDES OF WALL**
- **3 ~ #4 STIRRUP**
- **SPACING @ 6"**
- **W 3.5 SPIRAL @ 6" PITCH**
- **#4 STIRRUP SPACING @ 12"**

**NOTE**

- **SPIRAL REINFORCEMENT SHALL BE LAPPED AS SHOWN TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT (TOP AND BOTTOM)**
- **135° HOOK (TYP.)**
- **1' - 5" MIN. LAP**

**EXPANSION JOINT AT WIDTH STEP**

- **TRAFFIC SIDE**
- **EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES**
- **8" OR 10" CMU**

**PLAN VIEW**

- **TYPICAL EXPANSION JOINT**
- **CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT**
- **EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES**
- **8" CMU**
- **10" CMU**

**NOTE**

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- **TYPICAL BOTH SIDES OF WALL**
- **3 ~ #4 STIRRUP**
- **SPACING @ 6"**
- **W 3.5 SPIRAL @ 6" PITCH**
- **#4 STIRRUP SPACING @ 12"**
Sheet 2 of 2 sheets

2" CLR.

TYPICAL EXPANSION JOINT

PIPE TO #6
1/4" 1/2" CLEARANCE
TO FACE SHELL

SECTION

CAP ABOVE

PILASTER

REINFORCEMENT

L

L

SECTION

SOLID GROUT CAP

6" CMU (TYP.)

6" MIN.

4" COMPACTED LEVEL CRUSHED GRAVEL BASE

GROUT ALL CELLS BELOW GRADE SOLID, MIN. TWO COURSES (TYP.)

SECTION

C

A

TRAFFIC SIDE

BACKER ROD WITH POLYURETHANE SEALANT — BOTH WALL FACES

SECTION

BAR "C"
W/ CONCRETE
1 1/2" CLR.

BAR "A"

BAR "C"

TRAFFIC SIDE

1' - 3 3/8"

HORIZONTAL DOWEL ~ PROVIDE SAME NUMBER AND SIZE AS BAR "B" LAP 2' - 0" MIN.

BAR "C" @ CENTER OF WALL

FILL TOP COURSE W/ GROUT

NOTE: SPIRAL REINFORCEMENT SHALL BE LAPPED 17" MIN. A 135° HOOK THAT IS HOOKED AROUND A LONGITUDINAL BAR SHALL BE USED TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.

1 ~ #5 FULL HEIGHT

2 ~ #4 FULL HEIGHT (TYP.)

MASONRY WALL ON SHAFT FOUNDATION

NOTE

SPIRAL REINFORCEMENT SHALL BE LAPPED 17" MIN. A 135° HOOK THAT IS HOOKED AROUND A LONGITUDINAL BAR SHALL BE USED TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.

BAR "C" @ CENTER OF WALL

FILL TOP COURSE W/ GROUT

NOTE

SPIRAL REINFORCEMENT SHALL BE LAPPED 17" MIN. A 135° HOOK THAT IS HOOKED AROUND A LONGITUDINAL BAR SHALL BE USED TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.

BAR "C" @ CENTER OF WALL

FILL TOP COURSE W/ GROUT

NOTE

SPIRAL REINFORCEMENT SHALL BE LAPPED 17" MIN. A 135° HOOK THAT IS HOOKED AROUND A LONGITUDINAL BAR SHALL BE USED TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.

BAR "C" @ CENTER OF WALL

FILL TOP COURSE W/ GROUT

NOTE

SPIRAL REINFORCEMENT SHALL BE LAPPED 17" MIN. A 135° HOOK THAT IS HOOKED AROUND A LONGITUDINAL BAR SHALL BE USED TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.
NOTES

1. Wall to be designated Noise Barrier Wall Type 15A, 15B, 15C or 15D. The Contract specifies actual wall designations.

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

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

4. Plywood and Glulam panels and all lumber shall be pressure preservative treated.

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

Panel Set Vertically

Wind Exposure & Velocity

Noise Barrier Type

Type

Wind Exposure

Wind Velocity (MPH)

Soil Type

Soil Type

32

D1

B1

80

38

D2

B2

90


Harold J. Peterfeso
11-10-05
All rebar shall have a minimum 1 1/2" cover.


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

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

FOUNDATION BAR "A" (TYP.)
BAR "F"
BAR "G"

4" CONCRETE SLAB
4" CONCRETE SLAB
4" CONCRETE SLAB

FOR CAST-IN-PLACE WALL WITH TRAFFIC BARRIER

NOISE BARRIER WALL
ACCESS DOOR TYPE 2

STANDARD PLAN D-2.83-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso
11-10-05

Washington State Department of Transportation
NOTES
1. All reinforcing steel shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.

For Precast Wall on Shaft Foundation

Noise Barrier Wall
Access Door Type 3

Standard Plan D-2.84-00
Sheet 1 of 1 Sheet

Approved for Publication
Harold J. Petersen 11-10-05

Washington State Department of Transportation

EXPIRES AUGUST 23, 2006

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NOTES

1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.82 for door and frame details.

FINISHED GRADE LINE

TOP OF TRAFFIC BARRIER

FRONT VIEW

DOOR - SEE DETAIL

TOP VIEW

STANDARD PLAN D-2.86-00

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 4

SECTION A

SECTION B

SECTION C

CONCRETE SLAB

COMPOSITE SLAB

TOP OF ROADWAY

FINISHED GRADE

FINISHED GRADE
NOTES

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

#6 x 11' - 0" (TYP.)
2 PER SIDE OF DOOR

#5 x 7' - 0" (TYP.)

BAR "A"
8" OR 10"
3" OR 5"

4" CONCRETE SLAB

GROUND LINE

CONCRETE SLAB DETAIL

CONCRETE SLAB

DOOR OPENING

WALL

SOLID GROUT CAP

DOOR FRAME

ANCHOR (TYP.)

#6 x 7" - 0" (TYP.)
2 PER SIDE OF DOOR

BAR "C"
6" OR 10"

BAR "C" OR BAR "D" PER 4' DOOR OPENING

BAR "A"
4" (...) FOR MASONRY WALL

SHAFT FOUNDATION SHOWN

FRONT VIEW

SECTION A

UNLESS OTHERWISE SPECIFIED OR SHOWN ON ALL DETAILS:

STANDARD PLAN D-2.88-00

ALL REBAR SHALL HAVE A MINIMUM 1 1/2" COVER.

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

1 1/2" DOORSTOP

GROUND LINE

SIDE VIEW

1/2"

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

C5 x 9 DOOR FRAME W/ 1/2" x 1 1/2" DOOR STOP

1 1/2" DOOR STOP

5"

1/2" TIE BAR

COUNTERSINK DETAIL

WELD ANCHOR PIN TO HINGE REINFORCEMENT PLATE (TYP.) ~ (CHANNEL WIDTH) x 12" x 1/4", WELDED TO FRAME

WELD FRAME TOGETHER INSIDE OF CHANNEL.

GRIND SMOOTH EXTERIOR SURFACES BEFORE PAINTING IF NEEDED.

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Geosynthetic Reinforcement Length and Limits of Structure Excavation Class B

Incl. Haul, Wall Backfill and Compaction

Section Detail

Geosynthetic Wall, Type 1

Includes Design

Ground Acceleration Coefficient, A=0.16g to 0.30g
Horizontal Backslope with 2 ft. Traffic Surcharge

Geosynthetic Wall, Type 2 & 3

Includes Design

Ground Acceleration Coefficient, A=0.16g to 0.30g

Geosynthetic Wall, Types 4

Static Design Only

Ground Acceleration Coefficient, A=0.15g or Less

Geosynthetic Wall, Types 5 & 6

Static Design Only

Ground Acceleration Coefficient, A=0.15g or Less

Permanent Geosynthetic Walls

Typical Cross Sections

NOTES

For the values of "x", "y", and "z", see Sheet 2.

For Geosynthetic Wall Construction Sequence, see Sheet 3.

W = Epoxy Coated

Key Notes:

1. "N" rows of Φ 4 dowel reinforcement placed between geosynthetic layers at 8'-0" O.C. Horizontal spacing. See Table, Sheet 2. Vertical spacing between rows to be equal, as multiple of "Sv" allow. Rows may be staggered.

2. Geotextile for underground drainage Class A, Low Survivability (only needed if a geogrid is used for geosynthetic reinforcement).

3. Φ 4 "O" UML Geotextile Overlay, top & bottom

4. 3" I.D. PVC pipe for weep hole in wall facing – place between geosynthetic layers approx. 3'-0" to 6'-0" horizontal spacing, length to extend to outer surface of specified wall facing.

Wall Facing (Typ.) (See Std. Plan D-3a)

Finished Grade After Construction of Wall Facing

Approximate Final Batter for Plane of Geosynthetic Layers

Drawn By: Mark Sujka

SHEET 1 OF 3 SHEETS

Effective: April 2, 2007 to January 6, 2008

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<table>
<thead>
<tr>
<th>WALL HEIGHT (ft)</th>
<th>GEOSYNTHETIC REINFORCEMENT LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TYPE 1</td>
</tr>
<tr>
<td>1' - 0 1/2&quot;</td>
<td>13.3</td>
</tr>
<tr>
<td>1' - 1/2&quot;</td>
<td>16.1</td>
</tr>
<tr>
<td>1' - 3 1/2&quot;</td>
<td>22.4</td>
</tr>
<tr>
<td>1' - 4&quot;</td>
<td>23.8</td>
</tr>
<tr>
<td>1' - 5&quot;</td>
<td>24.5</td>
</tr>
</tbody>
</table>

**NOTES**

1. The long-term geosynthetic design strength \( T_{w} \) shall be determined in accordance with WSDOT standard practice.
2. The qualification products list for products in which \( T_{w} \) has been determined.
3. **T**: The distance from the top of wall (shown) to a geosynthetic layer, and is used to determine \( T_{w} \) for that layer.
4. Column **T** is a reference for standard plan D-3a.

**STANDARD PLAN D-3**

**EXPRESS JULY 1, 2007**

Harold J. Peterson 07-13-05
Washington State Department of Transportation
UNROLL GEOSYNTHETIC AND POSITION IT
SO THAT A 4' - 0" WIDE "TAIL" DRAPES OVER
THE FORM. IF A GEOGRID IS USED FOR THE
GEOSYNTHETIC REINFORCEMENT, POSITION
GEOTEXTILE TO PREVENT BACKFILL FROM
SPILLING THROUGH GEOGRID OPENINGS.

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

COMPLETE BACKFILLING UNTIL THE COM-
PACTED BACKFILL LAYER THICKNESS IS
EQUAL TO THE REQUIRED VERTICAL
GEOSYNTHETIC LAYER SPACING.

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

NOTES
1. USE OF THE TEMPORARY FORM SYSTEM, AS DETAILED IN THIS PLAN, IS OPTIONAL.
2. TO HELP MAINTAIN THE WALL FACE BATTER, LEAVE THE FORM SYSTEM FOR THE PRE-
CEEDING 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.

USE OF THE TEMPORARY FORM SYSTEM, AS DETAILED IN THIS PLAN, IS OPTIONAL.
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LAYER IS COMPLETE, REMOVE THE FORM SYSTEM FROM THE LOWER LAYER AND
RESET IT FOR THE NEXT LAYER. SEE BELOW.
GEOSYNTHETIC WALL FASCIA AND FACING
STANDARD PLAN D-3a

TYPICAL SECTION
PERMANENT GEOSYNTHETIC RETAINING WALL
WITH SHOTCRETE FACING

KEY NOTES
1. Dowel reinforcement (see Standard Plan D-3).
2. 3" slab, concrete course. - Prepare the lower 3" slab
   as required to accommodate architectural features and
   finish.
3. Construction joint with roughened surface
4. Weep hole in wall facing (see Standard Plan D-3)
   - Weep holes shall be kept clean of concrete.
5. Vertical construction joints in fascia (see Standard Plan D-3)
   - Vertical construction joints in fascia shall be
     placed at 2' - 0" O.C. with 1/2" preformed joint filler,
     (see Standard Plan D-1e, sheet 1, "Elevation").
6. Vertical construction joints in footing (see Standard Plan D-3)
   - Vertical construction joints in footing shall be
     placed at 12' O.C. with 3/4" preformed joint filler
     (see Standard Plan D-1e, sheet 1, "Elevation").
7. Cast-in-place concrete fascia. - The fascia plate
   shall be vertical on all walls. Match the ap-
   proximate final batter of the geosynthetic layers
   with the fascia plate. Where the traffic barrier is
   at grade, the fascia plate shall be vertical or
   match the approximate final batter of the
   geosynthetic layers. Where the traffic barrier is
   at grade, the fascia plate shall be vertical or
   match the approximate final batter of the
   geosynthetic layers.

NOTES
All bars shown on this plan shall be 1/2" x 3/8" or 3/4" x 1/2" bars.

1/8" = epoxy coated

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Harold J. Peterfeso 06-30-04

EXPIRES MAY 19, 2006

STATE DESIGN ENGINEER
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. ALL REINFORCING STEEL SHOWN ON THIS PLAN SHALL BE ASSEMBLED IN 34 UNLESS OTHERWISE NOTED. ALL DIMENSIONS ARE CUT TO OUT.
   - Epoxy coated
   - For structural details below the match line, see standard plans 54 and 84.

2. INSTALL BARRIER DUMMY JOINTS ON TRAFFIC SIDE ONLY.

3. 1/2" EXPANSION JOINT WITH PREMOLDED JOINT FILLER.

4. CONSTRUCTION joint with roughened surface.

5. WHEN ARCHITECTURAL FEATURES ARE SPECIFIED.
   - Install barrier dummy joints on traffic side only
   - Architectural features and finish.

6. FOR STRUCTURAL DETAILS BELOW THE MATCH LINE, SEE STANDARD PLANS 54 AND 84.

7. 2 LAYERS 15 LB. TAR PAPER

8. MATCH LINE
   - 1/8" CONCRETE COVER ~ INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES Below THE MATCH LINE
   - Junction box & pull box ~ 8" x 8" x 1' - 6" NEMA 4 X S.S. (TYP.)

9. DUMMY JOINT DETAIL
   - All dimensions are cut to out
   - Epoxy coated

10. DIMENSION FOR BARRIER GEOMETRY
   - Reference line
   - Pivot point for barrier
   - Grade at curb line = pivot point
   - Finished HMA roadway grade is perpendicular to the transverse roadway slope, the HMA on the low side of the roadway 
     Should be perpendicular to the transverse roadway slope, the HMA on the low side of the roadway should be 9 1/4" wide.
      The HMA on the high side shall always be perpendicular to the T.R.S.

11. NOTE: HMA CONCRETE COVER ~ INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES.

12. PIVOT POINT FOR BARRIER GEOMETRY
   - Reference line
   - Pivot point

13. MATCH LINE
   - 1/8" CONCRETE COVER ~ INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES.
   - Junction box & pull box ~ 8" x 8" x 1' - 6" NEMA 4 X S.S. (TYP.)


15. THE BARRIER GEOMETRY REFERENCE LINE (B.G.R.L.) IS ON WALL FACING.

16. CONSTRUCTION joint with roughened surface.

17. FOR STRUCTURAL DETAILS BELOW THE MATCH LINE, SEE STANDARD PLANS 54 AND 84.

18. 1/2" EXPANSION JOINT WITH PREMOLDED JOINT FILLER.

19. INSTALL BARRIER DUMMY JOINTS ON TRAFFIC SIDE ONLY

20. Architectural features and finish.
CONDITION A OR CONDITION B WITH GEOTEXTILE

CONDITION A

CONDITION B

NOTES
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.
One cell
Overall Length

TYPICAL GABION

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

FASTENING ADJACENT BASKETS

LACING DETAIL

Single loop
Double loop
Single loop

TWISTED FABRIC

Cross-connecting wire placement, end cells

Cross-connecting wire placement, interior cells of front gabions

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

STANDARD PLAN D-6

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.

APPROVED FOR PUBLICATION
Clifford E. Mansfield 6/12/98
DEPUTY STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JULY 1, 1999
**ASSEMBLY DETAILS**

- Use hog rings at 2" intervals (TYP).
- Use wire rope clips (TYP).
- Fasten all horizontal laps by continuously weaving with the wire or with hog rings at approximately 6" intervals.
- Fasten mesh to vertical wire ropes by continuously weaving with the wire.

**NOTE:**
- The Contractor may provide two twin base wire rope clips at 3" O.C. in lieu of three U-bolt type wire rope clips as shown.

**WIRE ROPE CONNECTION**

- Anchor wire rope

- Intermediate horizontal wire rope

- Intermediate vertical wire rope

- U-bolt

- Steel ring, anchor rod or bottom horizontal wire rope

**HOG RING**

Use for top connections of netting.

- Top wire rope

- Bottom wire rope

- Horizontal wire rope

**U-BOLT**

Use to clamp intermediate horizontal wire ropes to vertical wire ropes.

- 1/4" x 1" x 3" Steel plate

- 1/2" Steel u-bolt

**Rope thimble**

- Steel ring, anchor rod or bottom horizontal wire rope

**Wire rope clips** (see Note 1)

- 9 gauge Steel wire

**MAXIMUM LENGTH OF HORIZONTAL WIRE ROPE**

- 150'

**Faster mesh to vertical wire ropes by continuously weaving with the wire.**

**NOTE:**
- The Contractor may provide two twin base wire rope clips at 3" O.C. in lieu of three U-bolt type wire rope clips as shown.
STANDARD PLAN D-7A
SLOPE PROTECTION
WIRE MESH

SECTION A-A

1. Two twin base wire rope clips at 3" centers may be substituted for three u-bolted wire rope clips shown.

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**Concrete Slope Protection**

(Pneumatically placed or poured in place cement concrete shown)

Concrete Slope Protection

Embankment slope 6'-0" centers MIN

8'-0" centers MAX

Type 1 Slope Protection Fill Section Detail

(Semi-open concrete masonry units shown)

**ELEVATION**

Top of slope protection

See Type 1 Slope Protection Fill Section Detail

*Calculated toe of fill slope

Slope protection

Fill slope

Sheep

Ed of lane

**SIDE ELEVATION**

(For fill section on lower roadway)

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

**TYPE 1 SLOPE PROTECTION CUT SECTION DETAIL**

(Semi-open concrete masonry units shown)

**ELEVATION**

Top of slope protection

See Type 1 Slope Protection Fill Section Detail

*Calculated toe of fill slope

Slope protection

Fill slope

Sheep

Ed of lane

**SIDE ELEVATION**

(For fill section on lower roadway)

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

**TYPE 2 SLOPE PROTECTION CUT SECTION DETAIL**

(Pneumatically placed or poured in place cement concrete shown)

10 Gage 6" x 6" wire mesh reinforcement @ center

(See Std. Spec. 9-07.7)

**SIDE ELEVATION**

(For cut section on lower roadway)

*Fill slope shall be rounded to allow placement of concrete slope protection.
1. The design and shape of the semi-open concrete masonry unit shown is only one example of the products that may be used.

2. The Type 3 Slope Protection Curb Detail shall be used only when the lower roadway cross section requires a curb.
NOTE:
1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 2 1/8" 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.
USE ONLY FOR TEMPORARY BRIDGES
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
STANDARD PLAN E-2
APPROVED FOR PUBLICATION
DATE
SHEET 1 OF 2 SHEETS

PILE OR FRAME
DETOUR BRIDGE WITH
ASPHALT OVERLAY

HALF SECTION-PILE BENT
TYPICAL SECTION-TWO LANE BRIDGE

HALF SECTION-PILE BENT
TYPICAL SECTION-SINGLE LANE BRIDGE

HALF SECTION-FRAME BENT
TYPICAL SECTION-FRAME BENT

On pile trestles, when H exceeds 10' but is less than 20', longitudinal braces shall be placed on outside piles on both sides of trestle in every third panel or as required by local conditions. When H exceeds 20', two-story bracing shall be used. Longitudinal struts and cross braces shall be centered at each end with 3/4" DIA bolts and washers used.

On frame trestles, longitudinal bracing shall be placed on outside posts on both sides of trestle in alternate panels or as required by local conditions. When H exceeds 20', two-story bracing shall be used. Longitudinal struts and cross braces shall be centered at each end with 3/4" DIA bolts and washers used.

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Brian Ziegler
05-29-98
Pile or Frame Detour Bridge with Asphalt Overlay

Use Only for Temporary Bridges

Standard Plan E-2

Sheet 2 of 2 Sheets

Effective: April 2, 2007 to January 6, 2008

Notes:

1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas Fir-larch.
3. 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 plant 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.
8. Two-lane bridges shall use thirteen lines of stringers, single lane bridges shall use eleven lines of stringers.

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BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY
THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON
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LIFTING LOOP (TYP.)

1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.
2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.
3. 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.

PILE TO PILE-CAP CONNECTIONS

For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E-4, Note 2.

PILE BUNKING AND SHIPPING SUPPORT DIAGRAMS

For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.
2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.
3. 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.

PILE HANDLING DIAGRAMS

Pile lifting Cases 1 and 2:
- Do not allow pile tip to bear on other piling stored in a lower layer.

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.

PILE TO PILE-CAP CONNECTIONS

For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E-4, Note 2.
GENERAL NOTE

See Standard Plan F-3 for Curb Expansion and Contraction Joint spacing.

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1. The intent of this design is to facilitate the completion 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.

2. The centerline of the drainage structure may differ from the centerline of the frame and grate.
The installation of curb in areas with existing guardrail could require the removal and resetting of the guardrail or its components.

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

See Contract for exception to distances shown.

Type 3 and 6 curbs are not used on roadways with a posted speed greater than 40 mph.
# Curb Radius Table

This table lists the calculated dimensions for casting blocks suitable for constructing various curb radii. Curved blocks or blocks with different dimensions may be adaptable with prior approval of the Engineer.

<table>
<thead>
<tr>
<th>CURB RADIUS</th>
<th>DIMENSION A</th>
<th>DIMENSION B</th>
<th>DIMENSION C</th>
</tr>
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<tr>
<td>2</td>
<td>12&quot;</td>
<td>2&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>4&quot; TO 5&quot;</td>
<td>12&quot;</td>
<td>1 1/2&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>12&quot;</td>
<td>1&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>13&quot;</td>
<td>7/8&quot;</td>
<td>10 1/4&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>14&quot;</td>
<td>1 1/2&quot;</td>
<td>10 2/3&quot;</td>
</tr>
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<td>16&quot;</td>
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<td>11&quot; TO 12&quot;</td>
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<td>5/8&quot;</td>
<td>10 1/4&quot;</td>
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<td>1&quot;</td>
<td>12&quot;</td>
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<td>22&quot; TO 24&quot;</td>
<td>16&quot;</td>
<td>1 1/2&quot;</td>
<td>12 1/2&quot;</td>
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<tr>
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<td>16&quot;</td>
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<td>14 3/4&quot;</td>
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<td>16&quot;</td>
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<tr>
<td>34&quot; TO 36&quot;</td>
<td>16&quot;</td>
<td>1&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>OVER 36&quot;</td>
<td>LINE TAMENT BLOCK, SEE SHEET 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

2. Layouts 1, 2, & 3 require two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 1". The bid item does not include the adjacent Curb (or Curb & Gutter), or Sidewalk.

3. Ramp slopes shall not be steeper than 12H:1V.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

5. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.


7. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

Layouts 1, 2, & 3 require two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 1". The bid item does not include the adjacent Curb (or Curb & Gutter), or Sidewalk.

Ramp slopes shall not be steeper than 12H:1V.

Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

See Standard Plan F-30.10 for sidewalk joint placement and details.

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1. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' x 4'.

2. The Type 2 Ramp Layout requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 2". The bid item does not include the adjacent Curb (or Curb & Gutter), the Sidewalk between Ramps, or the Cement Conc. Pedestrian Curb.

3. Ramp slopes shall not be steeper than 12H:1V.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

5. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.


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RAMP CENTERLINE
3' - 0" MIN.

OPENING
5' - 0"

RAMP
SIDEWALK

CEMENT CONCRETE CURB

CEMENT CONCRETE PEDESTRIAN CURB
(SEE STD. PLAN F-10.12)

RAMP SLOPES SHALL NOT BE STEEPER THAN 12H:1V.

Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

See Std. Plan F-30.10 for sidewalk joint placement and details.

6" TOP OF ROADWAY
CEMENT CONCRETE CURB & GUTTER
(SEE NOTE 5)

THIS PATTERN AREA SHALL BE YELLOW IN COLOR

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1. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

2. The Type 3B Ramp Layout requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 3B". The bid item does not include the adjacent Curb (or Curb & Gutter), the Sidewalk between Ramps, or the Cement Conc. Pedestrian Curb.

3. Ramp slopes shall not be steeper than 12H:1V.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

5. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

SIDEWALK RAMP TYPE 4A

NOTES
1. This layout is used to provide access to a single crosswalk parallel to the major street. The bid item "Concrete Sidewalk Ramp Type 4A" does not include the adjacent Curb or Curb & Gutter, the Sidewalk, or the Concrete Pedestrian Curb.

2. Ramp slopes shall not be steeper than 12H:1V.

3. Avoid placing drainage structures, junction boxes, or other obstructions in front of ramp access areas.

4. Curb & Gutter is shown, use the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

5. See Std. Plan F-30.10 for sidewalk joint placement and details.

6. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' x 4'.

This pattern area shall be yellow in color.

PLAN VIEW
SIDEWALK RAMP TYPE 4A LAYOUT

SECTION A

SECTION B

SECTION C

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EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008
NOTES

1. When the driveway width exceeds 16 feet, construct a full depth expansion joint (see Std. Plan F-30.10) with 1/2" joint filler along the driveway centerline. Construct expansion joints parallel with the centerline as required at 15' maximum spacing when driveway widths exceed 30'.

2. See Std. Plan F-30.10 for sidewalk details.

3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.

When the driveway width exceeds 15 feet, construct a full depth expansion joint (see Std. Plan F-30.10) with 3/8" joint filler along the driveway centerline. Construct expansion joints parallel with the centerline as required at 15' maximum spacing when driveway widths exceed 30'.

Cement Concrete Driveway Entrance Types 1, 2, 3 & 4

Standard Plan F-30.10-00

Sheet 1 of 2 Sheets

Approved for publication

Ken L. Smith
01-23-07
Washington State Department of Transportation

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.
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. "V" distances
2. "W" distances

NOTES:

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.
**Elevation**

- Base elevation 1'-0"
- Panel length P to be constant throughout span and not to exceed D + 2"

**Top truss diagonals**
- Y = Height of shallowest sign on structure, D + 1' MIN

**Structure Dimensions**

**Panel Points (TYP)**
- See Notes 5 and 6

**Chord to end post connection type**

- CHORD TO END POST CONNECTION TYPE R
- Where no diagonals connect

**CHORD TO END POST CONNECTION**

- Type R
- Where no diagonals connect

**Panel Points (TYP)**
- See Notes 5 and 6

**Panel length P to be constant throughout span and not to exceed D + 2"**

**Sign bridge foundation**
- 1'-8" 17'-6" Min.

**Sign bridge layout**

**End truss diagonal (TYP)**
- See Notes 2

**Bottom of lighting bracket**
- 1' + 0"

**Structural dimensions**

**Top truss diagonals**

**Far truss diagonals**

**Near truss diagonals**

**Bottom of lighting bracket**

**Elevation**

**Plan**

**Section A-A**

**End view**

**Materials specifications**

<table>
<thead>
<tr>
<th>Tube (Chords, Diagonals, Interior &amp; Post)</th>
<th>Galvanized Steel (min. 500 Grade B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM A 36 or ASTM A 53 Grade B or C</td>
<td>AASHTO M 232 * (1/4 &quot; for 7 1/2 &quot; O.D. chord)</td>
</tr>
</tbody>
</table>

_**Note:**

- All members are pipe. Values shown are nominal pipe size and wall thickness.
- CHORD TO END POST CONNECTION TYPE R
- Where no diagonals connect
- Top and far truss diagonal: L = 5/8" for 7 1/2" O.D. chord
- Horizontally diagonal connection when chords where vertical and horizontal connect.
- Bottom horizontal diagonal: L = 3/8" for 7 1/2" O.D. chord
- Alternate Joint Detail is used.
- (Chords, Struts & Diagonals, End Truss, Post)
**CONDUIT PLACEMENT**

Drill and tap for set screw

**HANDHOLE DETAIL**

Round and smooth inside edges

**END POST BASE WITH HANDHOLE LOCATION**

Hand hole frame

**REFERENCES**

1. Horizontal and vertical clearance requirements shall be as shown on Contract Plans.
3. Details not shown are same as Chord to End Post Connection Type R, omitting the 3/4" plate stiffener on the tee member.
4. Ends of diagonals shall be cut to fit neatly against chord or post. Cutlet shall be to be diagonal tube or pipe thickness plus 1/16".
5. Horizontal diagonals and post chords shall be vertical diagonals connected (post position).
6. Diagonals shall be placed at panel points. Bolt diagonals symmetrically about panel line at (or near) panel points. An interior diagonal is not required at panel ends.
7. Oval gussets or shims shall be required at interior diagonal locations.
8. Bolts shall equal chord thickness or 5/16", whichever is less.
9. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom of chord. No chord shop splices permitted in middle third of span. An interior splice is not required in end post.
10. Drill hole in chord at each diagonal end strut. Diameter shall be 1/8" or greater over 60'-6" for spans 60' or less, diameter shall be 1/8".

**NOTES**

1. Horizontal and vertical clearance requirements shall be as shown on Contract Plans.
3. Details not shown are same as Chord to End Post Connection Type R, omitting the 3/4" plate stiffener on the tee member.
4. Ends of diagonals shall be cut to fit neatly against chord or post. Cutlet shall be to be diagonal tube or pipe thickness plus 1/16".
5. Horizontal diagonals and post chords shall be vertical diagonals connected (post position).
6. Diagonals shall be placed at panel points. Bolt diagonals symmetrically about panel line at (or near) panel points. An interior diagonal is not required at panel ends.
7. Oval gussets or shims shall be required at interior diagonal locations.
8. Bolts shall equal chord thickness or 5/16", whichever is less.
9. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom of chord. No chord shop splices permitted in middle third of span. An interior splice is not required in end post.
10. Drill hole in chord at each diagonal end strut. Diameter shall be 1/8" or greater over 60'-6" for spans 60' or less, diameter shall be 1/8".

**NOTES ON HANDHOLE DETAIL**

Round and smooth inside edges

**HANDHOLE DETAIL**

Round and smooth inside edges

Removable raintight hand hole cover with gasket.

Fasten with 2 stainless steel (ASTM F-593) screws

1/2" Steel bolt, 1 1/2" long, with washer and nut for ground.

**END POST BASE WITH HANDHOLE LOCATION**

Hand hole frame

**REFERENCES**

1. Horizontal and vertical clearance requirements shall be as shown on Contract Plans.
3. Details not shown are same as Chord to End Post Connection Type R, omitting the 3/4" plate stiffener on the tee member.
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9. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom of chord. No chord shop splices permitted in middle third of span. An interior splice is not required in end post.
10. Drill hole in chord at each diagonal end strut. Diameter shall be 1/8" or greater over 60'-6" for spans 60' or less, diameter shall be 1/8".

**NOTES ON HANDHOLE DETAIL**

Round and smooth inside edges

Removable raintight hand hole cover with gasket.

Fasten with 2 stainless steel (ASTM F-593) screws

1/2" Steel bolt, 1 1/2" long, with washer and nut for ground.
VERTICAL STRUTS
AT SPAN END ONLY

Y = 5' - 0" MIN.
1' - 8" MIN. TO 1' - 6" MAX.

X/2

VERTICAL "FAR" TRUSS DIAGONAL (TYP.)

VERTICAL "NEAR" TRUSS DIAGONAL (TYP.)

X

PANEL LENGTH (4' - 3" MAX.) TO BE CONSTANT "FAR" TRUSS END DIAGONAL.

CHORD (TYP.)

CHORD (TYP.)

1 1/4" CAPPED NIPPLE

BOTTOM OF BASE PLATE

HOLE ON SIDE AWAY FROM TRAFFIC

ELEVATION

DOUBLE CANTILEVER SIGN STRUCTURE

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HEMISPHERICAL POST FINIAL, 1/8" MIN. THICKNESS. INSTALL AFTER GALVANIZING.

END OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS.

DIAGONAL CONNECTION DETAIL TYPICAL OF ALL DIAGONALS.

3/4" DIAM. HOLE IN CHORD AT EACH END OF ALL DIAGONAL CHORDS AND STRUTS.

1/8" PLATE MIN. 9" 3/4" MAX.

3/8" ALLEN HOLLOW SET SCREW AT 180° INTERVALS.

3/8" ALLEN HOLLOW SET SCREW WITH DOG POINT (TYP.) (CORROSION RESISTANT METAL OR COATING) AT 90° INTERVALS.

DIAGONAL CONNECTION DETAIL TYPICAL OF ALL DIAGONALS

BACK-UP RING 100% MT SEE WELD DETAIL "D"

TYPICAL TRUSS DETAILS:

ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS.

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REMOVABLE RAIN TIGHT
HAND HOLE COVER WITH GASKET
— FASTEN WITH TWO STAINLESS STEEL
(ASTM F 593) SCREWS

2 1/2" DIAM. STEEL BOLT,
1 1/2" LONG, WITH WASHER
AND NUT FOR GROUND

INSIDE EDGES SHALL BE
ROUND AND SMOOTH
ALL AROUND

DRILL AND TAP FOR
1/4" DIA. CAP SCREW,
ASTM F 593, W/ S.S.
WASHER, SPACING
O.C.

WELDED GALV. CLOTH
1/16" x 7/16" SQ. WRAP
AROUND BASE PLATE
WITH 3" MIN. LAP

24" O.D. PIPE (t = 0.969) SPLICE WITH
18" O.D. PIPE (t = 0.750) SPLICE WITH

2" DIA. HOLE FOR ANCHOR BOLTS

STEP B

DETAIL "G"

SECTION B

BASE WELD DETAIL

POST BASE DETAILS

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
**BAR LIST**

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>GRY.</th>
<th>LENGTH</th>
<th>SIZE</th>
<th>TYPE</th>
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<td>12</td>
<td>22&quot; WELD CLEARANCES</td>
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<td>SHAFT SPIRAL</td>
<td>1</td>
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<tr>
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<td>GAP TOP</td>
<td>4</td>
<td>18&quot; - 36&quot;</td>
<td>#6</td>
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</tr>
</tbody>
</table>

**SHORING OPTIONS**

- #4
- #5
- #9

**COLD DRAWN WIRE**

- AASHTO M 32

- #4
- #5
- #9

**DEFORMED WIRE**

- AASHTO M 225

- #4
- #5
- #9

**MATERIAL SPECIFICATIONS**

- **SHAFT CONCRETE**: CLASS 4000
- **ALL OTHER CONCRETE**: CLASS 4000
- **STEEL, FBE, BAR**: AASHTO M 31, GRADE 60
- **ANCHOR ROD**: ASTM F 1554, GRADE 105
- **ANCHOR NUTS**: AASHTO M 291
- **ANCHOR PLATE**: ASTM A 36

**COLUMN AND SHAFT SPIRAL OPTIONS**

<table>
<thead>
<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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<td>#4</td>
<td></td>
<td></td>
<td>8  18  18</td>
</tr>
</tbody>
</table>

**ANCHOR PLATE DETAIL**

- **MARK LOCATION**: QTY.
- **LENGTH**
- **SIZE**
- **TYPE**

**SPIRAL WELDED LAP SPLICE DETAIL**

WELDING SHALL MEET THE REQUIREMENTS OF STD. SPEC. 6-02.3(24)E FOR WELD DIMENSIONS, SEE TABLE BELOW.

**BENDING DIAGRAM**

(ALL DIMENSIONS ARE OUT TO OUT).

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NOTES
1. Notch is only required with multiple post installations.

2. 8 x 10, 8 x 12, and 8 x 14 Timber Sign Posts can not be made breakaway and do not have holes or notches. These posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

3. Signs with a width less than 12 feet and supported on three 8 x 6 or 8 x 8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

4. Signs with a width less than 17 feet and supported on four 8 x 6 or 8 x 8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

5. For "X", "Y", "H1", "H2", "H3", and "H4" refer to the Sign Specification Sheet in the Contract.

---

POST INSTALLATION TABLE

<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>DEPTH</th>
<th>HOLE DIAMETER</th>
<th>NOTCH</th>
<th>NOTCH DEPTH</th>
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<td>NOT REQ'D</td>
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</table>
NOTE

NOTE
CENTERLINE OF NAILS TOP OF POST "H2" (POST HEIGHT)
SEE NOTE "Y" (SIGN HEIGHT)
"H1" (POST HEIGHT)
SEE NOTE "X" (SIGN WIDTH)
24’ MAX.

TOTAL SIGN AREA (SQUARE FEET)

POST EMBEDMENT DEPTH

DEPTH IN FEET

UP TO 50
51 TO 100
101 TO 150
151 TO 200
201 TO 250
251 TO 300
301 TO 350
351 TO 400
401 TO 450
451 TO 500
501 TO 550
551 TO 600
601 TO 650
651 TO 700
701 TO 750
751 TO 800
801 TO 850
851 TO 900
901 TO 950
951 TO 1000
1001 TO 1050
1051 TO 1100
1101 TO 1150
1151 TO 1200
1201 TO 1250
1251 TO 1300
1301 TO 1350
1351 TO 1400
1401 TO 1450
1451 TO 1500
1501 TO 1550
1551 TO 1600
1601 TO 1650
1651 TO 1700
1701 TO 1750
1751 TO 1800
1801 TO 1850
1851 TO 1900
1901 TO 1950
1951 TO 2000
2001 TO 2050
2051 TO 2100
2101 TO 2150
2151 TO 2200
2201 TO 2250
2251 TO 2300
2301 TO 2350
2351 TO 2400
2401 TO 2450
2451 TO 2500
2501 TO 2550
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2651 TO 2700
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2901 TO 2950
2951 TO 3000
3001 TO 3050
3051 TO 3100
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3151 TO 3200
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9651 TO 9700
9701 TO 9750
9751 TO 9800
9801 TO 9850
9851 TO 9900
9901 TO 9950
9951 TO 10000

EXPIRES MAY 5, 2005

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ROADSIDE SIGNS ON LAMINATED WOOD BOX POSTS

STANDARD PLAN G-4b

APPROVED FOR PUBLICATION

DATE

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 1 SHEET

DRAWN BY: ADAM COCHRAN

STANDARD PLAN G-4b

LAMINATED WOOD BOX POST (TYP.)

COMPACTED NATIVE BACKFILL MATERIAL

FINISHED GROUND LINE

BREAKAWAY FEATURE

EQUAL WINDBEAM SPACING

3’ - 0” MAX.

ROADSIDE SIGNS ON LAMINATED WOOD BOX POSTS

06-30-04

Harold J. Peterfeso

NOTE: FOR POST PLACEMENT IN PAVEMENT, SEE CONCRETE FOUNDATION SLEEVE DETAIL, STANDARD PLAN G-4a

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ROADSIDE SIGNS ON LAMINATED WOOD BOX POSTS

STANDARD PLAN G-4b

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DATE

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 1 SHEET

DRAWN BY: ADAM COCHRAN

STANDARD PLAN G-4b

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COMPACTED NATIVE BACKFILL MATERIAL

FINISHED GROUND LINE

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NOTES
1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGN.
2. FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE OVERHEAD SIGN STRUCTURE, SEE STANDARD PLAN G-6a.
3. FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE OVERHEAD SIGN STRUCTURE, SEE STANDARD PLAN G-6b.
4. LOCATION OF RAILING SPLICES TO BE DETERMINED BY FABRICATOR. SEE "RAILING SPLICE DETAIL."

LOCATION OF RAILING SPLICES TO BE DETERMINED BY FABRICATOR. SEE "RAILING SPLICE DETAIL."
Steel Grating Detail

Plan

Section F

1 1/4" Toe Plate

Every Fourth Bearing Bar and Near All Toe Plate Corners

1/16" Toe Plate

Bearing Bar

1/16" Toe Plate

Cross Bar (Typ.)

Section G

1 1/4" Toe Plate

Bearing Bar

1/16" Toe Plate

Cross Bar (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.

Install and arrange the grating fasteners according to the grating manufacturer's recommendations.

Harold J. Peterfeso 06-27-03

Maintenance Walkway for Overhead Sign Structures

Standard Plan G-6

Sheet 3 of 3 Sheets

Approved for Publication

Washington State Department of Transportation

Expires November 14, 2004
MONOTUBE SIGN BRIDGE

5' - 0"
2' - 6"
5' - 0"

MATERIAL SPECIFICATIONS

PIPE
STRUCTURAL TUBING
ALL OTHER BOLTS
GALVANIZING FOR PIPE
PLATES AND SHAPES
GALVANIZING

AASHTO M 111
STD SPEC. 9-06.5(3)
STD SPEC. 9-06.5(1)
AASHTO M 232
ASTM A 36

STEEL GRATING
ASTM A 36 OR ASTM A 53
GRADE B, TYPE E OR S,
ASTM A 500 GRADE B

PLATES AND SHAPES
ASTM A 500 GRADE B

WALK-IN CABINET TYPE VMS
3' - 0" MAX. ATTACHMENT BRACKET SPACING
4' - 0" MAX. W4 x 13 SPACING

RAILING
ENTRANCE TO WALKWAY
(SWING GATE INSIDE ONLY)

PLAN
SEE CONTRACT FOR MAINTENANCE WALKWAY LAYOUT
2' - 0" MIN.
8' - 0" MAX.
SPACING (TYP.)

ELEVATION

MAINTENANCE WALKWAY INSTALLED ON MONOTUBE OVERHEAD SIGN STRUCTURE
(WALKWAYS MAY BE USED WITH OTHER LAYOUTS THAN THAT SHOWN ABOVE)

NOTES
1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOP PLATE DETAILS, SEE STANDARD PLAN G-6.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. 3/8" DIA. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.

DETAIL "A"

HOLE DIAM. =
BOLT DIAM. + 1/16"
1 1/2" R
1
1
5" WHEN AN INTERMEDIATE SUPPORT IS USED

DETAIL "B"

1/2" PLATE

JAW & EYE END OPEN BODY TURNBUCKLE WITH 14 KIPS MIN. BREAKING STRENGTH (GALVANIZED)

2.0" R

3/8" DIA. WIRE ROPE

MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE OVERHEAD SIGN STRUCTURE
STANDARD PLAN G-6a
Sheet 1 of 3 Sheets

APPROVED FOR PUBLICATION
Harold J. Peterfeso 08-27-03
Washington State Department of Transportation

EXPIRES NOVEMBER 14, 2004
FALL RESTRAINT BRACKET INSTALLATION
ON NEW MONOTUBE SIGN STRUCTURE

FALL RESTRAINT BRACKET INSTALLATION
ON EXISTING MONOTUBE SIGN STRUCTURE

SUPERINTENDENT

Harold J. Peterfeso
08-27-03

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
ATTACHMENT BRACKET DETAIL

MAINTENANCE WALKWAY
PARTIAL PLAN

SECTION D

SECTION E

SECTION F

BRACKET NOTES

PAINT ENTIRE ATTACHMENT BRACKET TO MATCH EXISTING STRUCTURE EXCEPT FOR MOUNTING BEAM. BOLTS, LIGHT, BRACKET LENGTH, SIZE AND SPACING SHALL BE DETERMINED FROM THE CONTRACT PLANS OR WSDOT STANDARD PLAN.

MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE OVERHEAD SIGN STRUCTURE
STANDARD PLAN 0-6a

SHEET 3 OF 3 SHEETS

Drawn By: Mark Sujka

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WALK-IN CABINET TYPE VMS

4'-0" MAX. W x 13 SPACING

SEE CONTRACT FOR VMS DIMENSIONS

MIN. ATTACHMENT BRACKET SPACING

3'-0" MAX. ATTACHMENT BRACKET SPACING

SEE CONTRACT FOR MAINTENANCE WALKWAY LAYOUT

RAILING

2'-0" MIN.

5'-0"

2'-6"

MAINTENANCE WALKWAY INSTALLED ON TRUSS-TYPE OVERHEAD SIGN STRUCTURE

ENTRANCE TO WALKWAY (SWING GATE INSIDE ONLY)

TOP OF VARIABLE MESSAGE SIGN FALL RESTRAINT DETAIL

CLOSED SPELTER SOCKET (TYP.)

3/8" DIAM. U-BOLT (TYP.)

3/8" PLATE (TYP.)

3/4" PLATE (TYP.)

3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS

STANDARD PLAN G-6b

MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE OVERHEAD SIGN STRUCTURE

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1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE DETAILS, SEE STANDARD PLAN G-6.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. A. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
   B. WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.

MATERIAL SPECIFICATIONS

| PIPE | AASHTO A 36 OR AASHTO A 43 GRADE E TYPE E OR B OR ASTM A 36 GRADE B |
| PLATES AND SHAPES | AASHTO A 36 |
| STRUCTURAL TUBING | AASHTO A 36 GRADE B |
| ALL OTHER BOLTS | STD SPEC. 9-06.5(1) |
| STEEL GRATING | ASTM A 500 GRADE B |
| WIRE ROPE | ASTM A 603 W/ CLASS A WEIGHT ZINC COATED WIRES THROUGHOUT |

NOTES

1. STRUCTURAL LUGS (INTERMEDIATE SUPPORT) SEE DETAIL "A" (SEE NOTE 2)
2. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
3. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE DETAILS, SEE STANDARD PLAN G-6.
4. A. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
   B. WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.

RIPLER

PULL RESTRAINT BRACKET (TYP.) (SEE DETAIL)

3/8" DIAM. WIRE ROPE (SEE NOTE 4)

MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE OVERHEAD SIGN STRUCTURE

VIEW A

EXPIRES NOVEMBER 14, 2004
NOTES

1. Attach the Milepost Sign Panel to a timber sign post using two 3/8" diameter lag bolts, with washers; see Standard Plan G-4a. For post and attachment details on steel sign posts, see Standard Plan G-8f, Type ST-1.

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-1.

5. For lateral installations behind traffic barrier, ditches, and ditches, see Standard Plan G-1.

6. Install at the locations shown in the Contract. Installation may be moved 60 feet or less (longitudinally) before or after the contract location if obstructions are encountered, or to utilize the post of another sign. Mileposts that cannot be placed within this degree of accuracy shall be omitted entirely.

TYPICAL INSTALLATION

FOR SINGLE-FACED SIGNS

MILEPOST

STANDARD PLAN G-7

SHEET 1 OF 1 SHEET

DRAWN BY: RAYMOND ALLEN

APPROVED FOR PUBLICATION

DATE

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Harold J. Peterfeso
06-08-06

EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008

EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008

EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008

EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008
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-8a.


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Steel Sign Support Types PL, PL-T, & PL-U Installation Details

Standard Plan G-8c

Elevation Type PL Sign Support

Elevation Type PL-T Sign Support

Sign Attachment Detail

Pipe Clamp and U-Bolt

Pipe Clamp

Steel pipe cap

Steel pipe

Steel pipe cap

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Steel pipe
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-8a.

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

4. Sign post shall be 2 1/2" diam. galvanized schedule 80 steel pipe.
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-8a.

3. For "H1" refer to the Sign Specification Sheet in the Contract.
1. Dimensions for the parts used to assemble the breakaway sign bracket assembly 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-8a.

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

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.
1. For "W", horizontal distance from edge of traveled way to center of nearest post, and "V", vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-1.

2. For "X", "Y", "H1", "H2", "H3", and "H4" refer to the sign specification sheet in the contract.
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. Do not tighten any single Slip Plate Bolt to the recommended torque before pre-tightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.
ITEM AVAILABLE FROM FIXTURE MANUFACTURER,
MATERIAL IS GALV. 10 GAGE STEEL PLATE

LUMINAIRE MOUNTING PLATE

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

1"

7/16" X 1"

1/2" 7/16" X 1"

1/4" R (TYP.)

4 1/4" 2 1/4" 6 1/2"

9" 2 3/4" 7/8" 3 1/2" 7/8" 1/4" 4"

8 3/4" 1"

1 3/8" 1 1/2"

TRUSS

TOP CHORD

CHORD

BOTTOM CHORD

CONNECTION

OVERHEAD SIGN MOUNTING DETAILS

SIGN LIGHTING LUMINAIRE MOUNTING DETAILS FOR TRUSS STRUCTURES

NOTE: ALL NUTS, BOLTS, WASHERS, HARDWARE AND OTHER HARDWARE
SHALL BE STAINLESS STEEL, EXCEPT AS NOTED.
NOTE
1. Refer to Contract Plans for Monotube Beam Bracket element sizes, dimensions and weld symbols.

REFERENCE SHEET 2

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OVERHEAD SIGN MOUNTING DETAILS
STANDARD PLAN G-9a

SIGN ATTACHMENT DETAILS FOR TRUSS-TYPE AND MONOTUBE STRUCTURES

- **TOP OF SIGN:**
  - **BOLTED CONNECTION DETAIL**
  - **4" x 2"**
  - **3"**

- **WINDBEAM CONNECTION DETAIL**
  - **3/16" RIVETS**
  - **3"**

- **WINDBEAM CONNECTION DETAIL (ON BOTH SIDES OF WIDE FLANGES)**
  - **3/16" RIVETS**
  - **3"**

- **BOTTOM ChORD**
  - **3/16" RIVETS**
  - **3"**

- **TOP ChORD**
  - **3/16" RIVETS**
  - **3"**

- **WIND BEAM**
  - **(ON BOTH SIDES OF WIDE FLANGES)**
  - **W4 X 13 STEEL**

- **SIGN FACE**
  - **3"**

- **SECTION B**
  - **SIGN FACE**
  - **3"**

- **SECTION D**
  - **3/8" DIAM. WITH TWO FLAT WASHERS AND ONE LOCKNUT PER BOLT**
  - **3/8" x 1 3/4" BOLT WITH 1" x 5/8" RECT. HEAD, POST CLIP, WASHER, AND LOCKNUT (STAINLESS STEEL)**

- **ALUMINUM WINDBEAM DETAIL**
  - **0.1" RADIUS (TYP.)**
  - **0.725" 0.175"**

- **3"**

- **MONOTUBE BEAM**
  - **2" 2"**

- **CONNECTIO N FOR MONOTUBE BRACKET**
  - **W4 X 13 STEEL (TYP.)**
  - **2.50" 0.125" 0.125"**

- **HORIZONTAL SIGN PANEL SPICE**
  - **LOWER SIGN PANEL**
  - **3/16" RIVETS (OF STABILIZED BRACES)**

- **UPPER SIGN PANEL**
  - **3/16" RIVETS**
  - **(4" STAGGERED SPACING)**

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

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

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

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

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

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

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

Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be one bolt, flared leg; steel straps shall be 3/4" wide and 0.030" thick. Sign braces are only installed when specified in the contract. Typically braces are necessary on large sign panels that are exposed to high winds, traffic generated wind buffeting, or when snow thrown from plows might impact the sign. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type 3 or 4 sheeting.
1. When guardrail runs concurrent, the contractor shall either:
   A. Drive the flexible guide post in line with the guardrail posts, or
   B. Mount the shorter flexible guide post onto the guardrail post.

2. Guide posts shall be fastened to the guardrail posts using two 2" x 3/8" lag screws with washers, along centerline of post. Also acceptable is any approved method submitted by the guide post manufacturer.

3. When concrete barrier runs concurrent, the contractor shall mount barrier delineators where guideposts are required.
LEGEND

○ TYPE W

● TYPE Y

□ TYPE WW

SEE TABLE IN STANDARD PLAN H-1 FOR DEFINITION OF GUIDE POST TYPES

DIVIDED HIGHWAY

THREE EQUAL SPACES WHEN R<75'
FOUR EQUAL SPACES WHEN R>75' (TYP)

100' DECELERATION TAPER

EXPIRES OCTOBER 26, 2000

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NOTE 1. See plans for guide post requirements between interchanges.

2. Guide posts shall be placed at 100' on ramp tangents and tapers.

3. "S" dimension shown on Standard Plan H-1c or 100', whichever is smaller.

4. One half of "S" dimension shown on Standard Plan H-1c 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 minimum.

See table in Standard Plan H-1 for definition of guide post types.
**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.

**FOR DEFINITIONS OF GUIDE POST TYPES, SEE STANDARD PLAN H-1, GUIDE POSTS.**

**LEGEND**

- ○ TYPE W
- • TYPE WW
- □ TYPE Y
MISCELLANEOUS
GUIDE POST PLACEMENT

STANDARD PLAN H-1d

LEGEND

- TYPE W
- TYPE WW
- TYPE Y
- TYPE G1
- TYPE G2

FOR DEFINITION OF GUIDE POST TYPES,
SEE STANDARD PLAN H-1, GUIDE POSTS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-31-06
Washington State Department of Transportation

EXPIRES AUGUST 9, 2007

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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 60 feet max.

---

GUIDE POST PLACEMENT
FOR BRIDGES

See table in Standard Plan H-1 for definition of guide post types.
BEGIN RUMBLE STRIP ON RIGHT SHOULDER AT END OF WIDE LINE

SINGLE LANE OFF CONNECTION

TWO LANE OFF CONNECTION

END RUMBLE STRIP ON RIGHT SHOULDER AT BEGINNING OF DECELERATION TAPER

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE

END RUMBLE STRIP ON RIGHT SHOULDER AT END OF WIDE LINE

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE

BEGIN RUMBLE STRIP ON RIGHT SHOULDER AT END OF WIDE LINE

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE

END RUMBLE STRIP ON RIGHT SHOULDER AT BEGINNING OF DECELERATION TAPER

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE

BEGIN RUMBLE STRIP ON RIGHT SHOULDER AT END OF WIDE LINE

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE

END RUMBLE STRIP ON RIGHT SHOULDER AT BEGINNING OF DECELERATION TAPER

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE

BEGIN RUMBLE STRIP ON RIGHT SHOULDER AT END OF WIDE LINE

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE

END RUMBLE STRIP ON RIGHT SHOULDER AT BEGINNING OF DECELERATION TAPER

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LINE
SHOULDER RUMBLE STRIPS
ON LEFT SHOULDER

MEDIAN CROSSOVER

SHOULDER RUMBLE STRIP
ON MEDIAN SHOULDER

SHOULDER RUMBLE STRIP
ON OUTSIDE SHOULDER

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

MEDIAN SHOULDER

OUTSIDE SHOULDER

STRUCTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH

MEDIAN RUMBLE STRIP ON MEDIAN SHOULDER

SHOULDER TAPER DETAIL

SHOULDER RUMBLE STRIP ON MEDIAN SHOULDER

SHAPE LINE

ON RAMP

SHOULDER RUMBLE STRIP ON OUTSIDE SHOULDER

SHOULDER RUMBLE STRIP ON RIGHT SHOULDER AT END OF ACCELERATION TAPER

END RUMBLE STRIP ON RIGHT SHOULDER ADJACENT TO BEGINNING OF ON RAMP SHAPE LINE

4' MIN. ~ 5' MIN. WITH BARRIER OR GUARDRAIL AT EDGE OF SHOULDER

4' MIN. ~ 5' MIN. WITH BARRIER OR GUARDRAIL AT EDGE OF SHOULDER

450' 600'

600'

100' MIN.

SHEET 3 OF 4 SHEETS

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DRAWN BY: MARK SUJKA

STANDARD PLAN H-4

SHOULDER RUMBLE STRIP TYPE 1 FOR DIVIDED HIGHWAYS
RUMBLE STRIP PLACEMENT
AT INTERSECTIONS

IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START RUMBLE STRIP AT END OF THE TAPER.

RADIUS POINT OF RUMBLE TURN RADIUS - TYP.

MINOR ROAD

TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF DECELERATION TAPER.

TAPER

TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF DECELERATION TAPER.

TAPER

SHOULDER RUMBLE STRIP TYPE 1 FOR DIVIDED HIGHWAYS

STANDARD PLAN H-4
Rumble strips are not installed in certain reduced-width shoulder locations. See the SHOULDER TAPER DETAIL on Standard Plan H-4.

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Rumble Strip Placement at Intersections

Radius Point of Right Turn ~ TYP.

40' MIN. EDGE OF PAVED SHOULDER ~ EPS

Rumble Strips

Type 2 - 12' gap and 12" wide strip
Type 3 - 16' gap and 16" wide strip

Type 4 - 12" wide strip

Terminating Shoulder Rumble Strips

40' from the beginning or end of each right turn radius.

Terminating Shoulder Rumble Strips at the beginning or end of each right turn taper.

Type 2, 3, & 4 Shoulder Rumble Strip

For Undivided Highways

Standard Plan H-4a

EXPIRES MAY 16, 2005
1. Center Line Rumble Strip installation requires a minimum distance of 12 feet from Center Line 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.

Center Line Rumble Strip installation requires a minimum distance of 12 feet from Center Line to edge of paved shoulder. When directed by the Engineer, Rumble Strips may be installed along the turn pocket taper where there is a history of rear-end collisions in the turn pocket.
INTERSECTION WITH LEFT TURN CHANNELIZATION

**Non-Commercial Road Approaches and Driveways**

**Residential Road Approach**

**Driveaway**

**Intersection with Left Turn Channelization**

- **Center Line**
- **Rumble Strip**
- **Rumble Strip Optional** - See Note 3

**Channelized Intersections**

**Bridge Approach Slab**

- **Bridge**
- **Longitudinal Marking (Typ.)**
- **Center Line Rumble Strip**
- **Rumble Strip (Typ.)**

**Uncannelized Intersections and Commercial Road Approaches**

- **Terminate Rumble Strip at Beginning and End of Approach or Intersection**
- **Rumble (Typ.)**
- **Raised Pavement Marker**

**Legend**

- **Rumble Strip Usage as Directed by Engineer**
- **Approx. Midway Between Milling Grooves**
- **Refer to Standard Plan H-20.30 for Recessed Pavement Marker Detail**
- **Recessed Pavement Marker**

**Notes**

- **Terminate at End of Left Turn Channelization Stripping**
- **Omit Center Line Rumble Strips in This Area**
- **When Specified in Contract**
- **Marking**
- **When Specified in Contract**

**Header**

- **Effective: April 2, 2007 to January 6, 2008**
- **Drawing: All Sheets**

**Footer**

- **Approved for Publication**
- **Expiry: May 16, 2007**
- **State Design Engineer**

**End Note**

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1. The brass disc will be furnished by the state.
2. The text in the shaded area (see "Top View") shall be \( \frac{3}{16} \) in. 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. When the concrete is set, cover the entire monument with moist earth and leave for three days.
5. The top of the monument may be recessed or protruding, depending on conditions.
6. To replace a General Land Office (GLO) corner, consult a licensed professional land surveyor (PLS).

**NOTES**

**SECTION OF GROOVE FOR 1/4" LETTERS**

**SECTION OF GROOVE FOR 3/16" LETTERS**

**INSTALLATION**

**SECTION VIEW OF LEDGE ROCK, CONCRETE OR ASPHALT INSTALLATION**

**SURVEY MONUMENTS TYPE 1 AND TYPE 2**

**STANDARD PLAN H-6**

**DRAWN BY:** Mark Sujka

**EXPRESSES MAY 16, 2005**

**EFFECTIVE:** April 2, 2007 to January 6, 2008
MONUMENT COVER

ASSEMBLY SECTION

Concrete base

2" galvanized steel pipe

SECTION OF LETTER

PLAN

RISER RING

SECTION

RISER RING

MONUMENT CASE AND COVER

STANDARD PLAN H-7

APPROXIMATE WEIGHTS

Case 60 lbs
Cover 19 lbs
Total 79 lbs

RISER RING

DIMENSIONS

<table>
<thead>
<tr>
<th>SIZE</th>
<th>1 1/2&quot;</th>
<th>2&quot;</th>
<th>3&quot;</th>
</tr>
</thead>
</table>

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EXPIRES MAY 3, 2000

MONUMENT CASE AND COVER

STANDARD PLAN H-7

APPROVED FOR PUBLICATION

 Clifford E. Mansfield

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
Note 3:
When the distance $K$ is greater than the distance from the top of cut to the bottom of ditch, slope treatment shall begin at bottom of ditch.

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

For a 3:1 slope, $S = 3$.

### Values of $Z$ (feet)

For Class A Slope Treatment:

- 6:1 Slope
  - $Z = \frac{1}{2} \sqrt{\frac{1}{2}^2 - \frac{1}{2}^2} \cdot \frac{J}{K}
  - $Z$ value for $K = 4$ is $1.5$.
- 4:1 Slope
  - $Z = \frac{1}{2} \sqrt{\frac{1}{2}^2 - \frac{1}{2}^2} \cdot \frac{J}{K}
  - $Z$ value for $K = 4$ is $1.0$.
- 3:1 Slope
  - $Z = \frac{1}{2} \sqrt{\frac{1}{2}^2 - \frac{1}{2}^2} \cdot \frac{J}{K}
  - $Z$ value for $K = 4$ is $0.67$.
- 2:1 Slope
  - $Z = \frac{1}{2} \sqrt{\frac{1}{2}^2 - \frac{1}{2}^2} \cdot \frac{J}{K}
  - $Z$ value for $K = 4$ is $0.42$.
- 1.75:1 Slope
  - $Z = \frac{1}{2} \sqrt{\frac{1}{2}^2 - \frac{1}{2}^2} \cdot \frac{J}{K}
  - $Z$ value for $K = 4$ is $0.33$.

In this equation the term $\frac{J}{K}$ is positive when the slope treatment stake is lower than the slope stake (ascending ground) and negative when the slope treatment stake is higher than the slope stake (descending ground).
Embankment at Bridge Ends

End of wingwall
Back of pavement seat
Curb line
Grade
Embankment slope
2:1 or as noted in contract
Bottom of bridge
Embankment slope
outside bridge
Berm under bridge
Pavement
Shoulder
Traffic barrier
For narrow bridges
For shoulder width bridges

Plan at Bridge End

Flat Slab Bridge

Bridge on Columns or Piles

Bridge on Bearings

Embankment at Bridge Ends

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NOTES

1. Manufacturer shall submit shop drawings of pipe railing for review. Design shall be in accordance with AASHTO specifications.
2. Aluminum pipe railing shall have no external surface welds.

#4 Bar at each post

POST BASE DETAIL

SLAB AND GRADING SECTION

#4 Bar at each post

TREAD SHAPE DETAIL

Cement concrete stairway construction details

Standard Plan H-10

Approved for publication

State Design Engineer

Per manufacturer (TYP):
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 boxes to wood posts. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

5. A Type 2 Support (Standard Plan H-12a) is required when 2 or more mailboxes are to be installed on one support.
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-12a, Sheet 2. This design features slots that accommodate several
types of mailbox supports; only those slots necessary for assembling the type
being installed are required. An adjustable platform may be used in lieu of this
platform design. Adjustable platforms must fit the 1 7/8" M-Clamp.

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

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

DRAWN BY:  MARK SUJKA
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THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON
FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANS-
MAILBOX SUPPORT TYPE 2

MAILBOX SUPPORTS TYPE 2

SPACING DETAIL

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NOTES

1. The insert pipe is 1" nominal diameter. Schedule 40 steel pipe, as indicated; all other pipe shown on this plan is 1 1/4" nominal diameter, Schedule 40 steel pipe. All pipes, couplings, and elbows shall be galvanized in accordance with ASTM A 153.

2. The vertical support may be cast in a concrete foundation, or bolted to a U-channel post (see PLACEMENT DETAIL, Sheet 2). Avoid placing the vertical support in the flow line of a ditch.

3. The pipe angles required in this design may be achieved by using pipe fittings, or by bending the pipes. See DETAIL "A", Sheet 2.

4. Coat the 1" diam. pipe with grease (petroleum) before sliding the 1 1/4" diam. pipe (cantilever arm) onto it, to aid rotation and to guard against corrosion.

5. The Platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-12, Sheet 2. This design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required.

6. Match the edge of the mailbox platform to the end of the horizontal pipe mount. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners. Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform. See ALIGNMENT DETAIL.

7. Attach a newspaper box to the pipe with two 1 3/4" muffler clamps spaced 4" apart. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.
NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

BOLLARD TYPE 2
STANDARD PLAN H-13a

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NOTES:
1. Approval of local health department is required before work is started.
2. Excavated material shall be disposed of as directed by the Engineer.
3. All work shall be left open until inspected and approved by the Health Officer and the Engineer.
4. All grades shall be checked and approved by the Engineer.
5. Water tight manhole covers shall be approved by the Engineer prior to installation.
6. Precast septic tanks are acceptable, subject to the approval of the Engineer. Materials shall meet or exceed those shown.
7. Plan dimensions may vary as site conditions and system design permit.
8. All concrete shall be Class 4000.
9. Reinforcing steel shall be Grade 300 or Grade 400.

### Tank Capacity

<table>
<thead>
<tr>
<th>Capacity (Gal.)</th>
<th>Concrete (C.Y.)</th>
<th>Steel Reinf. (Lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000</td>
<td>23</td>
<td>3800</td>
</tr>
<tr>
<td>8000</td>
<td>28</td>
<td>4600</td>
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<tr>
<td>12000</td>
<td>37</td>
<td>6500</td>
</tr>
<tr>
<td>14000</td>
<td>42</td>
<td>7400</td>
</tr>
</tbody>
</table>

### Rest Area Septic Tank

- Outlet 6" cast iron soil pipe (Sanitary tee)
- Inlet 6" cast iron soil pipe (Sanitary tee)
- Equalizer pipe 6" cast iron soil pipe (Sanitary tee)
- I5 1/8" x 3 1/2" construction joint (TYP)
- Fifteen Bar C at 6" at 12"
REMOVABLE THREADED PVC OR PRIMED STEEL CAP
1/4" DIA HOLE (1) FOR AIR EXCHANGE
1" I.D. PVC OR STEEL PIPE
THREADED ENDS
1/4" DIA X 6' LONG FIBERGLASS ROD

BRACKET (2 PER UNIT), SEE DETAIL
1 5/8" LONG X 5/16" DIA BOLT (4 TOTAL)
2 1/2" LONG X 5/16" DIA BOLT WITH LOCK NUT (2 TOTAL)

2"X8" PRESSURE TREATED WOOD

PVC OR PRIMED STEEL T-ADAPTER FOR 1" I.D. PIPE
1" I.D. X 6' LONG PVC PIPE
SCORE 1/4" DEEP EVERY 1/2"
ALTERNATING CUTS ON TOP AND BOTTOM FOR DRAINAGE
PLACE AT LOWEST WATER LEVEL

ANGLE IRON (SEE DETAIL) NOTE:
EXTENSION CAN BE USED AS SHOWN IN DETAIL. IF NEEDED
ATTACH ANGLE IRON TO FULL LENGTH OF SUPPORTING BOARD
WITH 1 1/2" WOOD SCREWS

CUT POINT ON BOTH SIDES
3/8" DIA HOLES (4 TOTAL)

1" I.D. PVC OR STEEL PIPE
5/16" DIA HOLE (2 TOTAL)
5" LONG X 5/16" DIA BOLT WITH LOCK NUT

WATER INTAKE & CLEAN-OUT ASSEMBLY
NOT TO SCALE

NOTE: POUR IN APPROXIMATELY 1 TABLESPOON OF CORK DUST AT INSTALLATION AND AFTER EACH READING
NOTE: GAGE ASSEMBLY BACKING BOARD, PIPE, ROD, AND ANGLE IRON CAN BE EXTENDED AS NEEDED TO FIT SITE REQUIREMENTS.
When specified in the contract, install backup support for the geotextile (see Std. Spec. 8-01.30(a)).

1. Maximize detention of stormwater by placing fence as far away from the toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.
2. Install silt fencing along contours whenever possible.
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 8-01.30(a) and 8-01.51(15).

- Max. spacing without backup support: 6' max.
- Max. spacing with backup support: 10' max.

Bury geotextile in trench.

Notes:
1. Maximize detention of stormwater by placing fence as far away from the toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.
2. Install silt fencing along contours whenever possible.
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 8-01.30(a) and 8-01.51(15).
SHEET 1 OF 1 SHEET
STANDARD PLAN I-5

POST (SEE STD. SPEC. 8-01.3(9)A)
EDGE OF GEOTEXTILE
SECTION A

EROSION CONTROL AT CULVERT ENDS
APPROVED FOR PUBLICATION

DATE
STATE DESIGN ENGINEER
Washington State Department of Transportation

COMPOST BERM DESIGN
2' - 0" MIN.
1' - 0" MIN.
DISTURBED AREA
PROTECTED AREA
FLOW

SILT FENCE DESIGN
PLACE SAND BAGS AS REQUIRED AROUND CULVERT TO PROVIDE SUPPORT FOR SILT FENCE.

NOTE
PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).

EMBED POSTS INTO SAND BAGS AS REQUIRED

GEOTEXTILE FOR TEMPORARY SILT FENCE
(SEE STD. SPEC. 8-33.2, TABLE 4)

POINT (SEE STD. SPEC. 8-01.3(9)A)

DISTURBED AREA
PROTECTED AREA
FLOW

CULVERT, BOX CULVERT, OR PIPE ARCH
(END TREATMENT VARIES)

FLOW

NOTE
PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).

EMBED POSTS INTO SAND BAGS AS REQUIRED

COMPOST BERM (SEE STD. PLAN I-14)

CULVERT, BOX CULVERT, OR PIPE ARCH
(END TREATMENT VARIES)

SILT FENCE DESIGN

NOTE
PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).

COMPOST BERM DESIGN

SILT FENCE DESIGN

NOTE
PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).

EMBED POSTS INTO SAND BAGS AS REQUIRED

GEOTEXTILE FOR TEMPORARY SILT FENCE
(SEE STD. SPEC. 8-33.2, TABLE 4)

POINT (SEE STD. SPEC. 8-01.3(9)A)

DISTURBED AREA
PROTECTED AREA
FLOW

CULVERT, BOX CULVERT, OR PIPE ARCH
(END TREATMENT VARIES)

FLOW

NOTE
PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).

EMBED POSTS INTO SAND BAGS AS REQUIRED

GEOTEXTILE FOR TEMPORARY SILT FENCE
(SEE STD. SPEC. 8-33.2, TABLE 4)

POINT (SEE STD. SPEC. 8-01.3(9)A)

DISTURBED AREA
PROTECTED AREA
FLOW

CULVERT, BOX CULVERT, OR PIPE ARCH
(END TREATMENT VARIES)

FLOW

NOTE
PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).
TEMPORARY SILT FENCE

FOR INLET PROTECTION
IN UNPAVED AREAS

NOTE:

1. PREFABRICATED UNITS MAY BE USED IN LIEU OF THE DESIGN SHOWN ON THIS PLAN UPON APPROVAL OF THE ENGINEER.

2. STRUCTURE SHALL BE CONSTRUCTED SUCH THAT GEOTEXTILE MATERIAL SHALL BE FASTENED TO POSTS CREATING A SEAMLESS JOINT.

3. ENSURE THAT PONDING HEIGHT OF WATER DOES NOT CAUSE FLOODING ON ADJACENT ROADWAYS OR PRIVATE PROPERTY.

4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).

COMPACTED NATIVE SOIL

GRATE

1' - 0" MIN.

2' - 0" MIN.

BURY GEOTEXTILE IN 4' × 4' TRENCH

ISOMETRIC VIEW
(EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008)

PLAN VIEW
(CROSS BRACES NOT SHOWN)

SECTION A

ATTACH WOOD OR METAL CROSS BRACES TO STABILIZE POSTS

FASTEN CROSS BRACES TOGETHER WITH SCREWS, NAILS, NYLON TIES OR WIRE

POST (SEE STD. SPEC. 8-01.3(9A))

FLOW

GEOTEXTILE FOR TEMPORARY SILT FENCE
(SEE STD. SPEC. 9-33.2, TABLE 6)

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STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
CERTIFICATE NO. 000598
MARK W. MAURER

Harold J. Peterfeso 07-17-03

WASHTON STATE DEPARTMENT OF TRANSPORTATION

Effective: April 2, 2007 to January 6, 2008
NOTES

1. Perform maintenance in accordance with Standard Specification 6-01.3(15).
2. Size the below grate inlet device (BGID) for the storm water structure it will service.
3. The BGID shall have a built-in high-flow relief system (overflow bypass).
4. The retrieval system must allow removal of the BGID without spilling the collected material.

STORM DRAIN 
INLET PROTECTION 
STANDARD PLAN 1-7 
SHEET 1 OF 1 SHEET 
APPROVED FOR PUBLICATION 
Harold J. Peterfeso 07-17-03
Washington State Department of Transportation 
EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008
SHEET 1 OF 1 SHEET

WATTLE SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
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<tbody>
<tr>
<td>1:1</td>
<td>10 FEET</td>
</tr>
<tr>
<td>2:1</td>
<td>20 FEET</td>
</tr>
<tr>
<td>3:1</td>
<td>30 FEET</td>
</tr>
<tr>
<td>4:1</td>
<td>40 FEET</td>
</tr>
</tbody>
</table>

NOTES

1. INSTALL WATTLES ALONG CONTOURS (SEE STANDARD SPECIFICATION 8-01.2(10)).
2. WATTLES SHALL BE INSPECTED REGULARLY, AND IMMEDIATELY AFTER A RUNOFF PRODUCING RAINFALL, TO ENSURE THEY REMAIN THOROUGHLY ENTRENCHED AND IN CONTACT WITH THE SOIL.
3. LIVE STAKES MAY BE USED FOR PERMANENT INSTALLATIONS.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(10).
6. INSTALL WATTLES SNUGLY INTO THE TRENCH. ABUT ADJACENT WATTLES TIGHTLY, END TO END, WITHOUT OVERLAPPING THE ENDS.
7. PILOT HOLES MAY BE DRIVEN THROUGH THE WATTLE AND INTO THE SOIL, WHEN SOIL CONDITIONS REQUIRE.

STAKE AT EACH END AND 4' MAX. O.C. ALONG ENTIRE LENGTH

STAGGER JOINTS (TYP.)

8" MIN. EMBEDMENT
2" MIN.
3" MAX.

SHEETERS:

Harold J. Peterfeso 07-17-03
Washington State Department of Transportation

APPROVED FOR PUBLICATION
KEY-IN BALES TO PREVENT EROSION OR FLOW UNDER BALES 4" MINIMUM

STRAW BALES

COMPACT NATIVE MATERIAL TO PREVENT PIPING

STEEL, OR 2" × 2" WOODEN STAKES

STRAW STALKS STAND VERTICALLY

FINELY PACK ANY SPACES WITH STRAW

DRIVE FIRST STAKE AT AN ANGLE TOWARD THE PREVIOUS BALE TO PROMOTE A TIGHT FIT

SECOND STAKE

STEEL, OR 2" × 2" WOODEN STAKES

BALE BINDINGS

1' - 6" MIN. PENETRATION

NOTES

1. SEE STANDARD SPECIFICATION 8-01.3(9), FOR ADDITIONAL INFORMATION.

2. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).

DRAWN BY: MARK SUJKA
1. Geotextile encased check dams shall meet the requirements of standard specifications 8-01.3(6a) and 9-14.04.

2. Install the sloped ends of the check dam a minimum of 9" higher than the top of the check dam in the channel to ensure that water flows over the dam and not around it.

3. Flat bottom ditch design shown, check dam installation details are similar for "V" bottom ditches.

4. Perform maintenance in accordance with standard specification 8-01.3(16).

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

Orient the seam edge of the check dam toward the upstream side.

6" overlap (typ.)

Back of Ditch (typ.)

6" overlap (typ.)

Back of Ditch (typ.)

Geotextile encased check dams shall meet the requirements of standard specifications 8-01.3(6a) and 9-14.04.

State of Washington
Registered Landscape Architect
Certificate No. 000598
Mark W. Maurer
Harold J. Peterfeso
07-17-03
ROCK CHECK DAM

SIDE PROTECTION

SAND CHECK DAM THE DISTANCE APART WHERE POINTS "A" AND "B" ARE THE SAME ELEVATION

PLAIN SACKS FIRMLY AGAINST GROUND LINE AND ADJACENT SACKS.

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

WATTLE CHECK DAM

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

SANDBAG CHECK DAM

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

NOTE: SANDBAG CHECK DAMS (STD. SPEC. 9-13.6) SHALL BE #10 BURLAP OR APPROVED ALTERNATE FILLED WITH 48 TO 55 LBS. OF GRAVEL BACKFILL FOR DRAINS.

NOTE: QUARRY SPALLS (STD. SPEC. 9-13.6) SHALL BE 6" MIN. SPILLWAY BETWEEN STAKES (TYP.)

NOTE: EFFECTIVE DAM HEIGHT

NOTE: WATTLE (TYP.) BETWEEN STAKES (TYP.)

NOTE: EFFECTIVE PENETRATION (TYP.)

NOTE: EFFECTIVE SPILLWAY (TYP.)

NOTE: EFFECTIVE SPILLWAY (TYP.)
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(2).
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. Roll ends may be spliced in a check slot.

MISCELLANEOUS
EROSION CONTROL DETAILS

STANDARD PLAN I-14

1. PLACE CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION AND A MINIMUM OF 0.15" CRUSHED ROCK UNDER THE SPALLS, FROM THE EDGES OF THE EXISTING ROADWAY TO THE RADIUS RETURNS, OR AS DIRECTED BY THE ENGINEER.

Compost Berm Detail

- 2' - 0" SETTLING DEPTH
- 1' - 6" SEDIMENT STORAGE
- COMPACTED NATIVE MATERIAL CONSTRUCTED BY EXCAVATION OR EMBANKMENT

Temporary Sediment Trap

- 1' - 0" DEPTH OF 2" - 4" ROCK
- 1' - 0" DEPTH OF 3/4" - 1 1/2" WASHED GRAVEL BACKFILL

Elevation

- OUTFLOW CHANNEL CONSTRUCTED BY EROSION CONTROL
- 2' - 0" SETTLING DEPTH
- 1' - 0" DEPTH OF 2" - 4" ROCK

Section View

- 4" - 8" QUARRY SPALLS
- STABILIZED CONSTRUCTION ENTRANCE

Geometric View

- STABILIZED CONSTRUCTION ENTRANCE
- 25' - 0" R MIN. (TYP.)
- 15' - 0" MIN.

Temporary Outflow Channel

- COMPOST BERM DETAIL
- X = 1' - 0" FOR SLOPES 4H:1V OR FLATTER
- X = 1' - 6" FOR SLOPES STEEPER THAN 4H:1V

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Drawn by: MARK SUJKA

Washington State Department of Transportation

Effective: April 2, 2007 to January 6, 2008
FENCING MATERIAL

HIGH DENSITY POLYETHYLENE FABRIC WITH OPEN MESH, ORANGE COLOR

16" (TYP.)

STAPLE TOP TIE

SELF-LOCKING TIE ~ NYLON 6/6, 50# MIN. TENSILE STRENGTH, UV STABILIZED

2 x 2 WOOD POST (DEEPER FOR UNSTABLE SOIL)

STEEL T-BAR POST

6' - 0" MAX.

VERTICAL POST

SHEET 1 OF 1 SHEET

STANDARD PLAN I-15

TYPICAL SECTION

ENVIRONMENTALLY SENSITIVE AREA BOUNDARY

6' - 0"

HIGH VISIBILITY FENCE

STAPLE TOP TIE

SELF-LOCKING TIE ~ NYLON 6/6, 50# MIN. TENSILE STRENGTH, UV STABILIZED

ELEVATION

ELEVATION FENCE ON SLOPE

WORK AREA

HIGH VISIBILITY FENCE

STANDARD PLAN I-15

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Place grout even with top of foundation after plumbing light standard.

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

Details similar to slip base except where noted.
**SLIP/ANCHOR PLATES DETAIL**

- **Slip plate**: 4 5/8"

- **Anchor plate**: 3/8"

**SECTION A-A**

**KEEPER PLATE**

- Place between pole base plate and slip plate on top of middle washers.
- Smooth finish top, bottom, and notched surfaces

**POLE BASE PLATE**

- Smooth finish top, bottom, and notched surfaces

**PLATE WASHER**

- 1/8" back-up strip
- 1" hole with chamfered edges

**SECTION B-B**

**STRAP TEMPLATE ASSEMBLY DETAIL**

- Place over anchor bolts (See Note 4)

**STANDARD PLAN J-1b**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**OLYMPIA, WASHINGTON**

**APPROVED FOR PUBLICATION**

**DEPUTY STATE DESIGN ENGINEER**

**DATE**

**SHEET 2 OF 3 SHEETS**

**EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008**

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1. See Standard Plan C-8b for base plate and foundation requirements when light standards are mounted on concrete barrier.

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

3. The top of the anchor rod shall be both threaded and galvanized a minimum of 12". The bottom of the anchor rod shall be threaded a minimum of 3". Galvanizing shall be in accordance with AASHTO M111 after threading. Hooked anchor bolts are not allowed.

4. Strap templates shall be held in place by nuts 6" from the top of the foundation, and at bottom of anchor bolts resting on 1/2" square washers.

5. Pole base plate for a slip base design shall be 1 1/4" AASHTO M223 Gr. 345. Pole base plate for a fixed base design may be either 1 1/4" AASHTO M223 Gr. 345 or 1 1/2" AASHTO M183.

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

After bolting bottom slip plate assembly to foundation,

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

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

Misaligned anchor bolts must be removed and replaced.

NOTE:

Plate shall conform to ASTM M183 M (ASTM A36) except as noted.

Flat washer shall conform to ASTM A325.

Adapter & bolt size shall conform to AASHTO M164 M (ASTM A325).

+ Use matching diameter for threaded studs

* Contractor shall verify BC in field before ordering.  
  BC or anchor bolt sizes differ from those listed,  
  contact Bridge and Structures Office.

+ Plus or minus 2'-6"
See Standard Plans C-8b and C-14h for foundation details.

Round and smooth all edges along the wire-way to protect the conductors.

See Standard Plan J-1e for wiring details.

Install grout after plumbing the pole.

CONTINUOUS BACK-UP RING ~ 1/4" OR NO THINNER THAN POLE WALL THICKNESS, TACK WELD TO PLATE

t = SIZE OF FILLET WELD BY LIGHT POLE FABRICATOR

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
01-11-06
High Mast Timber Luminaire Support

Shown for 480 VAC power feed. Increase conductor and fuse size as required for 240 VAC power feed.

Galvanized steel mast arm - configuration varies with manufacturer.
Luminaire - see Contract for type and number.
Mounting height - roadway to luminaire elevation difference  1.25%, see Contract.

Variations in length - see Contract.
1/2" galvanized thimble eyebolt (single or double) with washers and nuts or eyelet.
Bending jumper.

Pole and bracket cable.
Equipment grounding conductor see Standard Plan J-3a.

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.

Copper split bolt connector.
Messenger cable.

Insulating tape for waterproof connection.
Fused quick disconnect - use 30 amp fuses for high mast supports.
Weatherhood - size as required.

Sheet conduit.

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

Grounding lug.
12 pole terminal block.

Direct burial conductors or galvanized steel conduits with conductors - see Contract.
Grounding bushing.

Supplemental ground - see Standard Plan J-9a.

Class 5 timber pole - length sufficient for mounting height and burial depth.
Class 2 timber pole - length sufficient for mounting height and burial depth.

1/4" x 9" step bolt.

11/2" x 10" plate collar bend to fit pole diameter (8" - 10¾"
11/2" x 4" machine bolts (two required) with washers and nuts
11/2" lag bolts (six required) - drill 9/16" hole in plate
21/2" pipe
31/2 wire hole 2" from gusset plate, smooth hole edges
1" nonmetallic conduit with 3/4" straps at code spacing

Distance varies, 35' MIN, 50' MAX, depending on line clearance requirements.

NOTES:

1. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.

2. When down guys are required, see Standard Plan J-7a.

3. When down guys are required, see Standard Plan J-7a.

4. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.

5. When down guys are required, see Standard Plan J-7a.

6. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.

7. When down guys are required, see Standard Plan J-7a.

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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 conduit shall be secured to the pole with conduit strap at 5' centers.

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

4. Where required by the serving utility, service breakers shall be installed above the meter socket in a separate raintight enclosure.

5. Bend and attach 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."

7. For Type C service wiring diagram, use Standard Plan, "Type E Service."

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

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

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

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15. For Type C service wiring diagram, use Standard Plan, "Type E Service."

16. See breaker schedule in contract for breaker and contactor sizes.
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# Pedestrian Pushbutton Details

**Key**
- 1: Pushbutton switch assembly
- 2: Cast metal housing
- 3: Protective collar
- 4: Pushbutton switch
- 5: Gasket
- 6: Cast aluminum conduit
- 7: Stainless steel fastener
- 8: Cast aluminum conduit
- 9: Aluminum 'H' extrusion
- 10: Chase nipple - 3/8" hex head x 5/8" pipe thread x 2½" long
- 11: 3/8" - 16 X 2 1/2" stainless steel bolt with washer
- 12: 3/8" x 4" lag bolt with washer
- 13: Drill and tap short for 3/8" bolt
- 14: Drill and tap short for ½" nipple
- 15: Conduit and fittings as required for timber pole installations; reverse conduit and conduit for top feed
- 16: 3/8" pilot hole for 3/8" lag bolt

**Metal Pole Installation**
- PPB-M (Pedestrian Pushbutton - Metal Pole)

**Wood Pole Installation**
- PPB-W (Pedestrian Pushbutton - Wood Pole)

**NOTE:**
When "PPB-MR" or "PPB-WR" are specified in the contract, the arrow shall be installed in the opposite direction than as shown for "PPB-M" or "PPB-W".

**Metal Pole Installation**
- PPB-M

**Wood Pole Installation**
- PPB-W

**Cast Aluminum Conduit**

**NOTE:**
When "PPB-MR" or "PPB-WR" are specified in the contract, the arrow shall be installed in the opposite direction than as shown for "PPB-M" or "PPB-W".

**Aluminum 'H' Extrusion**

**NOTE:**
When "PPB-MR" or "PPB-WR" are specified in the contract, the arrow shall be installed in the opposite direction than as shown for "PPB-M" or "PPB-W".

**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. Where pad or pedestal mounts are located in a sidewalk, construct mount top flush with sidewalk grade, omitting chamfer where top and sidewalk abut.
2. Pad mount design is typical.
3. Place a silicone seal between the cabinet foundation and the cabinet for the pad mount design.

NOTES

- Install one spare #4 bar each corner
- Locate conduits centrally in foundation
- #4 hoops
- 1'-6" Cabinet depth 1'-6"
- Cabinet width 6" + 2"
- 4" steel pipe
- 4" x 9" pipe flange
- 7 1/2" DIA bolt circle for at least 4 bolt holes 3/4" DIA each
- 4" x 9" slip-fitter
- 4" X 9" pipe flange
- 3" X 5" handhole with cover 5/8" X 2'-0" X 4" steel anchor bolts
- #4 bars at approximately 1'-0" centers
- 2" conduit and cap; others as required
- 3'-7" 2" conduit and cap; others as required
- 3'-7" 2" conduit and cap; others as required
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- 3'-7" 2" conduit and cap; others as required
SIDE MOUNT
TYPE A - PED.
TYPE E MOUNTING DETAILS

SIDE MOUNT
TYPE B - PED.
TYPE E MOUNTING DETAILS

TOP MOUNT
TYPE D - PED.
OR VEHICLE

TOP MOUNT
TYPE C - PED.
TYPE F - VEHICLE

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

KEY
① CENTER PIPE
② LOCKNIPPLE
③ NIPPLE
④ SERRATED ELBOW
⑤ SERRATED OR FLANGED ELBOW
⑥ REAMED TEE WITH SET SCREW
⑦ REAMED ELBOW WITH SET SCREW
⑧ BRONZE TERMINAL COMPARTMENT WITH:
   - GASKETED COVER
   - FASTENERS
   - WIRE LEADS
   - MOUNTING STAPLE FOR SIDE MOUNTS
   - 1 1/4"Dia DRAIN HOLE
   - 12 POSITION TERMINAL STRIP
   WHEREAS FOR SIDE MOUNTS
⑨ BRONZE COLLAR, 4 1/4" I.D. WITH SET SCREWS
⑩ ORNAMENT CAP
⑪ GASKET AND WASHER
⑫ CONDUIT LOCKNUT
⑬ TYPE E MOUNTING
⑭ FASTENER WITH SPACER
   - 1/2" Lag Screws on wood pole
   - 1/2" Bolts tapped to metal pole
⑮ FLATHEAD SOCKET BOLT
⑯ 1/2" INSERT HOLE FOR EXTERNAL WIRE ENTRANCE
   REQUIRED ON TIMBER POLE MOUNTINGS ONLY.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
APPROVED FOR PUBLICATION
DEPUTY STATE DESIGN ENGINEER

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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. A COPY MAY BE OBTAINED UPON REQUEST.

STANDARD PLAN J-6f

APPROVED FOR PUBLICATION
Clifford E. Mansfield  04-24-98
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
NOTES:
1. Type M mounting shall have "O" ring groove and seal top and bottom at signal attachment.
2. Type M mounting for conventional heads shall have a 2" diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2" dia opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 12" nominal arms.
5. See Standard Plan J-6h for tether wire, and backplate requirements.

KEY:
1. End cap
2. Conduit locknut, 1 1/2" DIA
3. Locknipple, 1 1/2" DIA
4. Steel washer
5. Neoprene gasket
6. Bronze serrated ell fitting with:
   - 3/8" stainless steel through bolt and nuts
   - Three set screws at slipfitter connection
   - Three allen head stainless steel set screws at conduit nipple connection
7. Serrated ring with pins
8. Hex locknut with:
   - Two allen head stainless steel set screws
   - Pin receptacles
9. Conduit nipple, 1 1/2" DIA
10. Hex locknut, 1 1/2" DIA
11. Mounting assembly
12. Bronze elevator plumbizer with 3/8" stainless steel through bolt, washers, and two nuts
13. Aluminum arm with set screw
14. Slotted tube with closure strip
15. Tube clamp, 2 1/2" ID, MIN
16. Internally threaded clamp assembly with:
   - Two set screws
   - 1/2" x 0.045" stainless steel bands
   - Screw buckles, 7/16" with swivels, nuts, and washers
   - Band clips with allen head stainless steel set screws
17. Bronze messenger hanger with:
   - 1/2" DIA J bolt
   - Cable lock bar
   - Rivet
   - Cotter key
18. Bronze internally threaded wire entrance with:
   - Bushing insert
   - Allen head stainless steel set screw
19. Bronze balance adjuster
20. Multi-head mounting assembly
21. Spider assembly
22. Serrated ring with no pins

ARM MOUNT
TYPE L

ARM MOUNT
TYPE LE
(TYPE L WITH EXTENSION FITTINGS)

ARM MOUNT
TYPE M

ARM MOUNT
TYPE N

SPAN WIRE
TYPE P (1 HEAD)

SPAN WIRE
TYPE Q (2 HEADS)

SPAN WIRE
TYPE R (3 HEADS)

SPAN WIRE
TYPE S (4 HEADS)

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### Signal Standard Type Designations

<table>
<thead>
<tr>
<th>Type</th>
<th>PPB</th>
<th>PS</th>
<th>I</th>
<th>RM</th>
<th>FB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ped. Push Button Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ped. Head Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAST ARM STANDARD</td>
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<tr>
<td>MAST ARM STANDARD</td>
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### Anchor Bolt, Nut, & Washer Sizes

<table>
<thead>
<tr>
<th>Type</th>
<th>PPB</th>
<th>PS</th>
<th>I</th>
<th>RM</th>
<th>FB</th>
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<tr>
<td>Standard</td>
<td>Dimensions</td>
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</tr>
<tr>
<td>1</td>
<td>PPB</td>
<td>4 - 1/2&quot; Dia x 12&quot; x 2&quot;</td>
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<tr>
<td>2</td>
<td>PS &amp; I</td>
<td>4 - 3/4&quot; Dia x 30&quot; x 4&quot;</td>
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<tr>
<td>3</td>
<td>FB &amp; RM</td>
<td>3 - 3/4&quot; Dia x 30&quot; x 4&quot;</td>
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### Foundation Details

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<thead>
<tr>
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<tr>
<td>Height</td>
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<tr>
<td>Pole Base Dia</td>
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</tr>
<tr>
<td>Plate Thickness</td>
<td>9/16&quot;</td>
</tr>
<tr>
<td>Plate Width</td>
<td>9 5/8&quot;</td>
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<tr>
<td>Hole Dia</td>
<td>1&quot;</td>
</tr>
<tr>
<td>Bolt Circle</td>
<td>5/8&quot;</td>
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<td>Foundation Depth</td>
<td>11&quot;</td>
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<tr>
<td>Foundation Width</td>
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<tr>
<td>Foundation Dia</td>
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<tr>
<td>Nut &amp; Washer</td>
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<tr>
<td>Plastic Drain Tube Dia</td>
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<td>Movable Rebar Hoop</td>
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<td>Manhole Size</td>
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<tr>
<td>Slipfitter Dia</td>
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</tr>
</tbody>
</table>

**Leveling Nut Height 1" maximum.**

* Tapered round or octagonal shaft, 1/4" cage, 4" OD at slipfitter. Taper = 0.14 inches/ft.
* Leveling nuts not required for Type PPB standard.
**RAMP METER DETAIL**

- **Stop Here Red**

- **Flashing Beacon and Ramp Meter Base Elevation**
  - See FOUNDATION DETAIL for other requirements.

- **Anchor Bolt Layout**
  - 3/4" Diameter Anchor Bolts, TYP
  - 1" Diameter Anchor Bolts, TYP

**SLIP/ANCHOR PLATES DETAIL**

- **Steel Plate**
- **Slip Plate**
- **Anchor Plate**

**KEEPER PLATE**

- Place between pole base plate and slip plate on top of middle washers.

**BASE PLATE**

- See Slip Anchor Plate Detail for dimensions not shown. Match Slip Plate dimensions.

**FLASHING BEACON DETAIL**

- **Flashing Warning Beacon**
  - Type D standard signal head mounting.
  - Standard Plan J-6d
  - (Drill slipfitter to seat set screws)

- **Flash Plate Head**
  - 3 1/2" R
  - 3" R

- **Traffic Signal Head**
  - Standard Plan J-6d
  - Type 1 mounting
  - (Drill slipfitter to seat set screws)

- **METERED FLASHING AHEAD WHEN RAMP METER DETAIL**
  - Secure conductors with cable ties. See Std. Spec. 9-29.7
  - See FOUNDATION DETAIL

- **PLATE WASHER**
  - (Chamfered)

- **Transport Roadway**

- **Install grout pad after plumbing standard**
  - 3/4" Chamfer

- **RAMP METER DETAIL**
  - Secure 5c cable with cable ties. See Std. Plan J-1e.

- **RAMP METER DETAIL**
  - Short, slipfitter, welds, and handhole are the same as shown for Type 1 Standards.
STRAIN POLE STANDARDS
TYPE IV AND V

STRAIN POLE DIMENSION CHART

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<tr>
<th>ITEM</th>
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NOTES
1. 2 1/2" 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.
1. All of the loop lead-in wires shall return to the Junction Box.

2. For splice detail, see Standard Plan J-8d.

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.
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1. All of the loop lead-in wires shall return to the Junction Box.

2. For Splice Detail, see Standard Plan J-8d.

TRAFFIC FLOW

1. 2 3

S1  S2  F1  S3  F3
S = START
F = FINISH

STOP LINE

1. 2 3

S1  F1  S2  F2
S = START
F = FINISH

TYPE 3 INDUCTION LOOP

TYPE 3A STOP LINE LOOP WIRING DIAGRAM

TYPE 3 ADVANCE LOOP WIRING DIAGRAM

TYPE 3 SAMPLING LOOP WIRING DIAGRAM

DRAWN BY: MONIQUE GLICK

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES MAY 5, 2005

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1. Fill the conduit trench to the top of the existing or new surfacing with CSTC, sand or controlled density fill. See "Standard Specifications" Section 2-09.3(1E).
2. Minor Regional variation is allowed in the soft pocket closure. Consult with the Engineer or see the Contract for additional requirements.
3. Conductors shall be snug to the bottom of the sawcut. High temperature backer rod shall be snug to the conductors.
1. Install the Junction Box and the lead-in conduit.
2. Sawcut the loop slots and the lead-in slots.
3. Lay out the loops wire starting at the Junction Box, allowing 5' minimum slack.
4. Install the wire in the loop slots as shown.
5. Finish laying out the wires at the Junction Box and identify the leads with the loop number, the "S" for start and the "F" for finish, and the loop series number.
6. Twist each pair of the insulated two times per foot from the loop to the Junction Box. Reverse the direction of the twist for each successive pair installed.
7. Construct a supplemental splice containing any series loop connections required in the plans. Supplemental splices are subject to the same requirements shown for the loop lead and the shielded cable splice.
8. Splice the loop leads of supplemental splice leads to the shielded cable as noted in the Contract.
9. Complete installation and test loop circuits or combination loop circuits. See Standard Specifications 8-20.3(14)D.
10. Consult for the loop stubout shall be as required in the Contract.
1. If parallel circuits of different sizes are contained in one conduit, the size of the grounding conductor shall be determined on the basis of the largest conductor. Only one grounding conductor is required for each conduit regardless of the number of circuits contained.

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

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

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

5. Required at all services and separately derived systems.
NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. The lid thicknesses are minimum. The diamond pattern shall be 25% minimum of overall thickness.

3. Lid support members shall be 3/16" minimum thick steel C, L, or T shape, welded to the frame.

4. A 1/4"-20NC × 3/4" S.S. ground stud shall be welded to the bottom of the lid; include S.S. nut and flat washer.

5. Bolts and nuts shall be liberally coated with anti-seize compound.

6. Connect a bonding jumper to steel conduit bushing for GRS conduit; connect to equipment grounding conductor for PVC conduit. Bonding Jumper shall be 83 min. 4 of tinned braided copper.

7. The system identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See system identification detail.

8. The Junction Box Type 2 shall be provided with a 12" deep extension when specified in the contract.

9. See the standard specifications for alternative reinforcement and class of concrete.

1/4-20NC × 3/4" S.S. ground stud shall be welded to the bottom of the lid; include S.S. nut and flat washer. Grind off diamond pattern before forming letters. See system identification detail.

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JUNCTION BOX DIMENSION TABLE

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<thead>
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<th>MARK</th>
<th>ITEM</th>
<th>BOX TYPE</th>
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<tbody>
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</tr>
<tr>
<td>B</td>
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<td>C</td>
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<td>INSIDE WIDTH OF JUNCTION BOX</td>
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<td>LID HOOK WIDTH</td>
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<td>C</td>
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<tr>
<td>D</td>
<td>LID SUPPORT</td>
<td>SEE NOTE 3</td>
</tr>
<tr>
<td>E</td>
<td>LID SUPPORT</td>
<td>SEE NOTE 3</td>
</tr>
<tr>
<td>F</td>
<td>LID SUPPORT</td>
<td>SEE NOTE 3</td>
</tr>
</tbody>
</table>

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. The lid thicknesses are minimum. The diamond pattern shall be 25% minimum of overall thickness.

3. Lid support members shall be 3/16" minimum thick steel C, L, or T shape, welded to the frame.

4. A 1/4"-20NC × 3/4" S.S. ground stud shall be welded to the bottom of the lid; include S.S. nut and flat washer.

5. Bolts and nuts shall be liberally coated with anti-seize compound.

6. Connect a bonding jumper to steel conduit bushing for GRS conduit; connect to equipment grounding conductor for PVC conduit. Bonding Jumper shall be 83 min. 4 of tinned braided copper.

7. The system identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See system identification detail.

8. The Junction Box Type 2 shall be provided with a 12" deep extension when specified in the contract.

9. See the standard specifications for alternative reinforcement and class of concrete.

1/4-20NC × 3/4" S.S. ground stud shall be welded to the bottom of the lid; include S.S. nut and flat washer. Grind off diamond pattern before forming letters. See system identification detail.

The system identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See system identification detail.

The Junction Box Type 2 shall be provided with a 12" deep extension when specified in the contract.

See the standard specifications for alternative reinforcement and class of concrete.

JUNCTION BOX DIMENSION TABLE

<table>
<thead>
<tr>
<th>MARK</th>
<th>ITEM</th>
<th>BOX TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>OUTSIDE LENGTH OF JUNCTION BOX</td>
<td>33&quot;</td>
</tr>
<tr>
<td>B</td>
<td>OUTSIDE WIDTH OF JUNCTION BOX</td>
<td>22 1/2&quot;</td>
</tr>
<tr>
<td>C</td>
<td>INSIDE LENGTH OF JUNCTION BOX</td>
<td>28 5/8&quot;</td>
</tr>
<tr>
<td>D</td>
<td>INSIDE WIDTH OF JUNCTION BOX</td>
<td>19 1/8&quot;</td>
</tr>
<tr>
<td>E</td>
<td>LID LENGTH</td>
<td>17 5/8&quot;</td>
</tr>
<tr>
<td>F</td>
<td>LID WIDTH</td>
<td>12 5/8&quot;</td>
</tr>
<tr>
<td>C</td>
<td>LID HOOK LENGTH</td>
<td>1&quot;</td>
</tr>
<tr>
<td>D</td>
<td>LID HOOK WIDTH</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>E</td>
<td>LID CAPACITY ~ CONDUIT DIAMETER</td>
<td>4&quot;</td>
</tr>
<tr>
<td>F</td>
<td>LID HOOP DIA.</td>
<td>1&quot;</td>
</tr>
<tr>
<td>B</td>
<td>LID SUPPORT</td>
<td>SEE NOTE 3</td>
</tr>
<tr>
<td>C</td>
<td>LID SUPPORT</td>
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1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. The lid thicknesses are minimum. The diamond pattern shall be 25% minimum of overall thickness.

3. Lid support members shall be 3/16" minimum thick steel C, L, or T shape, welded to the frame.

4. A 1/4"-20NC × 3/4" S.S. ground stud shall be welded to the bottom of the lid; include S.S. nut and flat washer.

5. Bolts and nuts shall be liberally coated with anti-seize compound.

6. Connect a bonding jumper to steel conduit bushing for GRS conduit; connect to equipment grounding conductor for PVC conduit. Bonding Jumper shall be 83 min. 4 of tinned braided copper.

7. The system identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See system identification detail.

8. The Junction Box Type 2 shall be provided with a 12" deep extension when specified in the contract.

9. See the standard specifications for alternative reinforcement and class of concrete.
NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. All lid thicknesses are minimum. The diamond pattern shall be 3/32" minimum thick.

3. Lid edges shall be location on frame. Max to bearing seat and perimeter bar for full even contact after shipment of frame and lid. Lid and frame units with uneven bearing will be rejected.

4. The installed box and frame shall fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation on the contact surfaces.

5. The hinges shall allow the lid to open 180°.

6. A 1/4-20NC × 3/4" S.S. ground stud shall be welded to the bottom of each lid; include S.S. nut and flat washer.

7. Bolts and nuts shall be liberally coated with anti-seize compound.

8. Connect a bonding jumper to steel conduit bushing for GRS conduit, connect to equipment grounding conductor for PVC conduit. As an alternative, the bonding jumper shall be attached to the front face of the hinge pocket with a 5/16-20NC × 3/4" bolt, S.S. nut, and flat washer. Bonding Jumper shall be 68 min. × 4" of tinned braided copper.

9. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See System Identification Detail.

10. A 1/4 tolerance is allowed for all dimensions.

11. See the Standard Specifications for class of concrete.

12. See the standard specifications for the class of concrete.
NOTES

1. Junction boxes type 7 and type 8 are identical except for the addition of locking bolts on the type 8.
2. All box dimensions are approximate. Exact configurations vary among manufacturers.
3. All lid thicknesses are minimum. The diamond pattern shall be 3/32" minimum thick.
4. Lid support members shall be 3/16" min. thick steel C, L, or T shape, welded to the frame. Exact configurations vary among manufacturers.
5. A 1/4-20NC × 3/4" S.S. ground stud shall be welded to the bottom of each lid; include 8-32, nut and flat washer.
6. The hinges shall allow the lids to open 180°.
7. Bolts and nuts shall be liberally coated with anti-seize compound.
8. Connect an equipment bonding jumper to steel conduit bushing for GRS conduit; connect to equipment grounding conductor for PVC conduit. As an alternative to the ground stud connection, the equipment bonding jumper shall be attached to the front face of the hinge pocket with a 5/16-18 NC × 3/4" S.S. bolt, nut, and flat washer.
   Equipment Bonding Jumper shall be #8 min. × 4' of tinned braided copper.
9. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See System Identification Detail.
10. See the Standard Specifications for alternative reinforcement and class of concrete.
11. Capacity – conduit diameter = 24"
SYSTEM IDENTIFICATION DETAILS

MTS
INTELLIGENT TRANSPORTATION SYSTEM

COMM
COMMUNICATION SYSTEM

LT
LIGHTING SYSTEM

TS
TRAFFIC SIGNAL SYSTEM

TEL
TELEPHONE SYSTEM

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TO CONDUIT RUN ALONG ROADWAY 5' - 0" MAX.

SIGN PANEL POST-MOUNTED (NEMA 3) J-BOX

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER
Washington State Department of Transportation

SIGN POST-MOUNTED JUNCTION BOX
STANDARD PLAN J-12

DETAIL VIEW

METALLIC FLEX CONDUIT CONDUIT BODY OR FLASHER CABINET (SEE CONTRACT)

BREAKAWAY SIGN SUPPORT HINGE (TYP.)

STEEL CONDUIT ENTRANCE INTO CONCRETE FOUNDATION

CONDUIT BODY SHOWN

CONDUIT CLAMP SUPPORT (GLOTTED STEEL CHANNEL BRACKET AND STAINLESS STEEL STRAPS) (TYP.)

STEEL SIGN SUPPORT

CONDUIT CLAMP (TYP.)

CONDUIT CLAMPS

CONDUIT CLAMP SUPPORT (SLOTTED STEEL CHANNEL BRACKET AND STAINLESS STEEL STRAP) (TYP.)

CONCRETE FOUNDATION

STEEL STRAP

SLOTTED STEEL CHANNEL BRACKET (TYP.)

1" STEEL CONDUIT

STEEL CONDUIT COUPLING ~ INSTALL FLUSH WITH TOP OF FOUNDATION

STEEL CONDUIT CLAMPING ~ INSTALL FLUSH WITH TOP OF FOUNDATION

ANCHOR FERRULE (TYP.) (STD. PLAN G-8a)

BREAKAWAY SIGN BASE ~ SEE NOTE 1

BREAKAWAY SIGN SUPPORT (SLOTTED STEEL CHANNEL BRACKET AND STAINLESS STEEL STRAP) (TYP.)

SHEET 2 OF 2 SHEETS

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1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder. Use a 12" thick lid for new pull box installation, otherwise see Contract Plans for overlay depth to match the lid thickness.

2. The diamond pattern shall be 3/32" minimum thick.

3. A 1/4-20NC × 3/4" S.S. ground stud with S.S. nut and flat washer shall be attached to the lid and coated with anti-seize compound.

4. Connect a bonding jumper to steel conduit bushings for GRS conduit; connect to equipment grounding conductor and also to the ground rod for PVC conduit. The Bonding Jumper shall be 5/16" × 4' of tinned braided copper.

5. The System Identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a weld bead. See SYSTEM IDENTIFICATION DETAIL, Standard Plan J-11a.

6. Concrete shall be Class 4000.

7. Plastic plugs shall be put into lid inserts after fabrication and after lid installation.

Plastic plugs shall be put into lid inserts after fabrication and after lid installation.
COIL THE CABLE BY USING A "FIGURE 8" FOLDED IN THE MIDDLE TO MAKE A LOOP

HEAVY DUTY LID

GROUND STUD = THREAD INTO PREDRILLED HOLE, SEE NOTE 0

LOCATION WIRE = PROVIDE 5'-6" CHAIN LOOP AROUND CHANNEL SECTION

PIPE HANGER

CABLE BUFFER ~ CORRUGATED PVC PIPE, 6" DIAM., 1'-0" LONG, SPLIT

KNOCKOUT (TYP.)

FIELD VERIFY

CABLE RACKING SCHEME

FIELD VERIFY

HEX HEAD BOLT 1/2-13NC × 15/16"

HEX BOLT 3/8-16NC × 12"

CHANNEL NUT WITH SPRING

PIPE HANGER

CABLE BUFFER ~ CORRUGATED PVC PIPE, 6" DIAM., 1'-0" LONG, SPLIT

PULL BOX

LOCATION WIRE = PROVIDE 5'-6" CHAIN LOOP AROUND CHANNEL SECTION

HEAVY DUTY LID

GROUND STUD = THREAD INTO PREDRILLED HOLE, SEE NOTE 0

FIELD VERIFY

CABLE RACKING SCHEME

FIELD VERIFY

HEX HEAD BOLT 1/2-13NC × 15/16"

HEX BOLT 3/8-16NC × 12"

CHANNEL NUT WITH SPRING

PIPE HANGER

CABLE BUFFER ~ CORRUGATED PVC PIPE, 6" DIAM., 1'-0" LONG, SPLIT

PULL BOX

LOCATION WIRE = PROVIDE 5'-6" CHAIN LOOP AROUND CHANNEL SECTION

HEAVY DUTY LID

GROUND STUD = THREAD INTO PREDRILLED HOLE, SEE NOTE 0

FIELD VERIFY

CABLE RACKING SCHEME

FIELD VERIFY

HEX HEAD BOLT 1/2-13NC × 15/16"

HEX BOLT 3/8-16NC × 12"

CHANNEL NUT WITH SPRING

PIPE HANGER

CABLE BUFFER ~ CORRUGATED PVC PIPE, 6" DIAM., 1'-0" LONG, SPLIT

PULL BOX

LOCATION WIRE = PROVIDE 5'-6" CHAIN LOOP AROUND CHANNEL SECTION

HEAVY DUTY LID

GROUND STUD = THREAD INTO PREDRILLED HOLE, SEE NOTE 0

FIELD VERIFY

CABLE RACKING SCHEME

FIELD VERIFY

HEX HEAD BOLT 1/2-13NC × 15/16"

HEX BOLT 3/8-16NC × 12"

CHANNEL NUT WITH SPRING

PIPE HANGER

CABLE BUFFER ~ CORRUGATED PVC PIPE, 6" DIAM., 1'-0" LONG, SPLIT

PULL BOX

LOCATION WIRE = PROVIDE 5'-6" CHAIN LOOP AROUND CHANNEL SECTION

HEAVY DUTY LID

GROUND STUD = THREAD INTO PREDRILLED HOLE, SEE NOTE 0

FIELD VERIFY

CABLE RACKING SCHEME

FIELD VERIFY

HEX HEAD BOLT 1/2-13NC × 15/16"

HEX BOLT 3/8-16NC × 12"

CHANNEL NUT WITH SPRING

PIPE HANGER

CABLE BUFFER ~ CORRUGATED PVC PIPE, 6" DIAM., 1'-0" LONG, SPLIT

PULL BOX

LOCATION WIRE = PROVIDE 5'-6" CHAIN LOOP AROUND CHANNEL SECTION

HEAVY DUTY LID

GROUND STUD = THREAD INTO PREDRILLED HOLE, SEE NOTE 0

FIELD VERIFY

CABLE RACKING SCHEME

FIELD VERIFY

HEX HEAD BOLT 1/2-13NC × 15/16"

HEX BOLT 3/8-16NC × 12"

CHANNEL NUT WITH SPRING

PIPE HANGER

CABLE BUFFER ~ CORRUGATED PVC PIPE, 6" DIAM., 1'-0" LONG, SPLIT
1. The heavy duty lid shall be used when a cable vault is placed in the paved shoulder. Use a 9" thick lid for the new cable vault installation, otherwise see Contract Plans for overlay depth to match the lid thickness.

2. The diamond pattern shall be 3/32" minimum thick.

3. A 1/4-20NC × 3/4" S.S. ground stud with S.S. nut and flat washer shall be attached to the lid and coated with anti-seize compound.

4. Connect a bonding jumper to steel conduit bushings for GRS conduit; connect to equipment grounding conductor and also to the ground rod for PVC conduit. The Bonding Jumper shall be #8 min. × 4' of tinned braided copper.

5. The System Identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a weld bead. See SYSTEM IDENTIFICATION DETAIL, Standard Plan J-11a.

6. Concrete shall be Class 4000.

7. Plastic plugs shall be put into lid inserts after fabrication and after lid installation.
1. The Junction Box shall be of type 304 stainless steel, welded seam construction: #12 gage backbox with #2B finish, #12 gage cover with #4 finish, and #12 gage mounting tabs.

2. All conduit connections to the Junction Box shall be concrete-tight (wet concrete shall not infiltrate during pour). Field drill or punch the holes in the center of the box end, unless adding additional conduit. (See SECTION "B")

3. Use concrete-tight fittings on the outside of the junction box conduit connection. Use an insulated, grounded bushing on the inside for GRS conduit. Use an end bell bushing on the inside for PVC conduit.

4. The System Identification letters shall be 1/16" line thickness formed by engraving, stamping, or with a S.S. weld bead. See Detail.

5. Liberally coat the threads of the cover fasteners with anti-seize compound during construction & before final closure.

6. Details shown for box installation in stationary forms.

7. The System Identification letters shall be 1/16" line thickness formed by engraving, stamping, or with a S.S. weld bead. See Detail.
Conduit installation in retaining wall traffic barrier

**Standard Plan J-16b**

- **Junction Box (Typ.):** Shown for dual conduit installation - Circuit types may vary.

- **Expansion Joint (Typ.):** Shown for dual conduit installation. Circuit types may vary.

- **Conduit Pipe:** 2" Steel conduit pipe or as shown in contract plans.

- **Ground Line:** Shown for dual conduit installation.

- **Junction Box (Type 1):** ~ See Std. Plan J-11a

- **Junction Box (Type 2):** ~ See Std. Plan J-16a

**Key Notes:**

1. Conduit fitting with internal bonding jumper - Type DX for deflection of 30° and 3/4" movement.
2. Where conduit exits from a structure, wrap conduit pipe for 1'-0" on each side from the exiting point. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with a minimum of 1" overlap.
3. 1'-0" long, 3/4" thick expanded polystyrene foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.
4. Where conduit in a structure is routed across a joint, wrap steel conduit pipe for 1'-0" on each side of joint. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with a minimum of 1" overlap.

**Design and Approval:**

- **Drawn by:** Elena Brunstein
- **Approved for publication:** May 5, 2007
- **State Design Engineer:** Harold J. Petersen 09-02-05
NOTES:

1. The Traffic Data Collection Loop spacing shall be 16'-0" from leading edge to leading edge. The loops shall be centered inside lanes without an adjacent shoulder; the loops in lanes adjacent to shoulders, including the median shoulder, shall be located 1'-8" from the edge of lane, see Detail "A".

2. Type 2 Advanced Induction Loops may also be used, see Standard Plan J-8b.

3. The loops and axle sensors shall be cut in the final lift of asphalt.

4. For concrete pavement lanes with asphalt shoulders, install all of the Piezo sensor and splice in the concrete lane. Also for concrete pavement lanes install the loops 4" to 6" away from the expansion joints.

5. The shoulder notch length along the roadway shall be 4" of the conduit size plus 2", whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

6. After all the wire leads are installed, seal the end of the conduit with Conduit Sealant. See the Special Provisions in the contract for the material used to fill the notch in the shoulder, or use an asphalt cold-patch.

7. Use Schedule 40 PVC conduit from the junction box to the cabinet. When there are four or more total lanes, use one conduit for each direction of travel. For conduit installation, see Standard Specification 8-20.

8. Use Schedule 80 PVC, HDPE, or Steel Conduit under the roadway. For conduit installation, see Standard Specification 8-20.

9. An inspector from the Traffic Data Office (TDO) shall be on site during all phases of the Traffic Recorder installation. The Contractor shall alert the Engineer 10 days prior to the beginning of any installation activity.

TYPICAL 7 LANE FREEWAY WITH MEDIAN

Lane 1 - (drive lane) ~ Loop L1, Piezo P1, Loop L2
Lane 2 - (drive lane) ~ Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) ~ Loop L5, Piezo P3, Loop L6
Lane 4 - (pass lane) ~ Loop L7, Piezo P4, Loop L8
Lane 5 - (drive lane) ~ Loop L1, Piezo P1, Loop L2
Lane 6 - (drive lane) ~ Loop L3, Piezo P2, Loop L4
Lane 7 - (pass lane) ~ Loop L5, Piezo P3, Loop L6
1. The Traffic Data Collection Loops shall be centered inside lanes without an adjacent shoulder; the loops in lanes adjacent to shoulders, including the median shoulder, shall be located 12" from the edge of lane, see Detail "A".

2. Type 3 Advanced Induction Loops may also be used, see Standard Plan J-8b.

3. The loops and axle sensors shall be set in the final lift of asphalt.

4. For concrete pavement lanes with asphalt shoulders, install all of the Piezo sensors and splice in the concrete lane. Also for concrete pavement lanes install the loops 4" to 8" away from the expansion joints.

5. The shoulder notch length along the roadway shall be 4" or the conduit size plus 2", whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

6. After all the wire leads are installed, seal the end of the conduit with a sealant. See the Special Provisions in the contract for the material used to fill the notch in the shoulder, or use an asphalt cold-patch.

7. Use Schedule 40 PVC conduit from the junction box to the cabinet. When there are four or more total lanes, use one conduit for each direction of travel. See Standard Specification 8-20 for conduit installation.

8. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. See Standard Specification 8-20 for conduit installation.

9. An inspector from the Traffic Data Office (TDO) shall be on site during all phases of the Traffic Recorder installation. The Contractor shall alert the Engineer 10 days prior to the beginning of any installation activity.


MEDIAN
SEE NOTE 8

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These are general installation instructions. See specific manufacturer's installation instructions in the Special Provisions of the Contract.

1. Using pavement crayons, paint, tape measure and cord, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the passive cable length is enough to reach the cabinet. DO NOT SPLICe CABLE. Leave a 4' minimum cable length inside of the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" diamond blade, wet-cut the slot for the sensor. The slot must be 3/4" wide, +/- 1/16", by 1" minimum deep. Cut the slot 8" longer than the sensor length, (including the lead attachment).

3. Cut home run slots for Piezo sensors. Center the home run slot on the sensor slot. Cut the home run slots 2" minimum to 2 1/2" maximum deep and 1/4" minimum wide. Cut the slots wider if installing conduit.

4. Using a power washer with water, remove and collect all the slurry and loose material from the slots. Sweep the slots with a stiff wire bristled brush. Dry all of the slots with a large capacity air compressor (150 CFM minimum). All of the slots and the pavement 1' on either side must be completely dry.

Using pavement crayons, paint, tape measure and cord, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the passive cable length is enough to reach the cabinet. DO NOT SPLICe CABLE. Leave a 4' minimum cable length inside of the cabinet.

Using a wet-cutting pavement saw with a 3/4" diamond blade, wet-cut the slot for the sensor. The slot must be 3/4" wide, +/- 1/16", by 1" minimum deep. Cut the slot 8" longer than the sensor length, (including the lead attachment).

Cut home run slots for Piezo sensors. Center the home run slot on the sensor slot. Cut the home run slots 2" minimum to 2 1/2" maximum deep and 1/4" minimum wide. Cut the slots wider if installing conduit.

Using a power washer with water, remove and collect all the slurry and loose material from the slots. Sweep the slots with a stiff wire bristled brush. Dry all of the slots with a large capacity air compressor (150 CFM minimum). All of the slots and the pavement 1' on either side must be completely dry.
**PERMANENT TRAFFIC RECORDER AND WEIGHT-IN-MOTION DETAILS**

**STANDARD PLAN J-20**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**APPROVED FOR PUBLICATION**

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The Loop and Piezo leads in all Junction Boxes and Cabinets are to be color-coded. Use colored tapes on each specific wire, see table. Wrap the tapes on the wires approximately 6" beyond conduit in all Junction Boxes.

2. The maximum load in the Cabinet is 5 Amps.

3. The Cabinet may be pedestal or pad mount, see Standard Plan J-6c for details.


7. See Special Provisions in the contract for splice kit enclosure.


9. Permanent Traffic Recorder and Weigh-in-Motion Details

10. Harold J. Peterfeso

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NOTES
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.

5. Coordinate with emergency services.

6. For signs 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

SIGN SPACING = X [1]

RURAL ROADS  45 / 55 MPH  250'  35/64  (2)
RURAL ROADS & URBAN ARTERIALS  35 / 40 MPH  100'  35/64  (2)
RESIDENTIAL & BUSINESS DISTRICTS  25 / 30 MPH  100'  35/64  (2)
URBAN STREETS  25 MPH OR LESS  100'  35/64

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

1. Road Closure

2. Detour

3. Two Flashing Warning Lights

4. Main Street

5. North

6. South

7. Barricade ~ Type 3 R

8. Barricade ~ Type 3 L

9. For local agency use only

10. Not for use on state routes

11. Expires August 9, 2007

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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.
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 size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

(a) All sign spacing may be adjusted to accommodate interchanges, ramps, at-grade intersections, and driveways.

(b) This sign spacing may be reduced in urban areas to fit roadway conditions.

NOTES:

1. Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.

2. Extend Channelizing Device taper across shoulder ~ recommended.

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5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

(a) All sign spacing may be adjusted to accommodate interchanges, ramps, at-grade intersections, and driveways.

(b) This sign spacing may be reduced in urban areas to fit roadway conditions.

FOR LOCAL AGENCY USE ONLY

NOT FOR USE ON STATE ROUTES

SIGN LOCATION

CHANNELIZING DEVICES

LEGEND

FLAGGING STATION

SIGN LOCATION

CHANNELIZING DEVICES

PROTECTIVE VEHICLE ~ RECOMMENDED

LONGITUDINAL BUFFER SPACE = B

TYPICAL PROTECTIVE VEHICLE WITH TMA (See Note 1)

VEHICLE TYPE

LOWED WEIGHT

MINIMUM WEIGHT 15,000 LB. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN. (DRY PAVEMENT ASSUMED)

SIGN SPACING = X (1)

(1) All sign spacing may be adjusted to accommodate interchanges, ramps, at-grade intersections, and driveways.

(2) This sign spacing may be reduced in urban areas to fit roadway conditions.

THEO OF WORK

SIGN LOCATION

CHANNELIZING DEVICES

LEGEND

FLAGGING STATION

SIGN LOCATION

CHANNELIZING DEVICES

PROTECTIVE VEHICLE ~ RECOMMENDED

LONGITUDINAL BUFFER SPACE = B

TYPICAL PROTECTIVE VEHICLE WITH TMA (See Note 1)

VEHICLE TYPE

LOWED WEIGHT

MINIMUM WEIGHT 15,000 LB. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN. (DRY PAVEMENT ASSUMED)

SIGN SPACING = X (1)

(1) All sign spacing may be adjusted to accommodate interchanges, ramps, at-grade intersections, and driveways.

(2) This sign spacing may be reduced in urban areas to fit roadway conditions.

THEO OF WORK

SIGN LOCATION

CHANNELIZING DEVICES

LEGEND

FLAGGING STATION

SIGN LOCATION

CHANNELIZING DEVICES

PROTECTIVE VEHICLE ~ RECOMMENDED

LONGITUDINAL BUFFER SPACE = B

TYPICAL PROTECTIVE VEHICLE WITH TMA (See Note 1)

VEHICLE TYPE

LOWED WEIGHT

MINIMUM WEIGHT 15,000 LB. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN. (DRY PAVEMENT ASSUMED)

SIGN SPACING = X (1)

(1) All sign spacing may be adjusted to accommodate interchanges, ramps, at-grade intersections, and driveways.

(2) This sign spacing may be reduced in urban areas to fit roadway conditions.

THEO OF WORK

SIGN LOCATION

CHANNELIZING DEVICES

LEGEND

FLAGGING STATION

SIGN LOCATION

CHANNELIZING DEVICES

PROTECTIVE VEHICLE ~ RECOMMENDED

LONGITUDINAL BUFFER SPACE = B

TYPICAL PROTECTIVE VEHICLE WITH TMA (See Note 1)

VEHICLE TYPE

LOWED WEIGHT

MINIMUM WEIGHT 15,000 LB. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN. (DRY PAVEMENT ASSUMED)

SIGN SPACING = X (1)

(1) All sign spacing may be adjusted to accommodate interchanges, ramps, at-grade intersections, and driveways.

(2) This sign spacing may be reduced in urban areas to fit roadway conditions.

THEO OF WORK

SIGN LOCATION

CHANNELIZING DEVICES

LEGEND

FLAGGING STATION

SIGN LOCATION

CHANNELIZING DEVICES

PROTECTIVE VEHICLE ~ RECOMMENDED
Channelizing Devices are recommended along centerlines 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 M65-06.

**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. Existing conflicting pavement markings that are no longer applicable shall be removed or collimated. Temporary markings shall be used as necessary, and signs shall be posted mounted for long term projects.

3. Steady-Burn Warning Lights (Type C, MUTCD) shall be used in lieu of Channelizing Devices at night.

4. For speed limits of 30 mph or less, sign W1-3 shall be used instead of W1-4.

5. Island 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 ft.


---

**LONGITUDINAL BUFFER SPACE = B**

**MINIMUM TAPER LENGTH = L FEET**

**CHANNELIZING DEVICE SPACING**

**SIGN SPACING = X (1)**

**NOT FOR USE ON STATE ROUTES**

---

**FOR LOCAL AGENCY USE ONLY**

---

**LANE SHEET ONTO PASSING LANE**

---

**STANDARD PLAN K-32.20-00**

---

**APPROVED FOR PUBLICATION**

---

**STATE DESIGN ENGINEER**

---

**DRAWN BY: ELENA BRUNSTEIN**

---

**DATE EXPRESSES AUGUST 9, 2007**

---

**EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008**
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.
### ROAD WORK

**Area**
- Two lanes closed ahead

**Blade 2L**

**L**

**Road Work Ahead**

**W20-5O1**

**PCMS**

**Min. Weight 15,000 LBS.**
*(Max. weight shall be in accordance with manufacturer recommendation)*

**Legend**
- **Blade**
- **Two lanes closed ahead**
- **Protective vehicle recommended**
- **Portable Changeable Message Sign**
- **Arrow panel**

**Minimum Taper Length** = **L** *(feet)*

<table>
<thead>
<tr>
<th>LANE WIDTH <em>(FEET)</em></th>
<th>POSTED SPEED <em>(MPH)</em></th>
<th>M/kg</th>
<th>X*(feet)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>35 / 40</td>
<td>326</td>
<td>294</td>
</tr>
<tr>
<td>11</td>
<td>40 / 45</td>
<td>334</td>
<td>320</td>
</tr>
<tr>
<td>12</td>
<td>45 / 50</td>
<td>350</td>
<td>326</td>
</tr>
</tbody>
</table>

**Sign Spacing** = **X** *(1)*

<table>
<thead>
<tr>
<th>POSTED SPEED <em>(MPH)</em></th>
<th>RURAL HIGHWAYS</th>
<th>RURAL ROADS &amp; URBAN ARTERIALS</th>
<th>RURAL ROADS &amp; URBAN ARTERIALS, RESIDENTIAL &amp; BUSINESS DISTRICTS</th>
<th>CURVATURE AREA</th>
<th>URBAN STREETS</th>
<th>ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>60 / 65 MPH</td>
<td>900 + 35/64</td>
<td>350 + 35/64</td>
<td>25 MPH OR LESS</td>
<td>25 / 30 MPH</td>
<td>35/64</td>
</tr>
<tr>
<td>30</td>
<td>70 / 75 MPH</td>
<td>1000 + 35/64</td>
<td>400 + 35/64</td>
<td>30 / 50 MPH</td>
<td>35/64</td>
<td>35/64</td>
</tr>
<tr>
<td>35</td>
<td>80 / 85 MPH</td>
<td>1100 + 35/64</td>
<td>450 + 35/64</td>
<td>30 MPH OR LESS</td>
<td>35/64</td>
<td>35/64</td>
</tr>
</tbody>
</table>

**Minimum Weight**

- **Minimum Taper Length** = **L** *(feet)*
- **Rotated Stopping Distance** = **X** *(feet)*

**Buffer Data**
- **Typical Protective Vehicle with TMA** *(see note 1)*
- **Minimum Weight 15,000 LBS.** *(Max. weight shall be in accordance with manufacturer recommendation)*

**Channelizing Device Spacing**

<table>
<thead>
<tr>
<th>POSTED SPEED <em>(MPH)</em></th>
<th>BEHIND TAPER <em>(FEET)</em></th>
<th>IN TAPER <em>(FEET)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>60 / 70</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>40 / 45</td>
<td>30</td>
<td>80</td>
</tr>
</tbody>
</table>

**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. Devices shall not encroach into adjacent lanes.
3. Extend device taper (L/3) across shoulder ~ recommended.
4. Portable Changeable Message Sign (PCMS) ~ recommended.
5. Traffic Safety Drums in closed lane every 1000' ± ~ recommended.
6. Traffic Safety Drums for all tapers on high speed roadway ~ recommended.
7. Channelizing Device spacing for the downstream taper option shall be 20 O.C.

**For Local Agency Use Only**
*NOT For Use On State Routes*

**Double Lane Closure**

**Standard Plan K-24.40-00**

**For engineering purposes only**

**Ken L. Smith**

**APPROVED FOR PUBLICATION**
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 Transverse Devices in closed lane every 1000' ~ recommended.

6. Traffic Safety Drums for all tapers on high speed roadway ~ recommended.

7. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

8. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

NOTES:

1. All sign spacing may be adjusted to accommodate interchange ramps, at-grade intersections, and driveways.

2. Sign spacing may be reduced in urban areas to fit roadway conditions.

3. Roll Ahead Stopping Distance = 30 Feet Min. (Dry Pavement Assumed)

4. In Taper = (L/3) Feet

5. PCMS Sample Message ~ ONE MILE AHEAD

6. ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

7.ypassed Speed = X (MPH)

8. Channelizing Device spacing for the downstream taper option shall be 20' O.C.


FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

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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. Extend device taper (L/3) across shoulder – recommended.

Portable Changeable Message Sign (PCMS) – recommended.

If the lane shift is short and has minimal radius curve (30mph or less) use sign W1-3 in lieu of sign W1-4.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
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.

Portable Changeable Message Sign (PCMS) ~ recommended.

Prohibit turns as necessary for traffic conditions.

For signs size refer to Manual on Uniform Traffic Control Device (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 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 movements, then the right lane may be restricted to right turn only, as shown. This procedure increases the throughput 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 sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

For local agency use only
NOT FOR USE ON STATE ROUTES

INTERSECTION ~ RIGHT LANE CLOSURE

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

STANDARD PLAN K-32.20-00

SIGN SPACING = X

CHANNELIZING DEVICE SPACING

POSTED SPEED (MPH) IN TAPER IN TAPER IN TAPER IN TAPER

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>25</th>
<th>30</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
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<tbody>
<tr>
<td>6</td>
<td>10</td>
<td>15</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>18</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (FEET) POSTED SPEED (MPH) MINIMUM TAPER LENGTH

<table>
<thead>
<tr>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

LEGEND

H Sign Location
D Channelizing Device
B Barricade ~ Type 3 L
< Avary Panel
NOTES
1. If the work area extends across a crosswalk, the crosswalk should be closed (see Standard Plan K-34-2B).
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 left lane having significant left-turning movements, then the left lane may be reopened as a turn lane 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.
**RURAL ROADS & URBAN ARTERIALS**

<table>
<thead>
<tr>
<th>速度限制（MPH）</th>
<th>MINIMUM TAPER LENGTH = L (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/30</td>
<td>100'  35/64</td>
</tr>
<tr>
<td>35/40</td>
<td>200'  35/64</td>
</tr>
<tr>
<td>45/55</td>
<td>300'  35/64</td>
</tr>
</tbody>
</table>

**URBAN STREETS**

<table>
<thead>
<tr>
<th>速度限制（MPH）</th>
<th>MINIMUM TAPER LENGTH = L (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/30</td>
<td>100'  35/64</td>
</tr>
<tr>
<td>35/40</td>
<td>200'  35/64</td>
</tr>
<tr>
<td>45/55</td>
<td>300'  35/64</td>
</tr>
</tbody>
</table>

**RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS**

<table>
<thead>
<tr>
<th>速度限制（MPH）</th>
<th>MINIMUM TAPER LENGTH = L (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/30</td>
<td>100'  35/64</td>
</tr>
<tr>
<td>35/40</td>
<td>200'  35/64</td>
</tr>
<tr>
<td>45/55</td>
<td>300'  35/64</td>
</tr>
</tbody>
</table>

**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 M55-0A.

**FOR LOCAL AGENCY USE ONLY NOT FOR USE ON STATE ROUTES**

**STANDARD PLAN K-33.60-00**
1. NO LEFT TURN signs are to be used if traffic volumes are too high or there is an opposing signal. Close the left turn pocket if there is one on the side street.

2. When turn prohibitions are implemented, two turn prohibition signs should be used, one on the near side and, space permitting, one on the far side of the intersection.

3. If the work space extends a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).

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.

7. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
1. When crosswalks or other pedestrian facilities are closed or relocated, 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.
### Notes

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available. If no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. For long term projects conflicting pavement markings that are no longer applicable shall be removed. Temporary markings shall be used as necessary and signs shall be post mounted.

3. The sign MOTORCYCLES USE EXTREME CAUTION may be used.

4. For signs refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

### Buffer Data

<table>
<thead>
<tr>
<th>Typical Protective Vehicle with TMA (See Note 1)</th>
<th>Minimum Tap Length = L (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle Type</strong></td>
<td><strong>Lane Width (Feet)</strong></td>
</tr>
<tr>
<td>4 Yard Dump Truck, Service Truck, Plow, etc.</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>

### Channelizing Device Spacing

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>In Taper</th>
<th>In Offset (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/40</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>30/45</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>35/50</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>40/55</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

### Sign Spacing

<table>
<thead>
<tr>
<th>X</th>
<th>(1)</th>
</tr>
</thead>
</table>

### Legend

- **SIGN LOCATION**
- **CHANNELIZING DEVICES**
- **PROTECTIVE VEHICLE ~ RECOMMENDED**

### Protective Vehicle

- A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available. If no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

### Road Work Ahead

- Roll Ahead Stopping Distance = 30 Feet Min. (Dry Pavement Assumed)

### Temporary Traffic Area

- Shoulder Work Area Protection
- Temporary Traffic Control Device
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 20' O.C.

3. No Encroachment on the traveled lane is permitted. If Encroachment is necessary, the lane shall be closed (see Standard Plan K-24.20).

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.

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SHEET 1 OF 1 SHEET

URBAN STREETS
25 MPH OR LESS

100'  35/64  (2)
200'  35/64  (2)

RURAL ROADS, URBAN ARTERIALS,
RESIDENTIAL & BUSINESS DISTRICTS

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER
Washington State Department of Transportation

SIGN LOCATION

CHANNELIZING DEVICES

PROTECTIVE VEHICLE ~ RECOMMENDED

LEGEND

60
30

POSTED SPEED (MPH)

IN TANGENT (FEET)

IN TAPER (FEET)

CHANNELIZING DEVICE SPACING

35 / 40 MPH

25 / 30 MPH

25 / 30

20

40

SIGN SPACING = X (1)

TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)

VEHICLE TYPE

LOADED WEIGHT

MINIMUM TAPER LENGTH = L (FEET)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN.
(DRY PAVEMENT ASSUMED)

LONGITUDINAL BUFFER SPACE = B

MINIMUM TAPER LENGTH = L (FEET)

SHOULDER WIDTH (FEET)

POSTED SPEED (MPH)

IN TAPER (FEET)

IN TAPER (FEET)

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. 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.

NOTE:

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.

SHOULDER CLOSURE ~ LOW SPEED ROADWAY (40 MPH OR LESS)
STANDARD PLAN K-40.40-60

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KNOW L. SMITH 05/15/07

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES
### Minimum Weight

Minimum weight 15,000 LBS. (Maximum weight shall be in accordance with manufacturer recommendations)

### Legend

- **W20-1** Road Work Ahead
- **W21-5** Stationary Operation
- **V20-1** Shoulder Work
- **V20-1** Road Work Ahead
- **TMA** Truck Mounted Attenuator
- **BEA** Warning Beacon

### Diagram Notes

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 5 miles.
2. In those situations where the distance between the advance sign and the work area is 2 to 5 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 sign sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
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-GRAGE INTERSECTIONS AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

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NOTES

1. Install these or other warning signs as needed for the specific hazard.

2. Portable Changeable Message Signs (PCMS) recommended. For
   one-lane two-way traffic situations (see Standard Plan K-20.40) for
   additional details.

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 M00-00.

INSTALL FOR EMERGENCY USE, AS NEEDED, ON PASSABLE ROADWAYS
WITH SPOT OR CONTINUOUS HAZARDS REQUIRING MINIMAL OR NO
SPECIFIC WARNING.

THIS SIGN IS NOT A REPLACEMENT FOR REQUIRED TRAFFIC CONTROL
MEASURES NEEDED AT MORE SUBSTANTIAL HAZARD LOCATIONS.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES
NOTES

1. Install additional Warning Signs based on site conditions and traffic characteristics. Use an appropriate Standard Plan for guidance.

2. Regulatory Speed Limit signs are not a substitute for Work Zone Warning signs. Speed Limit signs shall remain in place as long as the reduced speed condition applies.

3. Motorcycle Warning Signs are required as per Washington Administrative Code (WAC) 468-95-305.

4. Closing a road and restricting traffic shall conform to Revised Code of Washington (RCW) 47.48.

5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WashDOT Sign Fabrication Manual M55-05.

6. For Local Agency use only.

For Local Agency use only.

NOT FOR USE ON STATE ROUTES.

SPEED LIMIT XX
DO NOT PASS

CHIP SEAL PROJECT
FIELD LOCATE IN ADVANCE OF SIGNING

FROM AUG XX TO AUG XX

CHIP SEAL PROJECT FROM AUG XX TO AUG XX

CHIP SEAL PROJECT NEXT X MILES

PCMS SAMPLE MESSAGE

CHIP SEAL PROJECT

CHIP SEAL AREA

LEGEND

1. PORTABLE CHANGEABLE MESSAGE SIGN
2. CHANNELIZING DEVICES
3. PCMS

FOR LOCAL AGENCY USE ONLY

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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.

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SIGN SPACING = X (1)

RURAL HIGHWAYS
50 / 65 MPH  200' (2)  35/64
RURAL ROADS & URBAN ARTERIALS
35 / 40 MPH  200'  35/64  (2)
RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS
25 / 30 MPH  250'  35/64
URBAN STREETS
25 MPH OR LESS  140' (2)

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

WORK AREA

CHANNELIZING DEVICES

LEGEND

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>SIGN LOCATION</td>
</tr>
<tr>
<td>● ● ●</td>
<td>CHANNELIZING DEVICES</td>
</tr>
<tr>
<td>▪ ▪ ▪</td>
<td>ARROW PANEL</td>
</tr>
</tbody>
</table>

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.
1. For long term projects conflicting pavement markings that are no longer applicable shall be removed orobliterated. 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 of 5' O.C. to simulate a solid line.

6. Temporary Turn Arrow (TYP.) may be used on a pattern spacing of 6' O.C. to simulate a solid line.
For sign installation details, see Std. Plan G - series.

1. 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.

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.
NOTES

1. All fasteners may be zinc plated, galvanized or stainless steel. All
   steel angle and tubular steel shall be hot-rolled, high carbon steel,
   painted or galvanized.

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 ap-
   proved 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.

When sandbags are used in freezing weather, Urea fertilizer shall be
mixed with the sand in a quantity to prevent the sand from freezing.
AREA CLOSED TO TRAFFIC

USEABLE TRAFFIC LANE

ROAD CLOSURE AT INTERSECTION

ROAD CLOSURE AT OTHER LOCATIONS

MIN. 2' MIN.

TYPE 3L BARRICADE

TYPE 3R BARRICADE

DRAWN BY: LISA CYFORD

APPROVED FOR PUBLICATION

DATE

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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1. The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2' wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

2. The vertical dimensions for the side and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.

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 side and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.

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 side and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.
1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2' wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrower type barrier.

2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

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

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

**Temporary Conc. Barrier Anchoring**

**Temporary Installation of Precast Conc. Barrier Type 2 (STD. PLAN C-8) and Temporary Conc. Barrier (F-Shape) (STD. PLAN K-80.39) on Cement Conc. Pavement or Bridge Deck.**

**Type 1 Anchor**

**Type 2 Anchor**

**Type 3 Anchor**

**NOTES:**

1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2' wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrower type barrier.

2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

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

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

1. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.

2. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the anchors to the barrier and roadway surfaces.

4. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

5. Type 2 Anchor: Class 1 & 2

6. Type 2 Anchor: Class 1

7. Type 2 Anchor: Class 2
Wire Fence Type 1 and Wire Gates

Standard Plan L-10.10-00

 Sheets 1 of 2 Sheets

Wire Fence Types 1 & 2 and Wire Gates

Steel Posts and Braces

Corner Bracing

Intersection Bracing

Intermediate Bracing / Pull Post

End Post

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. Thrice 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. Wood anchors (for wood posts) shall be 2x4 lumber, 12' long minimum, and fastened with three 16d galvanized nails.

NOTES

Wood Anchors

4. Attach additional fasteners on posts which mark the angle point of any sudden change in topography.

5. Wood anchors (for wood posts) shall be 2x4 lumber, 12' long minimum, and fastened with three 16d galvanized nails.

Signed:

Ken L. Smith
02-21-07

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All concrete post bases shall be 10" minimum diameter.
Along the top and bottom, using Hog Rings, fasten the Chain Link Fence Fabric to the Tension Wire and Tension Cable within the limits of the first full fabric weave.
Details are illustrative and shall not limit hardware design or post selection of any particular fence type.

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>3 1/2 DIAL</td>
<td>Z</td>
<td>1.20</td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIAL</td>
<td>Y</td>
<td>0.10</td>
</tr>
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NOTES
1. All concrete post bases shall be 10" minimum diameter.
2. Along the top and bottom, using Hog Rings, fasten the Chain Link Fence Fabric to the Tension Wire and Tension Cable within the limits of the first full fabric weave.
3. Details are illustrative and shall not limit hardware design or post selection of any particular fence type.
CHAIN LINK GATE

STANDARD PLAN L-30.10-00

APPROVED FOR PUBLICATION

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008
NOTES

1. All glare screen posts shall be 1 5/8” × 2 1/4” Galvanized Steel H-Column.

2. Post Bolts shall be:
   - On Timber Posts: Hex head bolt 6/8-18 UNC × 8” with lock washer.
   - On Steel Posts: Hex head bolt 6/8-18 UNC × 2 1/2” with lock washer.
   Either with hex nut and washer, or eye nut and washer where shown in the plan.

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Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.
NOTES
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

WHERE SHOWN ON THE PLANS OR SPECIFIED IN THE SPECIAL PROVISIONS, RAISED PAVEMENT MARKERS SHALL BE USED FOR SUPPLEMENTING OR SUBSTITUTING THE PAINTED PAVEMENT MARKINGS SHOWN HEREON. SEE THE STANDARD PLANS FOR RPM SUPPLEMENT AND SUBSTITUTION PATTERNS.

THE CHANNELIZATION SHOWN ON THIS PLAN ASSUMES OPTIMAL ROADWAY GEOMETRIC DESIGN. THE DIMENSIONS MAY VARY TO FIT EXISTING CONDITIONS. SEE CONTRACT.

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NOTES

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1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown herein. See the Standard Plans for RPM supplement and substitution patterns.

2. When weaving section is more than 3/4 of a mile in length use lane line.

3. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**NOTES**

35 MPH
40 MPH
45 MPH
50 MPH
55 MPH
60 MPH
65 MPH

---

**TABLE**

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<td>637</td>
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<td>60</td>
<td>707</td>
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<tr>
<td>65</td>
<td>777</td>
</tr>
</tbody>
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**NOTES**

POSTED MAINLINE SPEED

**TABLE**

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<th>Distance (ft)</th>
<th>Width D (ft)</th>
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<tbody>
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<td>400</td>
<td>400</td>
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<tr>
<td>475</td>
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<td>550</td>
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<td>700</td>
<td>707</td>
</tr>
<tr>
<td>775</td>
<td>777</td>
</tr>
</tbody>
</table>

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DRAWN BY: ADAM COCHRAN

WEAVING SECTION

SINGLE LANE, PARALLEL TYPE ON-CONNECTION

DOUBLE LANE, PARALLEL TYPE ON-CONNECTION
1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' spacing is standard; however, for gore areas shorter than 150' use a 25' spacing, and for gore areas greater than 400' a spacing of 100' may be used.

2. The acute angle of the diagonals shall always point in the direction of mainline traffic.

**NOTES**

1. SEE NOTE 1

**GORE AREA MARKING LAYOUT**

- **WITH DIAGONALS**
- **WITH CHEVRONS**

**STANDARD PLAN M-3.20-01**

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION

Ken L. Smith 04-30-07

Washington State Department of Transportation

EXPIRES AUGUST 9, 2007
NOTES

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area.
   A 50' spacing is standard; however, for gore areas shorter than 150'
   use a 25' spacing, and for gore areas greater than 400' a spacing
   of 100' may be used.

2. The acute angle of the diagonals shall always point in the direction
   of mainline traffic.

3. See Note 1

GORE AREA MARKING LAYOUT
WITH CHEVRONS

- Yellow Edge Line
- Type 2Y Roadside Markers (80' Spacing)
- Type 2W Roadside Markers (Typ.)
- White Wide Line
- Chevron Marking (Typ.)
- Diagonal Marking (Typ.)

GORE AREA MARKING LAYOUT
WITH DIAGONALS

- Yellow Edge Line
- Type 2Y Roadside Markers (80' Spacing)
- Type 2W Roadside Markers (Typ.)
- White Wide Line
- Diagonal Marking (Typ.)

CONTINUE GORE MARKINGS
AT SAME SPACING TO END
OF GORE AREA ~ SEE NOTE 1
1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' spacing is standard; however, for gore areas shorter than 150' use a 25' spacing, and for gore areas greater than 400' a spacing of 100' may be used.

2. The acute angle of the diagonals shall always point in the direction of mainline traffic.

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LEFT TURN CHANNELIZATION
SYMMETRICAL WIDENING ABOUT CENTERLINE

LEFT TURN CHANNELIZATION
ASYMMETRICAL WIDENING LEFT OF CENTERLINE

LEFT TURN CHANNELIZATION
ASYMMETRICAL WIDENING RIGHT OF CENTERLINE

GENERAL NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

L = 12' Typical Lane Width. See Contract for specified lane widths.

LEGEND

Type 2L Traffic Arrow

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LEFT TURN CHANNELIZATION

REduced taper lengths - symmetrical widening
(for limited use in urban areas with posted speeds of 40 MPH or less)

**Legend**
- Type 2L Traffic Arrow

**General Notes**
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**Table:**

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>Approach Taper J</th>
<th>Dimension H</th>
<th>Approach Taper K</th>
<th>Dimension K</th>
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<tbody>
<tr>
<td>40 MPH</td>
<td>160'</td>
<td>27'</td>
<td>305'</td>
<td>87'</td>
</tr>
<tr>
<td>35 MPH</td>
<td>122'</td>
<td>33'</td>
<td>249'</td>
<td>41'</td>
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<td>30 MPH</td>
<td>95'</td>
<td>15'</td>
<td>186'</td>
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</tr>
<tr>
<td>25 MPH</td>
<td>67'</td>
<td>15'</td>
<td>106'</td>
<td>30'</td>
</tr>
<tr>
<td>20 MPH</td>
<td>40'</td>
<td>7'</td>
<td>53'</td>
<td>13'</td>
</tr>
</tbody>
</table>

**Dimensions:**
- Radius = respective H or K
- STOPPING POINT FOR LEFT TURN LANE
- NO PASS LINE (WHEN REQUIRED)
- WHITE EDGE LINE
- CENTER LINE
- APPROACH TAPER G
- APPROACH TAPER J
- APPROACH TAPER K

**Notes:**
- See Contract for length of storage lane.
- For use in urban areas with posted speeds of 40 MPH or less.
LEFT TURN CHANNELIZATION
TEE INTERSECTION

GENERAL NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

L = 12' Typical Lane Width. See Contract for specified lane widths.

LEGEND
Type 2L Traffic Arrow

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**Two-Way Left-Turn and Median Channelization**

**Standard Plan M-3.40-01**

**General Notes:**
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**Dimensions:***

- **Pointed Speed**: 60 MPH, 70 MPH, 80 MPH
- **Taper F**: 12'典型 Lane Width.
- **Dimension B**: 120'
- **Dimension E**: 90', 100', 110', 120'

**Legend:**
- **Type 2L Traffic Arrow**

**Notes:**
- **Design Engineer**: Washington State Department of Transportation
- **Drawn By**: Bill Berens

**Effective Dates:**
- **April 2, 2007 to January 6, 2008**

**Approved for Publication:**
- **Ken L. Smith, 01-30-07**

**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.
GENERAL NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The lane message "ONLY" may be added to the Traffic Arrow Type 2R locations shown, in which case, substitute the Arrow as per the LANE MESSAGE DETAIL.

L = 1/2' Typical Lane Width. See Contract for specified lane widths.

LEGEND

- Type 2R Traffic Arrow
- Type 3L Traffic Arrow

The lane message "ONLY" may be added to the Traffic Arrow Type 2R locations shown, in which case, substitute the Arrow as per the LANE MESSAGE DETAIL.

L = 1/2' Typical Lane Width. See Contract for specified lane widths.

LEGEND

- Type 2R Traffic Arrow
- Type 3L Traffic Arrow
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.

EXPIRES AUGUST 9, 2007
01-30-07 Ken L. Smith

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Bid Item "Bicycle Lane Symbol" includes Bike Lane Arrow and Bike Rider Symbol.  

2' x 6' White Bike Lane Arrow  
Bike Rider Symbol  

GRID IS 1" SQUARE  

TOTAL MARKING AREA  

MARKING AREA  

BIKE LANE ARROW DETAIL  

BIKE RIDER SYMBOL DETAIL  

MARKING AREA  

GRID IS 1" SQUARE  

TOTAL MARKING AREA  

MARKING AREA  

BIKE LANE ARROW DETAIL  

BIKE RIDER SYMBOL DETAIL  

MARKING AREA  

GRID IS 1" SQUARE  

TOTAL MARKING AREA  

MARKING AREA  

M-9.50-01  

STANDARD PLAN  

KEY NOTES  

1. Bid Item "Bicycle Lane Symbol" includes Bike Lane Arrow and Bike Rider Symbol.  
2. 2' x 6' White Bike Lane Arrow  
3. Bike Rider Symbol  

GENERAL NOTE  

See contract for location and material requirements.  

NOTES:   

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**GENERAL NOTE**

See contract for location and material requirements.

**KEY NOTES**

1. Bid item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" white transverse lines.
2. 24" white transverse line
3. W10-1 Advance Warning Sign (not included in RR Crossing Symbol Bid Item)
4. Place Stop Line 15' from the nearest rail or approximately 8 feet from RR gate, if present.

**GRID IS 1" SQUARE**

"R" DETAIL

**DIMENSIONS SHOWN ARE APPROXIMATE. SEE CONTRACT.**

**STOP LINE**

**DRAWN BY:** MARK SUJKA

**TOTAL MARKING AREA (PER 12' WIDE LANE) = 111.59 SQ.FT.**

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Ken L. Smith

01-30-07

**RAILROAD CROSSING LAYOUT**

**STANDARD SYMBOL**

**ALTERNATIVE SYMBOL**

**SHEET 1 OF 1 SHEET**

**EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**RAILROAD CROSSING**

**LAYOUT**

**SHEET 1 OF 1 SHEET**

**EFFECTIVE: APRIL 2, 2007 TO JANUARY 6, 2008**
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.
Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

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.

All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.

Refer to the Standard Plans for sidewalk ramp, detectable warning pattern, and curb details.
NOTE:
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 Center Line shall be 12" everywhere, except 4" for left turn channelization and narrow roadway with lane widths of 10 feet or less. Local Agencies (on non-State Routes) may specify a 4" distance for all locations.
4. The distance between the lines of the Double Lane Line shall be 4".
5. Wide Lane Line shall be white.
6. Wide Line shall be yellow or white as specified in the Plans.

Ken L. Smith  01-30-07
GENERAL NOTES:
See Standard Plan M-20.10 for pattern and color requirements.

PROFILED PLASTIC:
FOR:
CENTER LINE & LANE LINE - W = 4”
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE - W = 4”
REVERSIBLE LANE LINE - W = 4”
WIDE BROKEN LANE LINE - W = 4”

EMBOSSED PLASTIC:
FOR:
CENTER LINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE
REVERSIBLE LANE LINE
WIDE BROKEN LANE LINE
EDGE LINE & SOLID LANE LINE

PROFILED EMBOSSED PLASTIC:
FOR:
CENTER LINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE
REVERSIBLE LANE LINE
WIDE BROKEN LANE LINE
EDGE LINE & SOLID LANE LINE

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Raised Pavement Markers Types 2YY and 2W shall be spaced at 80' intervals on tangents and on horizontal curves with a radius of 5000' or more, and at 40' intervals on horizontal curves having radii of less than 5000'. Center the RPM's in the gaps between the pavement marking lines.

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

4. The Type 2W RPM's placed on multilane one-way roadways and all RPM's set in recesses shall have an abrasion resistant coating.

Recessed Pavement Marker Details

For use where specified in Contract

Longitudinal Marking Supplement with Raised Pavement Markers

Standard Plan M-20.30-01

Sheet 1 of 1 Sheet

NOTES

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80' intervals on tangents and on horizontal curves with a radius of 5000' or more, and at 40' intervals on horizontal curves having radii of less than 5000'. Center the RPM's in the gaps between the pavement marking lines.

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

4. The Type 2W RPM's placed on multilane one-way roadways and all RPM's set in recesses shall have an abrasion resistant coating.

Ken L. Smith 01-30-07
LEFT TURN LANE
~ SEE DETAIL  A

WIDE LANE LINE
~ SEE NOTE 2

DOUBLE CENTER LINE (YELLOW)
~ SEE DETAIL  B

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-3.20) is specified in the contract plans.

LONGITUDINAL MARKING SUPPLEMENT WITH RPM's
~ TURN LANES
STANDARD PLAN M-26.40-01
HEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Ken L. Smith 01-30-07
Washington State Department of Transportation EXPIRES AUGUST 9, 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. The NO PASS LINE (when required) is applied parallel to the CENTER LINE, 4" away, with the Type 2yy RPM's aligned (similar to TWO-WAY LEFT-TURN LINE).

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NOTE

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 MARKINGS
TRAFFIC ARROWS FOR HIGH SPEED ROADWAYS
STANDARD PLAN M-34.20-01
SHEET 1 OF 3 SHEETS

Harold J. Peterfeso 05-31-06
Washington State Department of Transportation

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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 MARKINGS**

**TRAFFIC ARROWS FOR LOW SPEED ROADWAYS**

**TYPE 3SR (RIGHT) TRAFFIC ARROW**

**TYPE 1S TRAFFIC ARROW**

**TYPE 2SR (RIGHT) TRAFFIC ARROW**

MIRROR IMAGE OF TYPE 2SL TRAFFIC ARROW (SHOWN AT REDUCED SCALE)

MIRROR IMAGE OF TYPE 3SL TRAFFIC ARROW (SHOWN AT REDUCED SCALE)

**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.

**GRID IS 4" SQUARE**

**TYPE 4S TRAFFIC ARROW**

SYMMETRICAL ABOUT CENTERLINE

**MARKING AREA**

7.73 SQ.FT.

8.03 SQ.FT.

7.73 SQ.FT.

14.83 SQ.FT.

14.83 SQ.FT.

12.86 SQ.FT.
SYMBOL MARKINGS
TRAFFIC ARROWS FOR
LOW SPEED ROADWAYS

TYPE 5 TRAFFIC ARROW
SYMBOL & LANE

TYPE 6SR (RIGHT)
TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

TYPE 6SL (LEFT)
TRAFFIC ARROW

ELLIPSE "A" AXIS
3' - 8"
ELLIPSE "B" AXIS
2' - 0"
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.

SYMBOIL MARKINGS
TRAFFIC ARROWS FOR
LOW SPEED ROADWAYS
STANDARD PLAN M-34.40-01
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION
Harold J. Peterfeso  05-31-06
Washington State Department of Transportation

DRAWN BY:  MARK SUJKA
MARKING AREA
19.58 SQ.FT.

MARKING AREA
23.14 SQ.FT.

MARKING AREA
15.94 SQ.FT.

MARKING AREA
15.94 SQ.FT.

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### Symbol Markings

<table>
<thead>
<tr>
<th>Type</th>
<th>Line</th>
<th>Marking Area</th>
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<tbody>
<tr>
<td>1</td>
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<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

**Yield Ahead Symbol**
- Type 1: Less than 45 MPH
- Type 2: 45 MPH or greater

**Yield Line Symbol**
- Type 1: Less than 45 MPH
- Type 2: 45 MPH or greater

**Access Parking Space Symbol**
- Standard (required for cement concrete surfaces)
- Minimum (required for cement concrete surfaces)

**Total Marking Area**
- White: 9.76 SQ.FT.
- Blue: 18.69 SQ.FT.
- White: 4.82 SQ.FT.
- Blue: 8.62 SQ.FT.

**Grid**
- 4" square

**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 Dates**
- April 2, 2007 to January 6, 2008