Standard Plans

M 21-01

April 6, 2009

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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.

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<td>Bicycle Lane Symbol Layout</td>
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<td>Railroad Crossing Layout</td>
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<td>Guide Posts and Barrier Delineators</td>
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<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
<td></td>
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</tbody>
</table>
**Survey Stakes**

**Standard Plan A-10.10-00**

- **Alignment Stake**: Stake every 100 feet on tangents, every 25 feet on curves.
- **Clearing/Grubbing (C&G) Lath**: Stake at each full station, 100 feet on tangents, every 25 feet on curves. No hub necessary.
- **Slope Treatment (ST) Stake**: For cut sections.
- **Daylight (D/L) Stake**: Fill (0.1 feet), side slope to a 2% roadway slope (50H:1V), distance from C line number 23 to 50 feet.
- **Cut to Back of Ditch Stake**: (2.2 feet), distance from & to catch (back of ditch) (25.7 feet), side slope ratio (4H:1V), back of ditch.
- **Hundred Foot Increments**: Lath for slope references.

---

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FILL FROM CATCH POINT TO BEGINNING OF SECOND SLOPE (0.8 FEET)
SLOPE RATIO (2H:1V)
FILL TO SUBGRADE SHOULDER (2.25 FEET)
SLOPE RATIO (4H:1V)
DISTANCE FROM C TO CATCH POINT (28.7 FEET)

FILL TO SUBGRADE (0.35 FEET)
FILL TO FINISH GRADE (CURB ELEVATION) (0.73 FEET)
DISTANCE FROM C (14.3 FEET)
SLOPE RATIO (2H:1V)

SLOPE LATH FOR CURB SECTION

COMPOUND SLOPE LATH

FILL TO CURB/GUTTER SHOULDER (4.13 FEET)
SLOPE RATIO (2H:1V)
DISTANCE FROM C TO CATCH POINT (28.7 FEET)

LUMINAIRE NUMBER (23)
LINE DESIGNATION AND STATIONING
HUNDRED FOOT INCREMENTS

OFFSET TO CENTER OF BASE (10 FEET)
FILL TO TOP OF CONCRETE BASE (1.1 FEET TO TOP OF FOUNDATION)

STAKE FOR FOUNDATION OF LUMINAIRES, SIGNALS OR SIGN STRUCTURES

STAKE FOR DRAINAGE
OFFSET (10 FEET)
CUT TO FLOW LINE (1.26 FEET)

STAKE FOR DITCH CONSTRUCTION
OFFSET (3 FEET)
FILL TO TOP AND BACK EDGE OF CURB (0.90 FEET)

STAKE FOR CURB/GUTTER
OFFSET (3 FEET)
FILL TO TOP OF CONCRETE BASE (1.1 FEET TO TOP OF FOUNDATION)

LUMINAIRE NUMBER (25)
LINE DESIGNATION AND STATIONING
HUNDRED FOOT INCREMENTS

DISTANCE FROM CATCH POINT TO BOTTOM OF DITCH (2.4 FEET)
SIDE SLOPE RATIO (4H:1V)

DITCH CUT TO BOTTOM OF DITCH (2.4 FEET)
DISTANCE FROM CATCH POINT TO BOTTOM OF DITCH (2.4 FEET)
SIDE SLOPE RATIO (4H:1V)

STAKE FOR DITCH CONSTRUCTION
OFFSET (3 FEET)
FILL TO TOP AND BACK EDGE OF CURB (0.90 FEET)

DISTANCE FROM CATCH POINT TO BOTTOM OF DITCH (2.4 FEET)
SIDE SLOPE RATIO (4H:1V)

STAKE FOR DITCH CONSTRUCTION
OFFSET (3 FEET)
FILL TO TOP AND BACK EDGE OF CURB (0.90 FEET)

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The Brass Disc will be furnished by the State.

The text in the shaded area (see TOP VIEW) shall be 3/16" high and will be stamped by WSDOT personnel prior to setting the cap. Only the assigned identification letters and numbers are to be placed on the Brass Disc.

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.

The top of the concrete shall be troweled smooth and the Brass Disc set in the center with top flush and level. The top of the monument may be recessed or protruding, depending on conditions.

The Brass Disc shall be rotated so it can be read while the observer is facing north. When the concrete is set, cover the entire monument with moist earth and leave for three days.

To replace a Public Land Survey System (PLSS) corner, consult a licensed Professional Land Surveyor (PLS).
Notes:
1. Dimensions may vary according to manufacturer.
2. Base to be placed on a well compacted foundation.
3. Monument case to be installed by contractor.

Approximate Weights:
- Case: 60 lbs
- Cover: 18 lbs
- Total: 78 lbs

### Monument Case and Cover

**Standard Plan A-10.30-00**

- **Sheet 1 of 1 Sheet**
- **Approved for Publication**

Monument Case and Cover

- **Dimensions**
- **Material**
- **Installation Instructions**

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

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

<table>
<thead>
<tr>
<th>CUT SLOPE (H:V)</th>
<th>GROUND LINE (H:V)</th>
<th>CLASS A</th>
<th>CLASS B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:2:1</td>
<td>≈ LEVEL</td>
<td>0.5'</td>
<td>≈ LEVEL</td>
</tr>
<tr>
<td>2:1</td>
<td>≈ LEVEL</td>
<td>1.7'</td>
<td>1.7'</td>
</tr>
<tr>
<td>1:1</td>
<td>≈ LEVEL</td>
<td>3.2'</td>
<td>3.2'</td>
</tr>
<tr>
<td>3:1</td>
<td>≈ LEVEL</td>
<td>5.0'</td>
<td>5.0'</td>
</tr>
<tr>
<td>1:1</td>
<td>≈ LEVEL</td>
<td>0.8'</td>
<td>≈ LEVEL</td>
</tr>
<tr>
<td>2:1</td>
<td>≈ LEVEL</td>
<td>1.4'</td>
<td>1.4'</td>
</tr>
<tr>
<td>1:1</td>
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<td>3.2'</td>
<td>3.2'</td>
</tr>
<tr>
<td>3:1</td>
<td>≈ LEVEL</td>
<td>5.0'</td>
<td>5.0'</td>
</tr>
<tr>
<td>1:1</td>
<td>≈ LEVEL</td>
<td>0.8'</td>
<td>≈ LEVEL</td>
</tr>
<tr>
<td>2:1</td>
<td>≈ LEVEL</td>
<td>1.4'</td>
<td>1.4'</td>
</tr>
<tr>
<td>1:1</td>
<td>≈ LEVEL</td>
<td>3.2'</td>
<td>3.2'</td>
</tr>
</tbody>
</table>

Slope treatment not required.

NOTES:
1. Slope treatment shall be constructed simultaneously with the roadway excavation. Hand trimming will not be required if satisfactory results are obtained with mechanical equipment.
2. Slope treatment is used to provide a transition between the existing ground and the cut slope. The intended purpose is to eliminate the abrupt edge and give the area a more natural appearance. The dimensions shown are approximate and can vary to achieve this purpose.
CONCRETE SLOPE PROTECTION
STANDARD PLAN A-30.10-00

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

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

EXTEND SLOPE PROTECTION 6" BEYOND OUTER EXTREMITY OF BRIDGE

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

SLOPE PROTECTION

B

DUMMY JOINT (TYP.)

EDGE OF SHOULDER

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

BOTTOM EDGE OF SLOPE PROTECTION FOLLOWS BOTTOM OF DITCH

FOOTINGS

EXISTING SOIL

EXISTING SOIL

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

DESIGNED BY: Fern Liddell

PLAN

TYPICAL SECTION (SHOWN ON LOWER ROADWAY)

FOOTINGS

EQUAL SPACING
6 CENTERS MIN.
6 CENTERS MAX.

OUTER EXTREMITY
OF BRIDGE

EXTEND SLOPE PROTECTION
6" BEYOND OUTER EXTREMITY
OF BRIDGE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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

2. The Curb Section shall be used only when the lower roadway cross section requires a curb.

The design and shape of the semi-open concrete masonry unit shown is only one example of the products that may be used. The Curb Section shall be used only when the lower roadway cross section requires a curb.
**HIGH TENSILE STEEL FASTENERS**

- **3" FABRIC OVERLAP**
- **3" FABRIC OVERLAP**

**THIMBLE**

**WIRE ROPE DETAIL**

- Distances X, Y, Z and torque to comply with manufacturer's specifications

**SEAM ALTERNATIVES**

- **12" FOLD**
- **OVERLAPPED SEAM** WITH FASTENERS
- **OVERLAPPED SEAM** WITH LACING

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

- **MAXIMUM LENGTH OF TOP HORIZONTAL SUPPORT ROPE** ~ AS SHOWN IN THE PLANS

**SLOPE PROTECTION ANCHOR** ~ SEE STD. PLAN 30.35.00

**NOTES**

1. Maximum anchor spacing (A) for debris and impact loads required as per table for a minimum allowable anchor capacity of 20,000 lbs. Systems subjected to snow loads may require narrower maximum spacing.
2. Hexagonal mesh must meet minimum requirements of ASTM A 975 for gabions.
3. U-Section of wire rope clips must be applied to the dead end of the rope as shown.

**SEAM ALTERNATIVES**

- **12" FOLD**
- **OVERLAPPED SEAM** WITH FASTENERS
- **OVERLAPPED SEAM** WITH LACING

**LENGTH ~ AS SHOWN IN THE PLANS**

**SLOPE PROTECTION ANCHOR** ~ SEE STD. PLAN 30.35.00

**NOTES**

1. Maximum anchor spacing (A) for debris and impact loads required as per table for a minimum allowable anchor capacity of 20,000 lbs. Systems subjected to snow loads may require narrower maximum spacing.
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**SEAM ALTERNATIVES**

- **12" FOLD**
- **OVERLAPPED SEAM** WITH FASTENERS
- **OVERLAPPED SEAM** WITH LACING

**LENGTH ~ AS SHOWN IN THE PLANS**

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- **12" FOLD**
- **OVERLAPPED SEAM** WITH FASTENERS
- **OVERLAPPED SEAM** WITH LACING

**LENGTH ~ AS SHOWN IN THE PLANS**

**SLOPE PROTECTION ANCHOR** ~ SEE STD. PLAN 30.35.00

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**SEAM ALTERNATIVES**

- **12" FOLD**
- **OVERLAPPED SEAM** WITH FASTENERS
- **OVERLAPPED SEAM** WITH LACING

**LENGTH ~ AS SHOWN IN THE PLANS**

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**SEAM ALTERNATIVES**

- **12" FOLD**
- **OVERLapped SEAM** WITH FASTENERS
- **OVERLAPPED SEAM** WITH LACING

**LENGTH ~ AS SHOWN IN THE PLANS**

**SLOPE PROTECTION ANCHOR** ~ SEE STD. PLAN 30.35.00

**NOTES**

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3. U-Section of wire rope clips must be applied to the dead end of the rope as shown.

**SEAM ALTERNATIVES**

- **12" FOLD**
- **OVERLAPPED SEAM** WITH FASTENERS
- **OVERLAPPED SEAM** WITH LACING

**LENGTH ~ AS SHOWN IN THE PLANS**

**SLOPE PROTECTION ANCHOR** ~ SEE STD. PLAN 30.35.00

**NOTES**

1. Maximum anchor spacing (A) for debris and impact loads required as per table for a minimum allowable anchor capacity of 20,000 lbs. Systems subjected to snow loads may require narrower maximum spacing.
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3. U-Section of wire rope clips must be applied to the dead end of the rope as shown.
Cement Concrete Pavement Joints

Plan View

- Finish outer edge of PVC if required
- Longitudinal contraction or construction joint (typ.)
- Tie bars ~ #5 bar × 30" on 36" centers
- Tie bar ~ 1 1/2" diam. × 18" on 12" centers
- Sawed groove ~ width 3/16" min., 5/16" max.
- Depth 1" min.
- See STD. SPEC. 5-05.3(8)B

Section View

- Sawed groove ~ width 3/16" min., 5/16" max.
- Depth 1" min.
- See STD. SPEC. 5-04.3(12)B

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

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

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

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

2. 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. Basal 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.

LONGITUDINAL SECTION

BAR LIST FOR STANDARD 10' x 25' APP. SLAB QUANTITY MODULE

<table>
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<th>LENGTH</th>
<th>QTY.</th>
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<td>6/8</td>
<td>20'-7&quot;</td>
<td>34</td>
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<tr>
<td>AP2</td>
<td>Longitudinal Top</td>
<td>6/8</td>
<td>25'</td>
<td>34</td>
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<tr>
<td>AP3</td>
<td>Transverse Bottom</td>
<td>6/8</td>
<td>30'</td>
<td>2</td>
</tr>
<tr>
<td>AP4</td>
<td>Transverse Top</td>
<td>6/8</td>
<td>30'</td>
<td>17</td>
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ALL REINFORCING BARS SHOWN ON THIS SHEET SHALL BE AASHTO M-31, UNLESS NOTED OTHERWISE.

APPROXIMATE QUANTITIES (PEAK %) FOR SLAB (BASED ON QUANTITY MODULE)

<table>
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<tr>
<th></th>
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<th>18' (AP)</th>
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<tr>
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<td>25'</td>
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<td></td>
<td></td>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>1/2&quot; MIN.</td>
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<tr>
<td>DEPTH</td>
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<td></td>
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<tr>
<td>CLR.</td>
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<tr>
<td>2&quot; CLR. (TYP.)</td>
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</tr>
<tr>
<td>3&quot; (TYP.)</td>
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DOWEL BAR DETAIL FOR CEMENT CONCRETE PAVEMENT

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EXPIRES AUGUST 23, 2008
NOTE:
PAINT THE METAL COMPONENTS OF THE APPROACH EXPANSION ANCHOR WITH ONE COAT OF FORMULA A-11-99 MEETING THE REQUIREMENTS OF STD. SPEC. SECTION 9-08.2.

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EMBANKMENT WIDENING AT BRIDGE END WITH WING WALL

STANDARD PLAN A-60.10-00

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER
2. 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 hot mix asphalt shoulders.

2. Place polyethylene film (per AASHTO M 171) or building paper along the longitudinal joint between partial panel replacement and existing panel.

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**Plan View**

**Partial Panel Replacement with Tie Bars**

- **Existing Cement Concrete Pavement**
- **New Cement Concrete Pavement**
- **Existing Longitudinal Joint**
- **Existing Transverse Joint**
- **Sawed Groove (Typ.)**
- **1.5'**
- **0.5'**
- **A**

**Partial Panel Replacement without Tie Bars**

- **Existing Cement Concrete Pavement**
- **New Cement Concrete Pavement**
- **Existing Longitudinal Joint**
- **Existing Transverse Joint**
- **Sawed Groove (Typ.)**
- **3' Min.**
- **0.5'**
- **A**

**Section B**

- **New Tie Bar ~ 3' Max. on Center**
- **Existing Cement Concrete Pavement**
- **Drill 7/8" Min. to 1 1/8" Max. Diameter × 15" Long Hole in Existing Cement Concrete for New Tie Bar**
- **New Tied Bar ~ #5 × 30" Epoxy Coated Reinforcing Bar**
- **3' Min.**
- **15" Concrete Pavement Depth**

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DOWEL BAR RETROFIT FOR TWO LANES
DIVIDED HIGHWAY (ONE WAY TRAFFIC)

1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 2.0', 1.0', 1.0', 1.0', 1.0', 1.0'

DOWEL BAR RETROFIT FOR ONE LANE
DIVIDED HIGHWAY (ONE WAY TRAFFIC)

2.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0', 1.0'

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Dowel Bar Retrofit for Each Lane

Undivided Highway (Two Way Traffic)

Dowel Bar (Typ) ~ See Placement Detail, Sheet 3

Skewed Transverse Contraction Joint
(See Std. Plan A-40.10)

Existing Cement Concrete Pavement

Dowel Bar Retrofit for Each Lane

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
TOP OF PAVEMENT AFTER GRINDING (NOT INCLUDED IN BID ITEM)

SECTION E

TRANSVERSE CONTRACTION JOINT

BOTTOM OF SLOT IS PARALLEL TO PAVEMENT SURFACE
3/16" MIN. TO 5/16" MAX.
SAW CUT AFTER CONCRETE PATCH MATERIAL HAS SET

TOP OF EXISTING CEMENT CONCRETE PAVEMENT
2 1/2"

CHAIR TO REST PARALLEL TO SURFACE

TOP OF EXISTING CEMENT CONCRETE PAVEMENT
2" MIN.
1/2" MIN.
1 1/2" SAW CUT DEPTH

PAVEMENT DEPTH VARIES
SEE CONTRACT

TOP OF EXISTING CEMENT CONCRETE PAVEMENT
3/8" FOAM CORE BOARD FILLER MATERIAL TO ~ MAINTAIN JOINT RADIUS VARIES DEPENDING ON SAW BLADE DIAM.

DOWEL BAR EXPANSION CAP ~ BOTH ENDS

CHAIR DETAIL

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NOTES

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

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

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

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

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

HMA OVERLAY WITHOUT BRIDGE APPROACH SLAB

HMA OVERLAY WITH BRIDGE APPROACH SLAB

ELEVATION VIEW
1. If a zone has rebar section loss or full depth repairs, then the concrete deck repair in each zone shall achieve 3,000 PSI before progressing to the adjacent zone.

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

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

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

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**PIPE ALLOWANCES**

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
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</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
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<tr>
<td>ALL METAL PIPE</td>
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<tr>
<td>SOLID WALL PVC (STD. SPEC. 9-08.12(1))</td>
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<tr>
<td>PROFILE WALL PVC (STD. SPEC. 9-08.12(2))</td>
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</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 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.

---

**PICTURE**

- **FRAME AND VANED GRATE**
- **RECTANGULAR ADJUSTMENT SECTION**
- **PRECAST BASE SECTION**
- **CATCH BASIN TYPE 1**

---

**DRAWN BY:** MARK SUJKA

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**EXPIRES JULY 1, 2007**

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**STANDARD PLAN B-5.20-00**

---

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

---

**APPROVED FOR PUBLICATION**

---

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---

**SHEET 1 OF 1 SHEET**

---

**EFFECTIVE:** APRIL 6, 2009 TO DECEMBER 6, 2009
### Pipe Allowances

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>Maximum Inside Diameter</th>
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<tbody>
<tr>
<td>Reinforced or Plain Concrete</td>
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</tr>
<tr>
<td>Profile Wall PVC (STD. 8/SEC. 9-08.12(2))</td>
<td>21&quot;</td>
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</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.

---

**FRAME AND VANEED GRATE**

One #3 bar hoop for 6" height
Two #3 bar hoops for 12" height

**RECTANGULAR ADJUSTMENT SECTION**

Two #3 bar hoops

**PRECAST BASE SECTION**

#3 bar each corner
#3 bar each side

**ALTERNATIVE PRECAST BASE SECTION**

#3 bar each corner, 18" min.
NOTES

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

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

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

4. The frame and grate may be installed with the flange 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.

PRECAST BASE SECTION

ALTERNATIVE PRECAST BASE SECTION
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-10.20-09

| PIPE ALLOWANCES |
|------------------|-----------------|-----------------|-------------------|
| CATCH BASIN DIAMETER | PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER |
|                   | CONCRETE | ALL METAL | GRABSP | SOLID WALL PVC | PROFILE WALL PVC |
| 48"               | 24"      | 30"       | 24"    | 37"             | 30"            |
| 54"               | 26"      | 30"       | 30"    | 37"             | 30"            |
| 60"               | 26"      | 30"       | 30"    | 37"             | 30"            |
| 72"               | 26"      | 30"       | 30"    | 37"             | 30"            |
| 84"               | 26"      | 30"       | 30"    | 37"             | 30"            |

Harold J. Peterfeso
06-01-06

EXPIRES JULY 1, 2007

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1. The pipe supports and the flow restrictor 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 restrictor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8".

3. The flow restrictor shall be fabricated from one of the following materials:
   - 0.060" Corrugated Aluminum Alloy Drain Pipe
   - 0.060" Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.060" Corrugated Aluminum Alloy Drain Pipe
   - 0.060" Aluminum alloy flax sheet. In accordance with ASTM B 206, B862 H32 or EPS
   - High Density Polyethylene Storm Sewer Pipe

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

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

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

7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 26 and ASTM B 275, designation 2000A; or cast iron in accordance with ASTM A 48, Class 30B.

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

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

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

9. Alternative shear gate designs are acceptable if material specifications are met and flange bolt pattern matches.
See Contract for size and location of all pipes and orifices. Baffle wall shall have #4 Bar at 12" spacing each way. Precast baffle shall be keyed and grouted in place. Bottom orifice plate shall be galvanized steel with a minimum thickness of 1/4". Attach orifice with 1/2" stainless steel bolts. Upper flow orifice plates and elbows shall be aluminum, aluminized steel or galvanized steel. Galvanized steel shall have Treatment 1.

- Bottom orifice plate
- GROUTED STEPS OR LADDER
- ELBOW ~ SEE DETAIL
- ISOMETRIC CUTAWAY
- TOP OF BAIFFLE WALL
- MANHOLE RING WITH LOCKING BOLTS" MARKED "STRAIN"
- ELBOW ~ SEE DETAIL
- BOTTOM ORIFICE PLATE
- CIRCULAR ADJUSTMENT SECTIONS
- CATCH BASIN TYPE 2 WITH Baffle TYPE FLOW RESTRICTOR
- STANDARD PLAN B-10.60-00
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Harold J. Peterfeso
06-08-06
**MANHOLE DIMENSION TABLE**

<table>
<thead>
<tr>
<th>DIAM (IN.)</th>
<th>WALL THICKNESS</th>
<th>BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>SEPARATE BASE</th>
<th>INTEGRAL BASE</th>
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**NOTE:** Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.

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**MANHOLE TYPE 1**

**STANDARD PLAN B-15.20-00**

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**SEPARATE BASE**

- PRECAST RISER SECTIONS
- STEPS OR LADDER
- ISOLATION PINitches
- ISOLATION PINitches

**INTEGRAL BASE**

- PRECAST WITH RISER
- ISOLATION PINitches
- ISOLATION PINitches

**GRAVEL BACKFILL FOR PIPE ZONE BEDDING**

- 12" MIN.
- 2.5" MAX.

---

**REINFORCING STEEL (TYP.**

- BASE REINFORCING STEEL
- 2 in / ft. in EACH DIRECTION

---

**EXPIRES JULY 1, 2007**

---

**Harold J. Peterfeso**

**06-01-06**

---

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**MANHOLE TYPE 2**

**STANDARD PLAN B-15.40-09**

**MANHOLE DIMENSION TABLE**

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<tr>
<th>DIAM</th>
<th>WALL THICKNESS</th>
<th>BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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**NOTE:**

Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.

**EXPIRES JULY 1, 2007**

Signature: Harold J. Peterfeso 06-01-06

Washington State Department of Transportation
MANHOLE RING AND COVER

CIRCULAR ADJUSTMENT SECTION

FLAT SLAB TOP

STEPS OR LADDER

12" (TYP.)

28" MAX.

12"

14"

MORTAR FILLET

SEPARATE BASE CAST-IN-PLACE

INTERNAL BASE PRECAST WITH RISER

SEPARATE BASE PRECAST

NOTE

Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.

MANHOLE DIMENSION TABLE

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DIAM.  | MINIMUM DISTANCE BETWEEN KNOCKOUTS | SEPARATE BASE | INTEGRAL BASE |
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MANHOLE TYPE 3

STANDARD PLAN B-15.60-00

SEPARATE BASE

CAST-IN-PLACE

INTEGRAL BASE

PRECAST WITH RISER

REINFORCING STEEL (TYP.)

GRAVEL BACKFILL FOR PIPE ZONE BEDDING

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1. Precast cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.

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NOTES:
1. Precast concrete cone sections may be eccentric or concentric.
2. Inlet pipe orientation varies among manufacturers.
3. Connect inlet pipe to structure using precast hole or core drilled hole.
4. For depths over 10', use 72" x 8' Alternative Precast Footing.
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" × 2" hex head bolts, nuts, and oversize washers. The washers shall have diameters adequate to assure full bearing across the slots.

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

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

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

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
<td>12&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>18&quot;</td>
</tr>
<tr>
<td>CPSSP # (STD. SPEC. 9-08.30)</td>
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</tr>
<tr>
<td>SOLID WALL PVC</td>
<td>18&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC</td>
<td>16&quot;</td>
</tr>
</tbody>
</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

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Harold J. Peterfeso 06-01-06
NOTES

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

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

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

RECTANGULAR FRAME
(REVERSIBLE)

STANDARD PLAN B-30.10-00

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

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.

BOLT-DOWN SLOT DETAIL
SEE NOTE 1

BOLT-DOWN SLOT - SEE DETAIL AND NOTE 1

STANDARD PLAN B-30.20-01
RECTANGULAR SOLID METAL COVER

NOTES

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

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

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

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

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

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

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

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

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

3. For Frame details, see Standard Plan B-30.10.
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 9-05.15(2) for additional requirements.

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

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

---

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 9-05.15(2) for additional requirements.

For Frame details, see Standard Plan B-30.10.

The thickness of the grate shall not exceed 1 5/8".
The gasket and groove may be in the seat (frame) or in the underside of the cover. The gasket may be "T" shaped in section. The groove may be cast or machined.

2. For bolt-down manhole rings 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 scales (1H:1.5V).

The neoprene gasket, groove and washer are not required for bolt-down manhole rings and covers that are not designated "Watertight". Washer shall be neoprene. In lieu of blind pick notch for storm sewer manhole covers, drill three 1" diameter holes at 120° spacing. Proprietary manhole covers without bottom ribs are acceptable. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1.5 times the horizontal scales (1H:1.5V).
NOTES
1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-30.30 and B-20.00.

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-30.30 and B-20.00.
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.
1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.

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

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

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


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.

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

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

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

PIPE ALLOWANCES

<table>
<thead>
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</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 4 (STD. SPEC. 9-05.20)</td>
<td>18&quot;</td>
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<tr>
<td>SOLID WALL PVC (STD. SPEC. 9-05.12(1))</td>
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<td>PROFILE WALL PVC (STD. SPEC. 9-05.12(2))</td>
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<tr>
<td>CORRUGATED POLYETHYLENE STORM SEWER PIPE</td>
<td>10&quot;</td>
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</table>

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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.

The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface. Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section. All exposed concrete edges shall be finished with a 1/2" radius. Pipes may enter through the inlets on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls. The flow line of the outlet pipe shall be 18" minimum above the inside bottom of the inlet structure. The grade line of the top inside of any inlet pipe shall enter no lower than the grade line of the top inside of the outlet pipe. Unit "H" and optional extension units "J" and "K" shall be grouted in place to the satisfaction of the Engineer. All pickup holes shall be grouted full after the basin has been placed. See contract for type of grate specified. See Standard Plan B-40.30 and B-40.40 for grate details.
WELDED GRATES
FOR GRATE INLET

STANDARD PLAN B-40.20-00

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

Sheet 1 of 1 Sheet

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Harold J. Peterfeso
06-01-06

APPROVED FOR PUBLICATION

EXPIRES JULY 1, 2007

Harold J. Peterfeso
06-01-06
NOTES

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.

The Contract may specify a rotated inlet installation. Orient the Grates in the Frame so they intercept flow. 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. Refer to Standard Specification 9-05.15(2) for additional requirements.
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.
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 grate 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-50.23.
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.
STANDARD PLAN B-50.20-00

GRATES FOR DROP INLET

DRAWN BY: MARK SUJKA

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HAROLD J. PETERFESO 06-01-06
NOTES
1. See Standard Specifications Section 7-08.3(3) for Pipe Zone Backfill.
2. See Standard Specifications Section 9-03.12(3) for Gravel Backfill for Pipe Zone Bedding.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.

PIPE ZONE

CONCRETE AND DUCTILE IRON PIPE

TRENCH WIDTH

PIPE ZONE BACKFILL
(SEE NOTE 1)

GRAVEL BACKFILL FOR PIPE ZONE BEDDING
(SEE NOTE 2)

FOUNDERATION LEVEL

PIPE ZONE BEDDING

PIPE ZONE BACKFILL
(SEE NOTE 1)

TRENCH WIDTH

METAL PIPE

TRENCH WIDTH

PIPE ZONE BEDDING

GRAVEL BACKFILL FOR PIPE ZONE BEDDING
(SEE NOTE 2)

FOUNDERATION LEVEL

PLASTIC PIPE

TRENCH WIDTH

PIPE ZONE BEDDING

GRAVEL BACKFILL FOR PIPE ZONE BEDDING
(SEE NOTE 2)

FOUNDERATION LEVEL

TRENCH WIDTH

PIPE ARCHES

TRENCH WIDTH

PIPE ZONE BACKFILL
(SEE NOTE 1)

GRAVEL BACKFILL FOR PIPE ZONE BEDDING
(SEE NOTE 2)

FOUNDERATION LEVEL

PAPER: 8.5X11"  SHEET: 1 OF 1

PIPE ZONE BEDDING AND BACKFILL

STANDARD PLAN B-55.30-00

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

ERIE: APRIL 6, 2009 TO DECEMBER 6, 2009

SHEETS 1 OF 1 SHEET

Harold J. Peterfeso

EXPIRES JULY 1, 2007
1. The Concrete Collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum Concrete Collar width shall be 12”. Concrete Collars may be used with all pipe materials and diameters. The Concrete Collar option shall only be used to extend existing pipes.

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

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

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

5. Use only a 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 BANDS FOR CORRUGATED METAL PIPE

STANDARD PLAN B-60.40-00

COUPLING BAND DIMENSION TABLE
(ALL DIMENSIONS ARE IN INCHES)

<table>
<thead>
<tr>
<th>BAND TYPE</th>
<th>CORRUGATION PITCH × DEPTH</th>
<th>PIPE DIAM.</th>
<th>MIN. W</th>
<th>GASKET TYPE</th>
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<td>2 2/3 × 1/2 (OR 3 × 1)</td>
<td>12 ~ 64</td>
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<td>SLEEVE</td>
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</tr>
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<td>3 × 1</td>
<td>54 ~ 96</td>
<td>12</td>
<td>SLEEVE</td>
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<td>OR 3 × 1</td>
<td>54 ~ 96</td>
<td>12</td>
<td></td>
</tr>
<tr>
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<td>REFORMED TO 2 2/3 × 1/2</td>
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<td>STEEL</td>
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<td>BUTYL</td>
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<td>3 × 1</td>
<td>54 ~ 144</td>
<td>24</td>
<td>SLEEVE</td>
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<tr>
<td></td>
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<td>12 ~ 72</td>
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<td></td>
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<tr>
<td></td>
<td>3 × 1</td>
<td>50 ~ 128</td>
<td>12</td>
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<tr>
<td></td>
<td>OR 3 × 1</td>
<td>50 ~ 128</td>
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<td>REFORMED TO 2 2/3 × 1/2</td>
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<td>54 ~ 144</td>
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<td>2 2/3 × 1/2</td>
<td>12 ~ 72</td>
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<tr>
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<td>3 × 1</td>
<td>50 ~ 128</td>
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<td></td>
<td>OR 3 × 1</td>
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<td>* PIPE ARCH ONLY</td>
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Span and rise dimensions are nominal and are measured to the inside crests of corrugations.

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 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).

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

NOTE 3: SEE NOTE 3

SIDE VIEW - PLACEMENT

ALLOWABLE HEIGHTS OF COVER

<table>
<thead>
<tr>
<th>SPAN</th>
<th>RISE</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' - 8&quot;</td>
<td>7' - 1&quot;</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6' - 10&quot;</td>
<td>7' - 2&quot;</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

INVERT TREATMENT - SEE NOTE 3

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.
3. Unless indicated otherwise, a 10" depth (over the inside crests of corrugations) of earth shall be placed in the invert of the Structural Plate Underpass, Design 1, for its full width and length. The earth shall consist of naturally occurring materials available in the vicinity of the structural plate underpass installation. See Standard Specification 7-03.3(4).
4. Designed for H-20 live load and maximum allowable soil pressure of 6 kips per square foot.
NOTES

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

EMBANKMENT SLOPE

SIDE VIEW ~ PLACEMENT

LENGTH IN A MULTIPLE OF 2'

HEADWALL ~ BOTH ENDS

SHEET 1 OF 1 SHEET

EQUIPMENT UNDERPASS
STANDARD PLAN B-65.40-09

APPROVED FOR PUBLICATION
Harold J. Peterfeso  04-01-09
Washington State Department of Transportation

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

**Metal Pipe**

**Concrete Pipe**

**Thermoplastic Pipe**

**Notes**

1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4H:1V. When slopes are between 4H:1V and 8H: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.

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

2. All sections shall be made in one piece for round pipe with a diameter of 12” to 24” inclusive and for pipe arches with a rise of 15” to 20” inclusive. All sections for larger sizes of pipe may be multiple pieces in conformance with the tabulated values shown.

3. Design A and sections for 12” thru 24” diameter and 60” x 60” thru 83” x 57” arch with annular corrugations and all helically corrugated pipe arches include one foot of pipe length as a connector section. The connector section shall be attached to the end section by welds, rivets or bolts and shall be the same thickness as the end section.

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

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

6. The reinforced edges of the following size End Sections shall be supplemented with galvanized steel stiffener angles:
- 60” thru 72” diameter pipe: 2 1/2” x 2 1/2” x 1/4” angle
- 78” and 84” diameter pipe and 72” x 63” & 83” x 57” pipe arch: 2 1/2” x 2 1/2” x 1/4” angle

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

7. Galvanized steel angle reinforcement will be placed under the center panel seams on the 72” thru 84” diam. pipe and 77” x 52” & 83” x 57” pipe arch End Sections.

8. As an alternative to the connector band and threaded rod used on 12” thru 24” culvert pipe, the attachment may be made with a 1” wide strap, 18 gauge galvanized steel fastened with a 1/2” diam., 8” long galvanized bolt and one square nut.

PLATED END SECTIONS
STANDARD PLAN B-70.60-09

DESIGN A
CONNECTION TO METAL PIPE

DESIGN B
CONNECTION TO CONCRETE PIPE INLET END ONLY

DESIGN C
CONNECTION TO METAL OR CONCRETE PIPE OUTLET ONLY
NOTES:
1. The variable dimension indicated for the height of step in step inset pipe shall conform to the manufactures 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".

HEADWALLS FOR CULVERT PIPE AND UNDERPASS
STANDARD PLAN B-78.36-01
Sheet 1 of 1 SHEET
EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009
Washington State Department of Transportation
APPROVED FOR PUBLICATION
Peaco, Babcock & Heath
04-10-06

ANCHOR BOLT DETAIL
3/4" BOLT
1/2" THD
6" LONG
NOTED:
1. Socket shall be 3" extra long steel pipe (3 1/2" O.D.). Socket must be the proper angle and height so that safety bars are parallel with headwall and side slopes, and are easily removable.

2. Safety Bars shall be 4" extra long steel pipe (5 1/2" O.D.), or 4 1/2" O.D. (235 psi wall thickness) steel tubing. Length (20' maximum) shall be the minimum required to submerge Resin Bonded Anchor placement in full depth concrete. When multiple bars are required (see table) place bar at equal spacing (10' max).

3. Bury culvert pipe to match side slopes
4. Resin bonded anchors shall be 7" in length (8" embedment)
5. Centerline of headwall shall be normal to roadway centerline

TYPE I SAFETY BARS FOR STEPPED CULVERT PIPE OR PIPE ARCH
STANDARD PLAN B-75.80-01

Approved For Publication
Peech, Balchikich 06-10-09
Washington State Department of Transportation
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 3/64" between bars to facilitate placement.

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

---

**NOTE:**

- **CULVERT PIPE OR PIPE ARCH (ON CROSS ROAD)**
- **HEADWALL ~ SEE STD. PLAN B-75.20 FOR DETAILS**
- **FIELD-CUT CULVERT TO MATCH BLOCKOUT IN HEADWALL**

---

**HEADING:** TYPE 2 SAFETY BARS FOR CULVERT PIPE OR PIPE ARCH (ON CROSS ROAD)

**STANDARD PLAN:** B-75.60-00

**APPROVED FOR PUBLICATION:**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**STANDARD PLAN NUMBER:** B-75.60-00

**DATE EXPIRES:** JULY 1, 2007

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

1. All pipes or pipe strakes shall be attached as shown in CONNECTOR DETAIL.
2. When a Toe Plate Extension is required, it shall be the same gage as the End Section.
   The dimensions shall be 8" high, and 6" less than the overall width, install centered, and
   lapped 2".
3. Cross Drainage Bar and Safety Bars shall be 3' Schedule 40 galvanized steel pipe. Cross Drainage Bars shall be placed a maximum 30" apart.
4. Holes for safety bar attachment shall be provided on and end sections.
5. Number of Safety Bars required will vary depending upon the length of the end section.

TAPERED END SECTION
WITH TYPE 3 SAFETY BARS

STANDARD PLAN B-90.20-00

<table>
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<tr>
<th>PIPE DIAMETERS (INCHES)</th>
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<th>DEPTH THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
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SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"

DATE: 15-04-06

EXPRESSED JUNE 1, 2007

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### Notes:

1. As an alternative connection on 16" through 24" pipe, a 1" wide strap of 18 gage or 12 gage galvanized steel, fastened with a 1/2" diam., 6" long galvanized bolt and square headed nut, may be used.

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

### Metal End Sections for Circular Pipes

<table>
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<th>END SECTION</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
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### Metal End Sections for Arched Pipes

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<tr>
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### Side View Diagram

- **Reinforced Edge Section**
  - Edge of end section sheet rolled snugly against steel rod.
  - 3/8" diam. galvanized heads in 12" max. ctrs.
  - Two plates extended - when required: 1/2" diam. Galv. head bolts in 12" max. ctrs.

- **Tapered End Section with Type 4 Safety Bars (On Cross Road)**
  - Standard Plan B-80.40-06
  - Sheet 1 of 1 sheet
  - Approved for Publication

- **HAROLD J. PETERFESO**
  - Washington State Department of Transportation
  - State Design Engineer

- **APPROVED FOR PUBLICATION**
  - May 1, 2007

- **DATE**
  - April 6, 2008 to December 6, 2009

- **NOTE:** This plan is not a legal engineering document, the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.
**Residential Storm Drain, Under Sidewalk**

**Standard Plan B-82.20-00**

**Concrete Curb**
- Type may vary

**Planting Strip**
- Reinforcement not shown

**Roadway**
- 4" drain pipe capped at edge of r/w

**Concrete Sidewalk**
- Temporary cap at edge of r/w, unless otherwise directed in contract

**Invert of Drain**
- Shall be at or above gutter line

**Wire Mesh Reinforcement**
- 6 x 6 W4.0 x W4.0 (4 gage)
- 4 x 4 W2.9 x W2.9 (6 gage)

**2% Min. Slope**
- Temporary cap at edge of r/w, unless otherwise directed in contract

**4" Min. R/W Line**
- Concrete curb - type may vary

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

**Harold J. Peterfeso**

**06-01-06**

**Washington State Department of Transportation**

**STANDARD PLAN B-82.20-00**

**EFFECTIVE:** APRIL 6, 2009 TO DECEMBER 6, 2009

**EXPIRES JULY 1, 2007**
1. Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gaskets for new sewer installations.

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

NOTES:

- SEE NOTE 1
- SEE NOTE 2

CAP

45 33/64 ELBOW

2% MIN., 45° MAX.

PROPERTY LINE

4" OR 6" DIAM. SEWER PIPE

SEE CONTRACT

TEER BRANCH

SEWER MAIN

LESS THAN 90° 33/64

WYE BRANCH

4" OR 6" DIAM. SEWER PIPE

SEE CONTRACT

PROPERTY LINE

WYE CONNECTION

TEE CONNECTION

45 33/64 ELEVATION VIEW

PROPERTY LINE

4" OR 6" DIAM. SEWER PIPE

SEE CONTRACT

TEE BRANCH

SEWER MAIN

CAP

SEE NOTE 3

4% MIN., 45° MAX.
45° BEND

4" OR 6" SEWER PIPE (SEE CONTRACT)

5" X 6" X 6" CONCRETE BLOCK OR CONTROLLED DENSITY FILL

45° BEND

STANDING SIDE SEWER CONNECTION

FOR SANITARY SEWER USE

STANDARD PLAN H-85.30-00

SHEET 1 OF 1 SHEET

DATE

STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY:  ADAM COCHRAN

STANDARD PLAN B-85.30-00
FOR SANITARY SEWER USE

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.

EXPRESSES JULY 1, 2007

Harold J. Peterfeso 06-01-06
DUCTILE IRON DROP CONNECTION

ELEVATION

TYPICAL MANHOLE

COMMERCIAL CONCRETE BLOCK - Poured in place

D.J.P. 18" BEND CLEARANCE 2"

Typical Example Foundation Construction

ONE LENGTH OF DUCTILE IRON PIPE CLASS B36 TO SOLID DUCTILE IRON pipe IS MORE THAN 48'

Flexible Joint

BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER

30' 10" RADIUS

9" BEND

Concrete Encased Drop Connection

ELEVATION

TYPICAL MANHOLE - Foundation Construction

MORTAR DAM OR PLUG AS REQUIRED BY ENGINEER

CROSSFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER

5' 0" RADIUS

TYPICAL MANHOLE

All pipes, except ductile iron pipe, shall be concrete encased.

FOR SANITARY SEWER USE

DROP CONNECTIONS

STANDARD PLAN E-88.56-01

Sheet 1 of 1 sheet

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009
NOTES:

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

STANDARD PLAN B-90.10-00

- **Water Main**: 12" pipe
- **Valve Box**: 6" gate valve (flange by mechanical joint)
- **Concrete Block**: 12" × 12" × 4" min.
- **Gravel Pocket**: 6 cubic feet min.
- **Trench Depth**: 36" min.
- **Asphaltic Felt**: 15 pound
- **Valve Box and Lid**: Hub and flange casting ~ cast iron
- **Auxiliary Gate Valve**: 12" × 12" × 4" min.
- **Mechanical Joint with Tie Rod Lug**: Face of curb

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.

### Type A
- **Property Line**: 2
- **Elevation**: Drawn by: Mark Sujka

### Type B
- **Property Line**: 2
- **Elevation**: Drawn by: Mark Sujka

EXPIRES JULY 1, 2007
NOTES

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.

2 INCH BLOWOFF ASSEMBLY

STANDARD PLAN B-98.20-00

ELEVATION

- Gate Valve with 2" square operating nut
- 2" Female × IP × 2 1/2" Male NST hose connection with cap (BLOWOFF OUTLET)
- Valve Box and Lid ~ Cast Iron
- Solid concrete bearing block ~ 4" × 8" × 16"
- Tapped Cap or Plug
- Concrete Block 4" × 8" × 16"
- Gate Valve with 2" square operating nut
- Drill 1/8" hole
- 15 Pound asphaltic felt
- Gravel Pocket
- Valve Size and Lid ~ Cast Iron

PLAN

- Property Line
- Meter Box (Locate in Field)
- Blowoff Outlet
- Thrust Blocking shall be clear of Blowoff piping
- Street Elbow
- Two Concrete Blocks 4" × 8" × 16" (Top Block Not Shown)
- Tapped Cap or Plug
- Water Main
The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.

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

**Notes**

**Plan View**

- TEE
- DEAD END

**Profile View**

- PLUGGED TEE
- VALVE

**Table**

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<th>Size</th>
<th>Test Pressure (PSI)</th>
<th>Thrust at Fittings in Pounds</th>
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<td>A</td>
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<th>Soil Type</th>
<th>Safe Bearing Load (PSF)</th>
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<td>MUCK, PEAT, ETC.</td>
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<td>SOFT CLAY</td>
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<tr>
<td>SAND</td>
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<tr>
<td>SAND AND GRAVEL</td>
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<tr>
<td>SAND AND GRAVEL CEMENTED WITH CLAY</td>
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<tr>
<td>HARD SHALE</td>
<td>10,000</td>
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</table>

**Contractor**

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

**Concrete Thrust Block**

- **Standard Plan B-30.40-08**
- **Sheet 1 of 1 Sheet**
- **Approved for Publication**
- **Matthew J. Peterfeso**
- **Washington State Department of Transportation**
- **Expires July 1, 2007**

**Notes**

- **Use Columns A**
- **Use Column B**
- **Use Column C**
- **Use Column D**
- **Use Column E**

**Contractor**

Divide thrust by safe bearing load to determine required area (in square feet) of concrete to distribute load. Areas to be adjusted for other pressure conditions. Provide two 1" minimum diameter rods on valves up through 10" diameter. Valves larger than 10" require special tie rod design.
### Blocking for 11.25° or 22.5° Vertical Bends

- **Diagram**: Two tie rods with turnbuckles are shown blocking for 11.25° or 22.5° vertical bends.

### Blocking for 45° Vertical Bends

- **Diagram**: Four tie rods with turnbuckles are shown blocking for 45° vertical bends.

### Dimension Table

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>Test Pressure (PSI)</th>
<th>Bend Angle</th>
<th>Concrete Volume (Cu Ft)</th>
<th>Cube Size (In.)</th>
<th>Tie Rod Dia.</th>
<th>Tie Rod Embedment</th>
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**Concrete Thrust Block**

**Standard Plan B-99.60-00**

- **Concrete Thrust Block for Convex Vertical Bends**

**Note:**

- Steel tie rods to be heavily coated with asphalt after installation.

**Harold J. Peterfeso**

- Approved for Publication
- Signed 06-08-06

**Washington State Department of Transportation**

**Expiring July 1, 2007**

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INLET PLACEMENT AT BRIDGE END

STANDARD PLAN B-95.40-09

**NOTES**

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

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

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

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

5. See Contract Plans for length of Curb.

---

Harold J. Peterfeso 06-06-06
Washington State Department of Transportation
1. When required by the Contract, a Snap Load Post Washer shall be used on the backside of the post (on Box or of the 1 $\frac{3}{8}$" Post Bolt Washer) and a Snap Load Rail Washer shall be placed on the face side of Beam Guardrail Types 1 and 2. Snap Load Rail Washers shall not be installed on terminals.

2. Rail Washers, also called “Snap Load Rail Washers” are not required on new installation except as called for in Note 1. Unnecessary Rail washers need not be removed from existing installations, except those on posts through 8 of 3C1 installation shall be removed.

3. Beam Guardrail post spacing for Types 1 through 4 shall be $\frac{3}{8}$ - $\frac{3}{16}$ on centers.

4. Timber blocks shall be toe-nailed to the post with a 1$\frac{3}{4}$ - 1$\frac{1}{2}$ galvanized nail to prevent block rotation.

5. For post and block details, see Standard Plans G-10.

6. When “Beam Guardrail Type 1 – 12' Long Post” is specified in the Contract, the post length shall be stamped with numbers, 12 $\frac{3}{4}$ in. high and 1$\frac{3}{8}$ deep, at the location where the letter “L” 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$\frac{3}{8}$ deep.

7. Existing posts shall not be replaced. Replace posts as necessary to achieve required guardrail height.
Typical Rail Element

Expansion Section

Notes:
1. Type 10 posts shall be 8x8 timber or W16×70. Type 11 posts shall be 10x10 timber or W16×15. For details see Standard Plan C-14a.
2. Type 10 guardrail post spacing shall be 6' - 0" on center. Type 11 shall be a maximum of 3' - 1 1/2" on center.

Beam Guardrail
(Thrie Beam)

Standard Plan C-1a

Sheet 1 of 1 Sheet

Approved for Publication
Peaza Battlehead RN
02-10-09
Washington State Department of Transportation
W BEAM

STEEL POST
See Notes 3 and 4

THRIE BEAM

W BEAM WOOD BLOCK
FOR STEEL POST

THRIE BEAM WOOD BLOCK
FOR WOOD POSTS

THRIE BEAM WOOD BLOCK
FOR STEEL POST

Wood Posts

See Table

6x8 or 10x10
(see Note 1)

2"

See Table

7 5/8 "

Alternate
holes (TYP)

3/4 " holes
(TYP)

3/4 " DIA
holes (TYP)

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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. W6x9 steel posts and timber blocks are alternates for 6x8 timber posts and blocks. W6x15 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 2, __ 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.

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. W6x9 steel posts and timber blocks are alternates for 6x8 timber posts and blocks. W6x15 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 2, __ 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.
NOTES
1. For post details see Standard Plan, "Beam Guardrail Posts and Blocks".

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

DETAIL B
5/30/97

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THREE BEAM GUARDRAIL REDUCER SECTION

TYPE A

(Left section shown, right section reversed)

SPICE BOLT SLOTS
3/4" x 2 1/2" (TYP)

POST BOLT SLOTS
3/8" x 2 1/2" (TYP)

THREE BEAM GUARDRAIL REDUCER SECTION

TYPE B

SHEET 1 OF 1 SHEET

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

INTERMEDIATE GUARDRAIL POST CONNECTION DETAILS

(Typ A shown):
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. 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.
For terminal type and details, see Contract and applicable Standard Plan(s).

The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10H:1V when the guardrail is within 12' - 0" from the edge of the shoulder. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

### Flare Rate Table

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<td>50</td>
<td>11 : 1</td>
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<tr>
<td>45</td>
<td>10 : 1</td>
</tr>
<tr>
<td>40 or less</td>
<td>9 : 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 tapping it behind the second 6×8 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" maximum is acceptable. If the last 12'-6" section extends more than 6'-3" but less than 12'-6", use a nested 9'-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" maximum spacing between the end of the transition and the structure.

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

Type 11 post height shall be 2'-9" length shall be adjusted to the top of foundation. The Beam Guardrail Type 10 shall be 12'-6" MIN.

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 6×8 post of the Beam Guardrail Transition Section Type 16, and by tapping it behind the second 6×8 post on the Beam Guardrail Type 10 side, or as approved by the Engineer.

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" maximum is acceptable. If the last 12'-6" section extends more than 6'-3" but less than 12'-6", use a nested 9'-3" thrie beam section in its place.

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" maximum spacing between the end of the transition and the structure.

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

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CASE 9A

- EDGE OF TRAVELED WAY
- CLEAR AREA ~ SEE STD. PLAN C-4f
- DIRECTION OF TRAFFIC
- BEAM GUARDRAIL BULL NOSE TERMINAL (DESIGN 1)
- BEAM GUARDRAIL Type 10
- BEAM GUARDRAIL BULL NOSE TERMINAL (DESIGN 1)
- PAY LIMIT
- 3'-0" MIN. ~ TO FACE OF GUARDRAIL

CASE 9B

- DIRECTION OF TRAFFIC
- CLEAR AREA ~ SEE STD. PLAN C-4f
- BEAM GUARDRAIL (W-BEAM OR THRIE BEAM ~ SEE NOTE 1)
- BEAM GUARDRAIL BULL NOSE TERMINAL (DESIGN 1)
- PAY LIMIT
- 3'-0" MIN. ~ TO FACE OF GUARDRAIL

CASE 9C

- Thrie Beam Guardrail is used when the distance from the end of the Bullnose Terminal to the beginning of the transition of the Bridge Rail is less than 100 feet.
- BEAM GUARDRAIL (W-BEAM OR THRIE BEAM ~ SEE NOTE 1)
- PAY LIMIT
- 3'-0" MIN. ~ TO FACE OF GUARDRAIL
- 3'-0" MIN. ~ TO FACE OF GUARDRAIL

NOTE

1. CASE 9C: Thrie Beam Guardrail is used when the distance from the end of the Bullnose Terminal to the beginning of the transition of the Bridge Rail is less than 100 feet.
NOTES:
1. SRT Terminal shown, for terminal type and details, see Contract or applicable Standard Plan(s).
2. Post spacing is 8' - 3' except where noted.
3. Type 4 anchor required. See applicable Standard Plan(s).
4. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H:1V when the guardrail is within 12' - 0" from the edge of the shoulder.

EDGE OF SHOULDER

BEAM GUARDRAIL PAY LIMIT

TERMINAL PAY LIMIT - SEE NOTE 1

VARIES - SEE CONTRACT

TWO-WAY TRAFFIC

CASE 10A

EDGE OF SHOULDER

VARIES - SEE CONTRACT

BEAM GUARDRAIL EXTENSION

LENGTH VARIES - SEE CONTRACT

CASE 10C

VARIES - SEE CONTRACT

ANCHOR PAY LIMIT - SEE NOTE 3

ONE-WAY TRAFFIC

EDGE OF SHOULDER

CASE 10B

VARIES - SEE CONTRACT

EDGE OF SHOULDER

SRT Terminal shown, for terminal type and details, see Contract or applicable Standard Plan(s).

Post spacing is 8' - 3' 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.
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 to the face of the guardrail should not exceed 10H:1V when the guardrail is within 12'-0" from the edge of the shoulder.

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

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

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

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

CASE 12 _D
(see Note 7)

CASE 12 _C
(see Note 7)

SECTION A-A

IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 6)

CASE 12 _B_
(see Note 7)

IDENTIFICATION PLATE
(see Note 5)

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 1/2" washer on back of post.

4. For terminal 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".

18'-9" Width = 15' X Spaces at 6'-3" (1 space MIN)

6'-3" Post spacing (TYP)

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

5/16" Bolt

1 1/2" Washer

Length = 25'

Identification plate

CRT post

Point A

Point A

S T A T E  D E S I G N  C H I P E R

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

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

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FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANS-
PORTATION.   A COPY MAY BE OBTAINED UPON REQUEST.
1. See Contract Plans for guardrail connection to bridge rail and concrete barrier.

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

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

4. For terminal 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.
NOTES
1. For Service Level 1, Weak Post Bridge Rail System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
4. See Standard Plan "Beam Guardrail Posts and Blocks".

Direction of Traffic

CASE 14

G-2 Post (TYP) (see Note 4)

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Type 20 Beam Guardrail pay limit

Type 6 Transition pay limit

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Thrie Beam Guardrail Reducer Section Type B

0 Spaces

Edge of Bridge

Terminal pay limit (see Note 2)

Terminal pay limit (see Note 2)

NOTES
1. For Service Level 1, Weak Post Bridge Rail System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
4. See Standard Plan "Beam Guardrail Posts and Blocks".

Direction of Traffic

CASE 14

G-2 Post (TYP) (see Note 4)

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Type 20 Beam Guardrail pay limit

Type 6 Transition pay limit

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Thrie Beam Guardrail Reducer Section Type B

0 Spaces

Edge of Bridge

Terminal pay limit (see Note 2)

Terminal pay limit (see Note 2)

NOTES
1. For Service Level 1, Weak Post Bridge Rail System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
4. See Standard Plan "Beam Guardrail Posts and Blocks".

Direction of Traffic

CASE 14

G-2 Post (TYP) (see Note 4)

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Type 20 Beam Guardrail pay limit

Type 6 Transition pay limit

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Thrie Beam Guardrail Reducer Section Type B

0 Spaces

Edge of Bridge

Terminal pay limit (see Note 2)

Terminal pay limit (see Note 2)

NOTES
1. For Service Level 1, Weak Post Bridge Rail System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
4. See Standard Plan "Beam Guardrail Posts and Blocks".

Direction of Traffic

CASE 14

G-2 Post (TYP) (see Note 4)

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Type 20 Beam Guardrail pay limit

Type 6 Transition pay limit

Type 1 Beam Guardrail pay limit (0 spaces MIN)

Thrie Beam Guardrail Reducer Section Type B

0 Spaces

Edge of Bridge

Terminal pay limit (see Note 2)

Terminal pay limit (see Note 2)
NOTES

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

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


CASE 15

Terminal Pay Limit (see Note 1)

Modified Beam Guardrail (see Detail and Note 3)

Beam Guardrail pay limit

Box Culvert

Spaces at 6'-3"

Direction of Traffic

25' (see Note 4)

See Note 2

See Note 2

Donald K. Nelson
3/28/97

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One Way Traffic

CASE 16

- Anchor pay limit (see Note 1)
- Beam Guardrail pay limit (see Note 2)
- Terminal pay limit (SRT shown) (see Note 2)
- Edge of shoulder
- Varies (see contract)

One Way Traffic

CASE 17

- Edge of shoulder
- Varies (see contract)
- Beam Guardrail pay limit (see Note 3)
- Terminal pay limit (SRT shown) (see Note 2)

Two Way Traffic

CASE 18

- Anchor pay limit (see Note 1)
- Beam Guardrail pay limit (see Note 1)
- Curb face extension line

NOTES

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

GUARDRAIL PLACEMENT
STANDARD PLAN C-2j

FLARE RATE TABLE

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<th>Rate</th>
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<td>14:1</td>
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<td>11:1</td>
<td>50</td>
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<tr>
<td>10:1</td>
<td>45</td>
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<tr>
<td>9:1</td>
<td>40 or less</td>
</tr>
</tbody>
</table>

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.

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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.

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

CASE 21

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NOTES
1. See Contract for transition and connection type.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Guardrail installation shall be Beam Guardrail Type 1 with standard post and block.
4. First letter of case designation indicates end treatment on side road. Second letter indicates 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.

GUARDRAIL PLACEMENT
STRONG POST
INTERSECTION DESIGN
STANDARD PLAN C-2p

CASE 22 A.  
(Case Note 4)

CASE 22 B.  
(Case Note 4)

CASE 22 C.  
(Case Note 4)

CASE 22 D.  
(Case Note 4)

IDENTIFICATION PLATE MOUNTING DETAIL

IDENTIFICATION PLATE DETAIL

(See Note 6)
NOTE

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

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

DRAWN BY:  MARK SUJKA

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**Sheet 1 of 1 Sheet**

**Washington State Department of Transportation**

**STANDARD PLAN C-3a**

**Type 6**

Eight Spaces @ 3' - 1 1/2" Max.

**Total Length = 25' - 0"**

**Beam Guardrail Pay Limit**

- **6' - 3" Post Spacing**
  - G-2 Post (Typ.)
  - See Std. Plan C-1b
  - 6' - 0" Long, 6×8 Post with Standard Block (Typ.)

**Type 2**

Six Spaces @ 3' - 1 1/2" Max.

**Total Length = 18' - 0"**

**Beam Guardrail Pay Limit**

- **6' - 3" Post Spacing**
  - 6×8 Post with Standard Block (Typ.)
  - 12' - 6" Nested W Beam (12 Gage)

**Type 5**

Four Spaces @ 3' - 1 1/2" Max.

**Total Length = 12' - 0"**

**Beam Guardrail Pay Limit**

- **6' - 3" Post Spacing**
  - 6×8 Post with Standard Block (Typ.)
  - 12' - 6" Nested W Beam (12 Gage)

**Type 4**

Six Spaces @ 3' - 1 1/2" Max.

**Total Length = 20' - 0"**

**Beam Guardrail Pay Limit**

- **6' - 3" Post Spacing**
  - 6×8 Post with Standard Block (Typ.)
  - 12' - 6" Nested W Beam (12 Gage)

---

**Beam Guardrail Transition Sections**

**Standard Plan C-3a**

**Type 5**

- 6' - 3" Long, 6×8 Post with Standard Block (Typ.)
- See Contract Plans for Specified Connection

**Type 4**

- 6' - 3" Long, 6×8 Post with Standard Block (Typ.)
- For 45 MPH and Below
- See Contract Plans for Specified Connection

---

**Drawn by:** Mark Sujka

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

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**Effective:** April 6, 2009 to December 6, 2009

**Approved for Publication:** 10-04-05

**Harold J. Peterfeso**

Washington State Department of Transportation

**Expiry:** July 24, 2006
NOTES

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

2. When three 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.

3. When three 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 flatter.

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TYPE 13
APPROACH END
THREE BEAM INSTALLED AT FACE OF BRIDGE RAIL

THREE BEAM GUARDRAIL TRANSITION SECTION TYPE A - PAY LIMIT

6' - 6" LONG, 10×10 POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL
PAY LIMIT

THREE BEAM GUARDRAIL REDUCER SECTION TYPE A

12' - 6" NESTED THREE BEAM (12 GAUGE)
FOUR SPACES @ 3' - 1 1/2" MAX.

3' - 8" LOAD
6' - 6" LONG

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

6' - 6" LONG, 10×10 POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL
PAY LIMIT

BEAM GUARDRAIL TRANSITION SECTION TYPE 14 - PAY LIMIT

THREE BEAM GUARDRAIL REDUCER SECTION TYPE A

12' - 6" NESTED THREE BEAM (12 GAUGE)
FOUR SPACES @ 3' - 1 1/2" MAX.

6' - 3" LOAD
6' - 6" LONG

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

2' - 6" TO 6' - 3"
THREE SPACES

TYPE 14
TRAILING END
THREE BEAM INSTALLED AT FACE OF BRIDGE RAIL

THREE BEAM GUARDRAIL TRANSITION SECTION TYPE 15 - PAY LIMIT

6' - 6" LONG, 10×10 POST WITH STANDARD BLOCK (TYP.)

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

6' - 6" LONG, 10×10 POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL
PAY LIMIT

THREE BEAM GUARDRAIL REDUCER SECTION TYPE A

12' - 6" NESTED THREE BEAM (12 GAUGE)
FOUR SPACES @ 3' - 1 1/2" MAX.
1. See Contract for the number of thrie beam sections for Beam Guardrail Type 11.

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

3. Install 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" × 4" lag bolts.

See Notes 1 & 2
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.

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.

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.

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (minimum)

Offset distances:
- FLEAT 350: 4'-0" minimum
- FLEAT TL2: 1'-8" minimum (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. 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.

27”

10’ MIN

4’ MIN

(SEE NOTES 4 & 5)

STANDARD PLAN C-4e

20:1 SLOPE OR FLATTER

RELATIVE TO GRADE

10:1 SLOPE OR FLATTER

(RELATIVE TO GRADE)

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.
GUARDRAIL POST LAYOUT - DESIGN 1

THREE BEAM WOOD 6" x 8" BREAKAWAY POST (BESI PLAN G-16)

NOTE: CABLE BEARING PLATE NOT SHOWN

THREE BEAM WOOD 6" x 8" POST (BESI PLAN G-16)

5/8" x 9" BOLT, NUT AND WASHER

6' - 0" STEEL FOUNDATION TUBE TS 8" x 0.1875"

GUARDRAIL POST LAYOUT - DESIGN 2

W-BEAM WOOD BLOCK FOR WOOD POSTS (SEE STD. PLAN C-16)

TAPERED BLOCK

8' - 0" STEEL FOUNDATION TUBE TS 8" x 0.1875"

5/8" x 9" BOLT, NUT AND WASHER

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NOSE CABLE ASSEMBLY

CABLE ANCHOR & BRACKET ASSEMBLY

ANCHOR PLATE

POST 1

POST 2

ANCHOR CABLE

PLAN - THRIE BEAM NOSE

STANDARD PLAN C-4f

2 1/16" BULL NOSE TERMINAL

NOSE CABLE, 2 REQUIRED

U-BOLT CABLE CLIPS, 6 REQUIRED

3/4" CABLE CLAMP

NOSE CABLE

U-BOLT CABLE CLIP ASSEMBLY

SECTION A

NOSE CABLE ASSEMBLY

ANCHOR CABLE AND PLATE, SEE STD. PLAN C-6f

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

NOSE CABLE

ANCHOR PLATE

THREE BEAM NOSE

SECTION A

STEEL PLATE, ASTM A36
12 5/8" x 5 7/8" x 3/16"

BEAM GUARDRAIL

BULL NOSE TERMINAL

STANDARD PLAN C-4f

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SLOTTED THREE BEAM RAIL ELEMENT #1
SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS
(TAIL 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
(TAIL 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

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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.

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".

---

ABOVE SHEET 1 OF 1 SHEET

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.

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".

---

Harold J. Peterfeso
10-31-03

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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.
BEARING PLATE

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

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

1/4" Hole (eight required)

3/8" x 1 1/2" Stud
Threaded full length (TYP)

3/16" x 1 1/2" x 3/4" Cable

ELEVATION

SECTION B-B

BEAM GUARDRAIL ANCHOR
TYPE 1

ANCHOR RAIL WASHER

ANCHOR CABLE

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

EXPIRES MAY 3, 1998

STANDARD PLAN C-6
NOTES

1. Rail section and W8 x 17 post shall be fabricated to receive 3/8" hex head bolts as shown.

2. All bolts shall be high strength 3/8" hex head bolts with anchor rail washers.

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ELEVATION

6' Post
(or 3' MIN in solid rock)

5' - 0" (or 2' - 0" in solid rock)

One 1 3/4" x 5 1/4" x 0.164"
washer with two 9/16" holes

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PLAN

W8 x 17 Steel post

3/8" Hex head bolts

3 1/8" Backing plate

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SECTION B-B

W8 x 17 Steel post

---

BACKING PLATE

Donald K. Nelson
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

STANDARD PLAN C-6a

APPROVED FOR PUBLICATION

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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.

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**NOTES**

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**DETAIL B**

1/4" Nut

1" x 4"

Stud threaded full length

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**BEAM GUARDRAIL ANCHOR TYPE 5**

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**STANDARD PLAN C-6d**

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**DONALD K. NELSON**

**STATE DESIGN ENGINEER**

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

**APPROVED FOR PUBLICATION**

**EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009**

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**EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009**

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**EXPIRES MAY 3, 1998**

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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.

5'-3”

Anchor plate (see Note 1)

Two 1” nuts and washers (see Note 1)

Standard 2” ID pipe sleeve (23/8” OD)

Two 1” nuts and washers (see Note 1)

Anchor Post Assembly (see Note 3)

BEAM GUARDRAIL ANCHOR TYPE 7

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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.

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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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.

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 wenn 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 9-06.5(4)) with thin slab ferrule inserts or wenn bonded anchors. See the Contract Plans.
1. Wire rope loops shall be 3'-6" long, except for the top loop of the Barrier Terminal, which shall be 2'-0" long.

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

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

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

CONCRETE BARRIER TYPE 2
STANDARD PLAN C-6
SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Peppo Jakobsen RN
Engineer
Washington State Department of Transportation
Concrete Barrier Type 4

Intermediate Plan

- 5 Bars (Bar B)
- V/8 Clearance
- Wire rope loop (TYP)
- Lifting notches
- 3" Clearance
- Bevel or round edges (3/4" MAX)
- Chamfer

Intermediate Elevation

- 2 1/2" Clearance
- Lifting notches
- Bevel or round edges (3/4" MAX)
- 10'-0" or 12'-6"

Section A-A

Type 4

- 1/4" Clearance
- 1/8" Chamfer
- Beveled or Chamfered

Transition Plan

- 2 1/2" Clearance
- Wire rope loop or alternate bar loop (TYP)
- 2" Clearance
- 3" Clearance
- Bevel or round edges (3/4" MAX)

Transition Elevation

- Wire rope loop or alternate bar loop loop (TYP)
- 3 1/2" Clearance
- Bevel or round edges (3/4" MAX)

Transition Section

- Varies 2'-0" to 3'-0"
- Chamfer
- Bevel or round edges (3/4" MAX)

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. This plan shall be used for 40" and 50' Light Standards with 18" max. length double mast arms.
2. See Standard Plan C-6b for details on barrier ends, Wire Rope Loops, and Connecting Points.
3. See the Contract Plans for conduit placement.
4. Concrete shall be Class 4000.
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.
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.
BOX CULVERT GUARDRAIL STEEL POST TYPE 1
(16" to 36" ground cover)

BASE ATTACHMENT DETAIL

See Base Plate Detail

3/4" Grout pad

Varies 6" to 10"

Box culvert

See Cover Plate Detail

POST ATTACHMENT DETAIL

Tack weld nut to plate

W8x35

See Note 1

See Anchor Attachment Detail

Center line of W8x35

W6x9

See Base Plate Detail

High strength bolts (four required) (See Note 1)

Traffic side

Center line of W6x35

W6x35

See Note 1

See Anchor Attachment Detail

Ground line

See Cover Plate Detail

3/4" x 2" Bolt with hex nut and washer (TYP)

Post base plate (See detail sheet 2)

3/4" Grout pad

Varies 6" to 10"

See Post Base Plate Detail

Box culvert

POST BASE ATTACHMENT DETAIL

W6x9

See Post Base Plate Detail

Center line of W6x9

3/4" Grout pad

Varies 6" to 10"

See Post Bearing Plate Detail

Box culvert

3/4" x 2" Bolt with hex nut and washer (TYP)

Post base plate (See detail sheet 2)

W8x35

See Base Plate Detail

High strength bolts (four required) (See Note 3)

Traffic side

Center line of W8x35

W6x9

See Note 1

See Anchor Attachment Detail

Ground line

See Cover Plate Detail

3/4" x 2" Bolt with hex nut and washer (TYP)

Post base plate (See detail sheet 2)

3/4" Grout pad

Varies 6" to 10"

See Post Base Plate Detail

Box culvert

POST BASE ATTACHMENT DETAIL

W6x9

See Post Base Plate Detail

Center line of W6x9

3/4" Grout pad

Varies 6" to 10"

See Post Bearing Plate Detail

Box culvert

3/4" x 2" Bolt with hex nut and washer (TYP)

Post base plate (See detail sheet 2)
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 5/4" 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.
1. PERMANENT INSTALLATION requirement: embed barrier 3" minimum, install 1/4" Premolded Joint Filler between segments, fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.

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

3. Installation on a horizontal curve with a radius less than 2000 requires a modified design.

4. For Barrier with 5'-10" repeat, see sheet 2.
For High Performance Barrier with 3'-6" repeat, see sheet 3.

PREPARED GRADED BASE
HORIZONTAL GRADE DIFFERENTIAL
BARRIER TRANSITION DETAIL

DIMENSION TABLE

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

NOTE:

- Use 80 Bar (Typ.)
- Use 80 Bar (Typ.)
- Use 80 Bar (Typ.)

SINGLE SLOPE CONCRETE BARRIER (PRECAST)
STANDARD PLAN C-13
SHEET 1 OF 6 SHEETS

APPROVED FOR PUBLICATION
Pe zoo Babcock PN
GT-03-08
Washington State Department of Transportation
STANDARD MOUNTING HEIGHT

SECTION A
3'-0" BARRIER, SHOWN LEVEL

SECTION B
4'-0" BARRIER FOR USE WITH A GIRDER, THAN 90 TO 95 MAX, GRADE SEPARATION

SECTION C
5'-0" BARRIER FOR USE WITH A GRADE, THAN 110 TO 130 MAX, GRADE SEPARATION

STANDARD MOUNTING HEIGHT

SECTION D
6'-0" BARRIER FOR USE WITH A GRADE, THAN 150 TO 180 MAX, GRADE SEPARATION
NOTES:

1. PERMANENT INSTALLATION requirement: embed barrier 5" minimum, install 1/4" pre-molded joint filler between segments, fill the Connection Blockout with grout, and cover the Rebar Grid in the blockout before adding grout.

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

3. See Standard Plan C-12a for REBAR GRID DETAIL and BARRIER CONNECTION DETAIL.

4. This plan is for transitions to precast concrete barriers only.

5. When High Performance Concrete Barriers are specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 5'-0" and a minimum embedment of 3'.
1. **PERMANENT INSTALLATION** requirement: embed barrier 3" minimum. Install 1/4" pre-molded Joint Filler between segments, fill the Connection Blockout with grout, mortering the Rebar Grid in the blockout before adding grout.

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

3. See Standard Plans C-13a for REAR GRID DETAIL and BARRIER CONNECTION DETAIL.

4. Vertical Back barrier is used only in the configurations shown in Standard Plans C-13a and C-13b, and when placed against a retaining wall.

5. When High Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 6", and a minimum embedment of 3".

---

**DIMENSION TABLE**

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD.</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>HP</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

---

**ELEVATION**

**SECTION A**

**PLAN**

---

**SECTION B**

**SIDE VIEW**

---

**MECHANICAL VIEW**

---

**ATTACHMENT**

---

**REINFORCING STEEL BENDING DIAGRAM**

---

**REMARKS**

---

**APPROVED FOR PUBLICATION**

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**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

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**PEZZO, BALDWIN & CO.**

---

**NOTE**

---

**DATE**

---

**SINGLE SLOPE CONCRETE BARRIER (PRECAST) VERTICAL BACK STANDARD PLAN C-13b**
1. **PERMANENT INSTALLATION** requirements: embed barrier 3'-0" minimum, install 1/4" Preformed Joint Filler between segments, fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before setting grout.

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

3. See Standard Plan C-14 for REBAR GRID DETAIL and BARRIER CONNECTION DETAIL.

4. The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.

5. When High Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P bar in the DIMENSION TABLE, with a minimum height above roadway of 3'-0", and a minimum embedment of 5'.
1. Reinforcing steel dimensions and spacings are shown for stationary form construction. When slipform construction is used, increase reinforcing steel dimensions to the outside surfaces of the barrier to 2.125" and adjust the fiber dimensions as required.

2. When connecting between cast-in-place and precast single slabs barriers, provide a Blockout, Filter Grid, and added fiber, as shown in Standard Plan C-12.

3. The actual dimensions will vary as the pressure changes and the barrier transitions in height and width. The dimensions may be modified for intermediate barrier heights.

4. For Barrier with a 3'-0" reveal, see Sheet 2. For High Performance Barrier with a 3'-0" reveal, see Sheet 3.

---

TYPICAL SECTION

DUMMY JOINT DETAIL

---

RISHPOR AND STEEL RIBBING DIAMETER

---

EXPANSION JOINT TABLE

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-0&quot;</td>
<td>1/4&quot;</td>
<td>0&quot;</td>
<td>1/4&quot;</td>
<td>0&quot;</td>
<td>1/4&quot;</td>
<td>0&quot;</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>1&quot;</td>
<td>0&quot;</td>
<td>1&quot;</td>
<td>0&quot;</td>
<td>1&quot;</td>
<td>0&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>3&quot;</td>
<td>0&quot;</td>
<td>3&quot;</td>
<td>0&quot;</td>
<td>3&quot;</td>
<td>0&quot;</td>
<td>3&quot;</td>
</tr>
</tbody>
</table>
This plan is for transitions to Precast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.

**NOTES**

1. Field bend as required in transition.
2. All bends are 2" radius.

**REINFORCING STEEL BENDING DIAGRAM**

- Field bend as required in transition.
- All bends are 2" radius.

**SECTION A**

- 3" MIN.
- VARIES 3'-6" TO 1'-0"
- 11/2" CLR.
- VARIES 6" TO 11" (TYP.)
- 3/4" CHAMFER (TYP.)
- VARIES 5/8" TO 3/4" (TYP.)

**SECTION B**

- 3" MIN.
- VARIES 3'-6" TO 1'-0"
- 11/2" CLR.
- VARIES 6" TO 11" (TYP.)
- 3/4" CHAMFER (TYP.)
- VARIES 5/8" TO 3/4" (TYP.)

**SECTION C**

- 3" MIN.
- VARIES 3'-6" TO 1'-0"
- 11/2" CLR.
- VARIES 6" TO 11" (TYP.)
- 3/4" CHAMFER (TYP.)
- VARIES 5/8" TO 3/4" (TYP.)

**SECTION D**

- 3" MIN.
- VARIES 3'-6" TO 1'-0"
- 11/2" CLR.
- VARIES 6" TO 11" (TYP.)
- 3/4" CHAMFER (TYP.)
- VARIES 5/8" TO 3/4" (TYP.)

**SECTION E**

- 3" MIN.
- VARIES 3'-6" TO 1'-0"
- 11/2" CLR.
- VARIES 6" TO 11" (TYP.)
- 3/4" CHAMFER (TYP.)
- VARIES 5/8" TO 3/4" (TYP.)

**SECTION F**

- 3" MIN.
- VARIES 3'-6" TO 1'-0"
- 11/2" CLR.
- VARIES 6" TO 11" (TYP.)
- 3/4" CHAMFER (TYP.)
- VARIES 5/8" TO 3/4" (TYP.)

**SECTION G**

- 3" MIN.
- VARIES 3'-6" TO 1'-0"
- 11/2" CLR.
- VARIES 6" TO 11" (TYP.)
- 3/4" CHAMFER (TYP.)
- VARIES 5/8" TO 3/4" (TYP.)
**NOTES**

1. The Terminal is used only on the tailing end of a barrier, unless otherwise stated in the Contract.

2. See Standard Plans C-14a, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details.

3. When High Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above territory of 3'-6" and a minimum embankment of 3'-6".

### DIMENSION TABLE

<table>
<thead>
<tr>
<th>Height</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Horizontal Bar (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP</td>
<td>6'-6&quot;</td>
<td>8'-0&quot;</td>
<td>7'-0&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td>10-0&quot;</td>
<td>10</td>
</tr>
<tr>
<td>STD</td>
<td>6'-6&quot;</td>
<td>8'-0&quot;</td>
<td>7'-0&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td>10-0&quot;</td>
<td>10</td>
</tr>
</tbody>
</table>
1. The Transition Section is used in the configurations shown in Standard Plans C-14a, and C-15b.

2. See Standard Plan C-14a, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details. Modify rerer on wider and as shown in EXPANSION JOINT MODIFICATION.

3. Reinforcing steel dimensions and clearance are shown for stationary form construction. When slip-form construction is used, increase reinforcing steel clearance to the outside surfaces of the barrier to 3/16" and adjust steel dimensions as required.

4. When High Performance Concrete Barrier is specified in the Contract, the dimensions given in the HPC row in the DIMENSION TABLE, with a minimum height above roadway of 5' - 0" and a minimum embankment of 3'.

SINGLE SLOPE CONCRETE BARRIER (CAST-IN-PLACE)
TRANSITION SECTION
STANDARD PLAN C-14d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Effective: April 6, 2009 to December 6, 2009
**NOTES**
2. ALL CONCRETE SHALL BE CLASS 4000.

**BAR LIST**

<table>
<thead>
<tr>
<th>BAR NO.</th>
<th>LOCATION</th>
<th>BAR/FT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BARRIER - TOP VERTICAL</td>
<td>#4 24</td>
</tr>
<tr>
<td>2</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>#4 24</td>
</tr>
<tr>
<td>3</td>
<td>BARRIER - HORIZONTAL</td>
<td>#6 10</td>
</tr>
</tbody>
</table>

**NOTE:**
- Dimensions are not counting gripper bars.
- All dimensions are out to out.

**TABLE**

<table>
<thead>
<tr>
<th>Grade Separation</th>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>HORIZONTAL BARS (FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 3’</td>
<td>3’-0”</td>
<td>2”</td>
<td>2”</td>
<td>2”-10”</td>
<td>3” MIN.</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>UP TO 7’</td>
<td>4’-0”</td>
<td>2”</td>
<td>1”-0”</td>
<td>2”-10”</td>
<td>6-0”</td>
<td>7” MIN.</td>
<td>5</td>
</tr>
<tr>
<td>UP TO 15’</td>
<td>4’-0”</td>
<td>2”</td>
<td>1”-0”</td>
<td>2”-10”</td>
<td>6-0”</td>
<td>7” MIN.</td>
<td>5</td>
</tr>
</tbody>
</table>

**LEADING END TRANSITION**
- FROM SINGLE SLOPE DUAL-FACED BARRIER TO MONOTUBE SIGN STRUCTURE FOUNDATION

**EXPANSION JOINT**
- 3/4” PREMOLDED JOINT FILLER AT EXPANSION JOINT (TYP.)

**DUMMY JOINT**
- 3/4” DUMMY JOINT (TYP.)

**ISOMETRIC VIEW**
- MONOTUBE SIGN STRUCTURE BARRIER TRANSITION FOR MONOTUBE SIGN SUPPORT FOUNDATION (SEE BRIDGE PLANS)

**SECTION A**
- 3’-6” BARRIER TRANSITION FOR MONOTUBE SIGN SUPPORT FOUNDATION

**SECTION B**
- SINGLE SLOPE CONCRETE BARRIER

**TYP.**
- 9 1/2”

**TABLE**

**NOTE: **

- When connecting between cast-in-place and precast single slope barrier, provide a slot and rebar grid as shown in STD. PLAN D-13.
- All concrete shall be CLASS 4000.

**DRAWN BY:** MARK SUJKA

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

**EXPIRES NOVEMBER 14, 2004**

**Sheet 1 of 1 Sheet**
SINGLE SLOPE CONCRETE BARRIER CANTILEVER SIGN
STANDARD PLAN C-14k

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

NOTES:
1. See Standard Specification 8-31.3(3) for construction requirements.
2. Use 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-12.

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>DATE/DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft Concrete</td>
<td>Class 40DP</td>
</tr>
<tr>
<td>All Other Concrete</td>
<td>Class 4000</td>
</tr>
<tr>
<td>Concrete Block</td>
<td>Class 2000</td>
</tr>
<tr>
<td>Anchor Rods</td>
<td>3/8&quot; diameter, 16&quot; long</td>
</tr>
<tr>
<td>Anchor Bolts</td>
<td>M12 x 600mm</td>
</tr>
<tr>
<td>Anchor Plates</td>
<td>A36 steel</td>
</tr>
</tbody>
</table>

SHAFT DEPTH

<table>
<thead>
<tr>
<th>SHAFT WIDTH</th>
<th>TOTAL U.S. AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot; - 20&quot;</td>
<td>300 - 400</td>
<td>1000 - 1400</td>
</tr>
<tr>
<td>18&quot; - 22&quot;</td>
<td>400 - 500</td>
<td>1000 - 1400</td>
</tr>
</tbody>
</table>

SEE SECTION "A - B" FOR SHAFT REINFORCEMENT

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Peaza Badakhsh 8N 05-10-08
Washington State Department of Transportation
1. Use the barrier type, precut or cast-in-place, as specified in the Contract.

2. For Single Slope Concrete Barrier details, use Standard Plan series 0-13 (precut) or 0-14 (cast-in-place).
NOTES:

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

2. For Single Slope Concrete Barrier details, see Translated Plan series 0-18 (striped) or 0-14 (cast-in-place).
TRAFFIC BARRIER SHOULDER WIDENING - FOR SHOULDERS 8.0' AND WIDER
STANDARD PLAN C-16a

PRECAST CONC. BARRIER TYPE 2

Hinge-Point

Shoulder

4.0' Min.

Face of Barrier

SINGLE SLOPE CONC. BARRIER
CAST-IN-PLACE

4.0' Min.

2.7 Min.

Hinge-Point

Pavement

MATCH SHOULDER SLOPE

MATCH SHOULDER SLOPE

FACE OF BARRIER

STEEPER THAN 2H:1V
BUT NOT STEEPER
THAN 1H:1V

FACE OF BARRIER

Hinge-Point

BEAM GUARDRAIL ON STEEP SLOPES

Hinge-Point

CABLE BARRIER

Type 3 Anchors
(SEE STD. PLAN C-8e)

ANCHORED PRECAST CONC. BARRIER TYPE 2

Shoulder

3.5 Min.

FACE OF BARRIER

Hinge-Point

Pavement

MATCH SHOULDER SLOPE

2H:1V OR FLATTER SLOPE

2H:1V OR FLATTER SLOPE

BEAM GUARDRAIL

Hinge-Point

Pavement

MATCH SHOULDER SLOPE

MATCH SHOULDER SLOPE

FACE OF BARRIER

SINGLE SLOPE CONC. BARRIER
PRECAST

4.0' Min.

4.0' Min.

Hinge-Point

Hinge-Point

FACE OF BARRIER

FACE OF BARRIER

2.0' Min.

3.5' Min.

BEAM GUARDRAIL ON STEEP SLOPES

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
11-08-05
NOTES
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 8.0' or more.

PRECAST CONC. BARRIER TYPE 2

SINGLE SLOPE CONC. BARRIER CAST-IN-PLACE

SHOULDER

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

SHOULDER

RESERVED

STANDARD PLAN C-16b

NOTES

1. SEE NOTES

2. SEE NOTES

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
11-08-05

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CABLE BARRIER TYPE 1 OR 2

FACE OF BARRIER

MATCH PAVED SHOULDER TO FACE OF GUARDRAIL

HINGE-POINT

SHOULDER

FACE OF BARRIER

SHOULDER

HINGE-POINT

CABLE BARRIER

ANCHORED PRECAST CONC. BARRIER TYPE 2

SINGLE SLOPE CONC. BARRIER PRECAST

SHOULDER

2.0' MIN.

HINGE-POINT

SHOULDER

3.0' MIN.

HINGE-POINT

SHOULDER

4.0' MIN.

HINGE-POINT
1. For component details, see Standard Plan C-23.60.
2. For terminal type and details, see Contract Plans and applicable drawings.
3. The slope from the edge of the shoulder into the face of the guardrail cannot exceed 10:1 when the face of the guardrail is less than 12'-0" from the edge of the shoulder.
4. For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.
5. Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.

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
1. For additional details not shown, see Standard Plan C-20.40-00.
1. See Contract for transition and connection type.

2. For additional installation requirements for Non-Flared Terminal placement see Standard Plan C-22.44.

3. Guardrail installation shall be Beam Guardrail Type 31 with standard post and block.

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

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

6. The guardrail Identification Plate shall be mounted at the lower rail side bolt on the back side of the rail element at the PC of the guardrail radius.
1. Postas installed on shoulder slopes steeper than 12H:1V shall be 6 ft long.

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

3. Determine the height of the W-Beam at the Anchor (H) by first calculating the perpendicular offset distance (D) from the edge of the barrier to the edge of the barrier. Then, add the product from the elevation of the point (H) on the edge of the barrier to obtain the offset distance. Add Beam Guardrail design height (H) to that distance for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION 10:

\[ Elevation_{top} = (Elevation_{anchor} - D_{offset}) + H \]

H = 37" (3.37) for Beam Guardrail Type 1

---

**BEAM GUARDRAIL TYPE 1**

**BURRED TERMINAL TYPE 2**

**STANDARD PLAN C-22.14-00**

**SHEET 1 OF 1 SHEETS**

Approved for PUblication

Prezio & Associates

Washington State Department of Transportation
1. An ET-PLUS 31 as manufactured by Trinity Industries, Inc. or an ET-PLUS 30 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, it 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 ET-PLUS 30.

6. See Note 2

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. 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. For End Section details, see Standard Plan C-7. For Anchor Post Assembly details, see Standard Plan C-1b. Use detail on this plan for Wood Breakaway Post. (No Block on this post). 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. Posts shall match those of connecting run: Timber or Steel.
1. This guardrail transition is for connection to a vertical concrete shape or single slope barrier and cannot be connected directly to a concrete safety shape.

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, 4 and 6 requires an additional hole to attach tapered blocks and/or rubrail.

5. Posts 1 and 2 are 10×10 timber or W8×13 steel posts ~ 7'-6" long. Posts 3 through 9 are 6×8 timber or W6×9 steel posts ~ 6'-0" long.

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1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or an S-shaped barrier. The toe of the single slope and the F-shaped barrier shall be tapered so that it does not project past the face of the approach guardrail.
1. See Standard Plan C-010 and C-06.00 for rail elements and truss beam block details.
2. When a transition is required on the trailing end of the bridge, use a minor range of this plan.
3. For additional alternatives not shown, see Contract Plans.

NOTE:

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

NOTE:

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

NOTE:

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

NOTE:

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009
NOTES:
1. Refer to Standard Plan C-1-1 and C-1-1b for component details for Beam Guardrail Type 1 not shown on this plan.
2. Refer to Standard Plan C-2-6-40 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" blockout of the Beam Guardrail Type 31. See PLAN VIEW – ALIGNMENT TAPER.
4. All panels for any standard barrier run shall be of the same type. Timber or Steel.
Notes:
1. Refer to Standard Plan C-1 and C-1b 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).
5. Wood blocks shall be toe-nailed to post (and blocks, if block combinations are utilized) with a 16d galvanized nail to prevent block rotation.
6. On steel posts, attach blockouts using bolt holes on approaching traffic side of post web.

SLOPE EMBANKMENT TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>3.5% OR FLATTER</th>
<th>1.5%</th>
<th>1.0%</th>
<th>0.4%</th>
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<tbody>
<tr>
<td>INTERTHROUGH</td>
<td>3.0 MI.</td>
<td>1.5 MI.</td>
<td>0.4 MI.</td>
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<table>
<thead>
<tr>
<th>WOOD BLOCK</th>
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<tbody>
<tr>
<td>3/4&quot; DIAM. HOLE THROUGH BLOCK FOR STEEL POST</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>W6×9 STEEL POST OR 6×8 TIMBER POST</th>
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</thead>
<tbody>
<tr>
<td>SEE NOTE 2</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>BLOCKOUT</th>
</tr>
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<tbody>
<tr>
<td>6×8 TIMBER POST OR W6×9 STEEL POST</td>
</tr>
<tr>
<td>SEE NOTE 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BEAM GUARDRAIL TYPE 31</th>
</tr>
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<tbody>
<tr>
<td>STANDARD PLAN C-32.40-00</td>
</tr>
<tr>
<td>SHEET 1 OF 1 SHEET</td>
</tr>
</tbody>
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1. The Design Layout Line shall intersect the Cable Barrier at a point that is at least 22 feet (perpendicular) from the opposite Edge of Travelled Way.
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 Travelled Way.
1. Extend the Cable Barrier until the Design Layout Line crosses the opposing Cable Barrier and intercepts the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Travelled Way.
1. Walls to be designated Noise Barrier Wall Type 1A, 1B, 1C, or 1D. The contract specifies actual wall designations.

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

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

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

5. The contract specifies actual foundation requirements D1 or D2.
1. Wall to be designated Noise Barrier Wall Type 2A, 2B, 2C or 2D. The Contract specifies actual wall designations.

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

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

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

5. See Contract.

**NOTES**

**CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING**

**STANDARD PLAN D-2.04-00**

**APPROVED FOR PUBLICATION**

Harold J. Peterfeso
Washington State Department of Transportation

EXPIRES AUGUST 23, 2006

**STATE DESIGN ENGINEER**

**SHEET 1 OF 2 SHEETS**

**NOTE:** THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

JOINT AND CORNER DETAIL

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

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

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

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

4. Construction joints in the shaft cap shall be spaced at 12/3 feet minimum.

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

#4 STIRRUP

W 3.5 SPIRAL @ 6" PITCH

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL

TYPE 4

STANDARD PLAN D-2.08-00

REINFORCEMENT TABLE

DEPTH

D1 OR D2

SEE NOTE 5

WEIGHTS AND MEASURES

ANGLE POINT

BAR "D"

BARRIER PANEL

3/4" CHAMFER (TYP.)

1/2" NOISE SEALER (TYP.)

TRAFFIC SIDE

PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

SPACING @ 12" THREE SPACES @ 6"

JOINT AND CORNER DETAIL

PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

2' - 0" CORNER PANEL

BAR "D"
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 Contractor specifies actual foundation requirements D1 or D2.

CAST-IN-PLACE W/TRAFFIC BARRIER ON TRENCH FOOTING

CARRY-OUT D-2.10-00

REINFORCING STEEL

#5 BARS 2'-2" MIN. SPLICE

22'-0" FOR TYPE C

24'-0"

2'-0"

18'-0"

16'-0"

14'-0"

12'-0"

10'-0"

8'-0"

6'-0"

#4 BARS 2'-0" MIN. SPLICE

2'-0"

2'-4"

2'-0"

1'-9"

5'-6"

3/4" CHAMFER (TYP.)

1/2" NOISE PANEL CORNER

6" MIN. ELEVATION

2'-0" MAX.

WALL HT

1/2" PREMOLDED JOINT FILLER IN EXPANSION JOINTS @ 1' - 9" CENTERS MAX. (TYP.)

1'-9" ELEVATION

3" CLR.

TYPICAL SECTION

J Hình Thân "C"

HÀ ALIENST

GHEAOL

DRAWN BY: ADAM COCHRAN

STANDARD PLAN D-2.10-00

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Harold J. Peterfeso

STATE DESIGN ENGINEER

EXPIRES AUGUST 23, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

SHEET 1 OF 1 SHEET

11-10-05

3/4" CHAMFER (TYP.)

2'-0"

2'-4"

BAR "C" (TYP.)

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 Contractor specifies actual foundation requirements D1 or D2.

CAST-IN-PLACE W/TRAFFIC BARRIER ON TRENCH FOOTING

CARRY-OUT D-2.10-00

REINFORCING STEEL

#5 BARS 2'-2" MIN. SPLICE

22'-0" FOR TYPE C

24'-0"

2'-0"

18'-0"

16'-0"

14'-0"

12'-0"

10'-0"

8'-0"

6'-0"

#4 BARS 2'-0" MIN. SPLICE

2'-0"

2'-4"

2'-0"

1'-9"

5'-6"

3/4" CHAMFER (TYP.)

1/2" NOISE PANEL CORNER

6" MIN. ELEVATION

2'-0" MAX.

WALL HT

1/2" PREMOLDED JOINT FILLER IN EXPANSION JOINTS @ 1' - 9" CENTERS MAX. (TYP.)

1'-9" ELEVATION

3" CLR.

TYPICAL SECTION

J Hình Thân "C"

HÀ ALIENST

GHEAOL

DRAWN BY: ADAM COCHRAN

STANDARD PLAN D-2.10-00

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SHEET 1 OF 1 SHEET

11-10-05

3/4" CHAMFER (TYP.)

2'-0"

2'-4"

BAR "C" (TYP.)

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 Contractor specifies actual foundation requirements D1 or D2.

CAST-IN-PLACE W/TRAFFIC BARRIER ON TRENCH FOOTING

CARRY-OUT D-2.10-00

REINFORCING STEEL

#5 BARS 2'-2" MIN. SPLICE

22'-0" FOR TYPE C

24'-0"

2'-0"

18'-0"

16'-0"

14'-0"

12'-0"

10'-0"

8'-0"

6'-0"

#4 BARS 2'-0" MIN. SPLICE

2'-0"

2'-4"

2'-0"

1'-9"

5'-6"

3/4" CHAMFER (TYP.)

1/2" NOISE PANEL CORNER

6" MIN. ELEVATION

2'-0" MAX.

WALL HT

1/2" PREMOLDED JOINT FILLER IN EXPANSION JOINTS @ 1' - 9" CENTERS MAX. (TYP.)

1'-9" ELEVATION

3" CLR.

TYPICAL SECTION

J Hình Thân "C"

HÀ ALIENST

GHEAOL

DRAWN BY: ADAM COCHRAN

STANDARD PLAN D-2.10-00

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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SHEET 1 OF 1 SHEET

11-10-05

3/4" CHAMFER (TYP.)

2'-0"

2'-4"

BAR "C" (TYP.)

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 Contractor specifies actual foundation requirements D1 or D2.

CAST-IN-PLACE W/TRAFFIC BARRIER ON TRENCH FOOTING

CARRY-OUT D-2.10-00

REINFORCING STEEL

#5 BARS 2'-2" MIN. SPLICE

22'-0" FOR TYPE C

24'-0"

2'-0"

18'-0"

16'-0"

14'-0"

12'-0"

10'-0"

8'-0"

6'-0"

#4 BARS 2'-0" MIN. SPLICE

2'-0"

2'-4"

2'-0"

1'-9"

5'-6"

3/4" CHAMFER (TYP.)

1/2" NOISE PANEL CORNER

6" MIN. ELEVATION

2'-0" MAX.

WALL HT

1/2" PREMOLDED JOINT FILLER IN EXPANSION JOINTS @ 1' - 9" CENTERS MAX. (TYP.)

1'-9" ELEVATION

3" CLR.

TYPICAL SECTION

J Hình Thân "C"

HÀ ALIENST

GHEAOL

DRAWN BY: ADAM COCHRAN

STANDARD PLAN D-2.10-00

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Harold J. Peterfeso

STATE DESIGN ENGINEER

EXPIRES AUGUST 23, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

SHEET 1 OF 1 SHEET

11-10-05

3/4" CHAMFER (TYP.)

2'-0"

2'-4"

BAR "C" (TYP.)

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 Contractor 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 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.

CAST-IN-PLACE WITH SINGLE SLOPE TRAFFIC BARRIER ON TRENCH FOOTING

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT. THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON ARCHIVAL. A COPY MAY BE OBTAINED UPON REQUEST.
1. Walls to be designated Noise Barrier Walls must meet the following criteria:
   a. Type 6A, 6B, 6C, or 6D. The contractor shall specify the actual wall designation.
   b. For intermediate wall heights, use the next higher type.
   c. Panels shall have at least 3 feet of level ground on each side.
   d. Construction joints in the foundation shall be spaced at 120 feet maximum.

2. PROVIDE A SMOOTH PROFILE CONSISTENT WITH ROADWAY PROFILE.

3. PROVIDE AN ADDITIONAL 2'-0" SPACE AND SETTING IN THRU CONSTRUCTION JOINTS.

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

5. STANDARD PLAN D-2.14-00

6. APPROVED FOR PUBLICATION

7. Washington State Department of Transportation

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT.

FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
1. Wall to be designated Noise Barrier Wall Type 6SSA, 6SSC, 6SSD or 6SSB. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panel shall have at least 9 feet of level ground on each side.
4. Construction joints in the foundation shall be spaced at 120 feet maximum.

**Typical Section**

1. Construction joint with roughened surface
2. Height may vary as required to provide a smooth profile consistent with roadway profile
3. #4 (typ.) placed as shown with 2' - 0" spaced and extending thru construction joints
4. 12" precasted joint filler in backfill behind joints (typ.) @ 24" - 0" centers max. level (typ.)

**Notes**

- Cast-in-place conc. wall
- #4 single slope traffic barrier on spread footing
- #4, 0", 1/2" precasted joint filler
- #4, 0", 1/2" precasted joint filler

**Standard Plan D-2.16-00**

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

1. 2' - 10" min.
9' - 9" for D1 or 8' - 3" for D2

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

The Contract specifies actual foundation requirements D1 or D2.

Cardinal Points:
- N
- S
- E
- W

SURFACE TREATMENT AS REQUIRED
REINFORCING STEEL BAR "D" ~ CENTERED ON WALL

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

2' - 10" min. expanison abreates as shown

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

NOISE BARRIER WALL TYPE 7SS
STANDARD PLAN D-2.20-00

Sheet 1 of 1 Sheet

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Harold J. Peterfeso
11-10-05

Washington State Department of Transportation

EXPIRES AUGUST 23, 2006
### Notes:
1. Wall to be designated Noise Barrier Wall Type 8A, 8B, 8C or 8D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 2'-0" of level ground on each side.
4. All joints shall be in full contact and sealed.
5. The Contract specifies actual foundation requirements D1 or D2.

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 8A</th>
<th>TYPE 8B</th>
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</thead>
<tbody>
<tr>
<td>6' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>5' - 0&quot;</td>
</tr>
<tr>
<td>7' - 0&quot;</td>
<td>6' - 0&quot;</td>
<td>6' - 0&quot;</td>
</tr>
<tr>
<td>8' - 0&quot;</td>
<td>7' - 0&quot;</td>
<td>7' - 0&quot;</td>
</tr>
<tr>
<td>9' - 0&quot;</td>
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<td>8' - 0&quot;</td>
</tr>
<tr>
<td>10' - 0&quot;</td>
<td>9' - 0&quot;</td>
<td>9' - 0&quot;</td>
</tr>
<tr>
<td>11' - 0&quot;</td>
<td>10' - 0&quot;</td>
<td>10' - 0&quot;</td>
</tr>
</tbody>
</table>

**Precast Concrete Wall on Trench Footing**

**Standard Plan D-3.30-00**

**Elevation**

**Section**

**Notes:**
- There shall not be more than 1'-0" of apron in each trench.
- All joints shall be in full contact and sealed.
- The Contract specifies actual foundation requirements D1 or D2.
1. Walls 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 130 feet maximum.

5. All joints shall be in full contact and sealed.
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

PRECAST CONCRETE WALL
ON SPREAD FOOTING

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## Noise Barrier Wall Type 11

### Standard Plan D-2.38-02

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<th>Applicable Position (Design)</th>
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<tbody>
<tr>
<td>D1</td>
<td>30</td>
</tr>
<tr>
<td>D2</td>
<td>20</td>
</tr>
</tbody>
</table>

### Notations
1. Wall to be designated Noise Barrier Wall Type 11A, 11B, 11C or 11D. The Contract specifies actual wall dimensions.
2. For intermediate wall heights, use the next higher H.
3. Piles shall have at least 3 feet of level ground on each side.
4. The Contract specifies actual foundation requirements D1 or D2.
5. Maximum Panel length shall be 12 feet.

### Diagrams

**Section A**
- Bar "F" - 6 ft lap splice to horizontal bars
- Bar "F" = 12" O.C. MAX.
- Concrete Plaster

**Section B**
- Bar "F" = 4-9/16" @ 12" O.C. MAX.
- NPS 4/5" Pipe
- Reinforcement

**Section C**
- Anchor Bolt Alternative
- Threaded Rod with Nuts at Top and Bottom
- Anchor Bolt Alternative

**Panel View**
- Typical Panel

### Effects
- Effective: April 6, 2009 to December 6, 2009
NOTE: THE BOTTOM OF EACH BAR "B" SHALL BE PAINTED WITH ONE COAT OF FORMULA A-1-160 PRIMER OR ONE COAT OF FORMULA A-11-40 PRIMER.

**DIMENSION TABLE**

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<tr>
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<th>B</th>
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<td>110</td>
<td>2.1562&quot;</td>
<td>1.2562&quot;</td>
<td>2.04&quot;</td>
</tr>
</tbody>
</table>

**BAR "B" THREADED BAR OPTION**

- NO TAP RING REQUIRED ON THE BASE PLATE WHEN USING THE THREADED BAR OPTION. (USE X-130 NUTS)

**BASE PLATE**

- LOCATIONS WHEN (2) 5 HOLES ARE REQUIRED (SEE TABLE)

**NOTE:** THE WEDGE HEAD SHALL BE RENEWED AND UNEVENLY BETWEEN THE WEDGE HEAD AND THE BASE PLATE.

- NO TAP RING REQUIRED ON THE BASE PLATE WHEN USING THE THREADED BAR OPTION. (USE X-130 NUTS)

**ANCHOR BOLT (TYPE) -**

- MAT 5094-04

**BENDER DIAM**

- OUTSIDE OF PLASTER TO OUTSIDE OF PLASTER MINUS 4.125"
NOTED:

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. Panes 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.

THE CONTRACT SPECIFIES:

1. WALL HT
2. FOOTING WX
3. CRUSHED STONE
4. TRENCH FOOTING
5. W/ TRAFFIC BARRIER

The Contract specifies actual wall designation.

<table>
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<tr>
<th>SOIL TYPE</th>
<th>WALL EXPOSURE &amp; VELOCITY</th>
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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 sealed.

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

### Table: Rebar Placement Details

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<td>BAR &quot;D&quot;</td>
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</table>

### Notes:

- Panels shall be braced laterally to prevent displacement during backfill.
- Reinforcement table listed wall height reinforced per listed wall height reinforcement table.
- Panels shall be braced laterally to prevent displacement during backfill.
- Type of bar "A" is #4 @ 16", bar "B" & bar "C" #4 @ 16", bar "D" center in wall.
- Joint and corner detail.

### Construction Details:

- Height may vary if required to provide a smooth profile consistent with the roadway profile.
- Joint and corner detail.
- Panels shall have at least 3 feet of level ground on each side.
- 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 sealed.
- The Contract specifies actual foundation requirements D1 or D2.
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
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.

NOTE:

1. Panel height to be determined by noise wall height.

2. Panels shall be placed in such a way that the vertical joint line is not in a street or drive way.

3. The 30° spiral shall be on the traffic side of the wall as shown on the detail.

4. A standard plan D-2.44-00 may be used.

5. A copy of this plan may be obtained upon request.

6. This plan is not a legal engineering document.
NOTES

1. Wall to be designated Noise Barrier Wall Type 14A, 14B, 14C or 14D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Parapets 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 Plates, and Bar "B" shall have a Preservative 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 288 for Washers; or Zinc rich Paint. Paint threads and nuts after installation.
6. The bottom 9" of Bar "B" shall be painted with one coat of Formula A-6-69 Zinc Dust Primer Off, one coat of Formula A-11-69 Primer.
7. The Contract specifies actual foundation requirements D1 or D2.

The Contract specifies actual foundation requirements D1 or D2.

The bottom 9" of Bar "B" shall be painted with one coat of Formula A-6-69 Zinc Dust Primer Off, one coat of Formula A-11-69 Primer.

All joints shall be in full contact and sealed.

The Contract specifies actual foundation requirements D1 or D2.

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

ADJUST REINFORCEMENT AS NECESSARY TO ACCOMMODATE ANGLE POINT

TYPICAL INTERMEDIATE AND END PANEL

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP)

BASE PLATE DETAIL

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

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END OF PANEL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Harold J. Peterfeso
11-10-05

EXPIRES AUGUST 23, 2006

STANDARD PLAN D-2.46-00

PRECAST CONCRETE WALL
W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

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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Harold J. Peterfeso
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EXPIRES AUGUST 23, 2006

STANDARD PLAN D-2.46-00

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Harold J. Peterfeso
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Harold J. Peterfeso
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W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Harold J. Peterfeso
11-10-05

EXPIRES AUGUST 23, 2006

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W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Harold J. Peterfeso
11-10-05

EXPIRES AUGUST 23, 2006

STANDARD PLAN D-2.46-00

PRECAST CONCRETE WALL
W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

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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. Panels shall have a minimum 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 222 for Hardware, AASHTO M 111 for Washers and Plates, Mechanical Galvanizing AASHTO M 208 CL B, or Zinc Rich Primer, Paint threads and nuts after installation.

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

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

### Table

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### Diagram

- **Isometric View:** Shown for Installation
- **Section At Shaft Support:**
- **Alternate Anchor Detail:** Threaded Rod with Nut Top and Bottom

### PreCast Concrete Wall W/ Single Slope Traffic Barrier on Shaft Foundation

- **Noise Barrier Wall Type 14SS**

---

**Effective:** April 6, 2009 to December 6, 2009

---

**APPROVED FOR PUBLICATION**

Harold J. Peterfeso

11-10-05

Washington State Department of Transportation

---

**APPROVED FOR PUBLICATION**

Harold J. Peterfeso

11-10-05

Washington State Department of Transportation
PRECAST CONCRETE WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL
TYPE 14SS

STANDARD PLAN D-2.48-00

DATE
STATE DESIGN ENGINEER
Washington State Department of Transportation

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Harold J. Peterfeso

EXPIRES AUGUST 23, 2006

DRAWN BY: ADAM COCHRAN

11-10-05
Effective: April 6, 2009 to December 6, 2009

Notes:

1. Wall to be designated Holmes 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 ft 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.

TRAFFIC SIDE

FILLER PLACED IN SASH BLOCK RECESSES.

1/2" JOINT

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

#5 (TYP.)

MASONRY WALL ON TRENCH FOOTHING

NOISE BARRIER WALL

TYPE 16

STANDARD PLAN D-2.60-00

SEE DETAIL A

TYPICAL BOTH SIDES OF WALL

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

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

EXPANSION JOINT AT WIDTH STEP

8" CMU

10" CMU

8" OR 10" CMU CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT

BOND BEAM GROUTING LIMIT

SEE DETAIL A

TYPICAL BOTH SIDES OF WALL

PLAN VIEW

TRAFFIC SIDE

PLAN VIEW

EXPANSION JOINT AT WIDTH STEP

BOND BEAM DETAIL

4'-0" MAX. (TYP.)

BOND BEAM GROUTING LIMIT

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NOTES:

1. Wall to be designated Noise Barrier Wall Type 17A, 17B, 17C or 17D. 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. All masonry shall have at least 3 feet of level ground on each side.

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

8. See “Masonry Wall Finishes and Details” sheet for masonry block finishes, special shapes, sizes and layout.

MASONRY WALL ON SPREAD FOOTING

Harold J. Peterfeso

11-10-05

Washington State Department of Transportation
FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

NOTE: TRANSVERSE BARS NOT SHOWN

STANDARD PLAN D-2.62-00

NOISE BARRIER WALL
TYPE 17

MASONRY WALL ON SPREAD FOOTING

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Harold J. Peterfeso 11-10-05
MASONRY WALL ON SHAFT
W/ GRADE BEAM FOUNDATION

NOTES:
1. Wall is an designated Noise Barrier Wall Type 10A, 10B, 10C, or 10D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells in the vertical steel reinforcing bar 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 shaft cap shall be spaced 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
9. The Contract specifies actual foundation requirements D1 or D2.

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AWE:

- S&W:
  - Type 19A: 0.3
  - Type 19B: 0.3
  - Type 19C: 0.3
  - Type 19D: 0.3

WIND EXPOSURE:

- Type 19A: 0.3
- Type 19B: 0.3
- Type 19C: 0.3
- Type 19D: 0.3

WIND VELOCITY:

- Type 19A: 0.3
- Type 19B: 0.3
- Type 19C: 0.3
- Type 19D: 0.3

MASONRY

- Type 19A: 0.3
- Type 19B: 0.3
- Type 19C: 0.3
- Type 19D: 0.3

CONSTRUCTION:

- Type 19A: 0.3
- Type 19B: 0.3
- Type 19C: 0.3
- Type 19D: 0.3

EXPANSION JOINTS:

- Type 19A: 0.3
- Type 19B: 0.3
- Type 19C: 0.3
- Type 19D: 0.3

DRAINAGE:

- Type 19A: 0.3
- Type 19B: 0.3
- Type 19C: 0.3
- Type 19D: 0.3

FOR LOCATIONS

- Type 19A: 0.3
- Type 19B: 0.3
- Type 19C: 0.3
- Type 19D: 0.3

The Contract specifies actual foundation requirements D1 or D2.
**Noise Barrier Wall Type 19**

**Standard Plan D-266-00**

**Effective:** April 6, 2009 to December 6, 2009

**Masonry Wall on Shaft**

**W Grade Beam Foundation**

**Expansion Joint at Width Step**

**Traffic Side**

- 8" or 10" CMU
- 5' @ 4' - 0" Max. (Typ.)

**Plan View**

- Typical Expansion Joint
- Expansion Joint Filler Placed in Sash Block recesses.

**Bond Beam**

- Bond Beam Concrete Limit
- Bond Beam Concave Limit

**Step Detail**

- Concrete Shaft
- W/ Spiral @ 6" Pitch
- #4 @ 12" Spacing

**Details**

- 1" Joint
- Polyurethane Sealant
- Backer Rod
- Typical Both Sides of Wall

**Bond Beam Detail**

- Cells with vertical reinforcing and bond beams shall be filled with grout.
- Expansion Joint Filler Placed in Sash Block recesses.

**Section A**

- 1/2" Joint
- Polyurethane Sealant
- Backer Rod
- Typical Both Sides of Wall

**Note**

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

- Bar "P" at equal spacing for total length used reinforcement bar around.
- Wall to be designated Noise Barrier Wall Type 20A, 20B, 20C, or 20D. The Contract specifies actual wall designations.
- For intermediate wall heights, use the next higher H.
- All masonry shall be hollow unit and installed as running bond.
- All masonry is to be specially inspected.
- All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
- Panels shall have at least 3 feet of level ground on each side.
- See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
- The Contract specifies actual foundation requirements D1 or D2.
**Typical Expansion Joint**

- Pipe to #6 1/4" 1/2" Clearance to face shell.
- 2" CLR.

**Angle Point Plan**

- Expansion joint filled w/ foam barrier.
- 1 ~ #5 full height bar.""
Wall to be designated Noise Barrier Wall Type 15A, 15B, 15C or 15D. The Contract specifies actual wall designations.

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

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

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

The Contract shall specify actual foundation requirements D1 or D2.

**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.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

EXPANSION JOINT
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

FOR CAST-IN-PLACE WALL
ON OFFSET SPREAD FOOTING

CONCRETE SLAB DETAIL

ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

4' - 0"
5' - 0"
CONCRETE SLAB
CONCRETE SLAB
GROUND LINE
GROUND LINE

CONCRETE SLAB
CONCRETE SLAB
GROUND LINE
GROUND LINE

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009

DRAWN BY: ADAM COCHRAN

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 TRANS-
PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

Harold J. Peterfeso

EXPIRES AUGUST 23, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
All rebar shall have a minimum 1 1/2" cover.

See Standard Plan D-2.02 for door and frame details.

See Standard Plan D-2.14 for wall reinforcement not shown.

#5 @ 6' - 8" (TYP.)
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

3" (TYP.)

3" (TYP.)

(SEE NOTE 2)

5"

2' - 0"

2' - 3"

VARIES

6"

1' - 9"

11"

3' - 0"

8"

11"

ANCHOR PIN (TYP.)

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

BAR "A" (TYP.)

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

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

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

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

TOP OF ROADWAY

FINISHED GRADE

CONCRETE SLAB DETAIL

FOR CAST-IN-PLACE WALL WITH TRAFFIC BARRIER

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Harold J. Peterfeso
11-10-05
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.

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

12' - 0"    4' - 6"
2' - 6"
8"
12' - 0"
4' - 6"
8 - 0"

SECTION A

48" DOOR OPENING

TOP VIEW

DOOR - SEE DETAIL

TOP OF TRAFFIC BARRIER

FINISHED GRADE LINE

FRONT VIEW

SECTION B

TOP OF ROADWAY

FINISHED GRADE

SECTION C

TOP OF ROADWAY

FINISHED GRADE

STANDARD PLAN D-2.86-00

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

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

All rebar shall have a minimum 1 1/2" cover. See Standard Plan D-2.92 for door and frame details. See Standard Plan D-2.68 for wall reinforcement not shown.
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

5" x CHANNEL WIDTH x 1/4"
REINFORCEMENT PLATE FOR ANCHORS (TYP.) WELDED TO FRAME

10 GAUGE STEEL DOOR FRAME W/ DOORSTOP

4 1/2" STAINLESS STEEL HINGE (TYP.)

6" x 16" S.S. PLATE W/ 10" x 1" DIAM. S.S. HANDLE

FRONT VIEW

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

ANCHOR BOLT HOLES ~ 1/2" DIAM.

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

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.
GEOSYNTHETIC REINFORCEMENT LENGTH AND LIMITS OF STRUCTURE EXCAVATION CLASS B
INCL. HAUL, WALL BACKFILL AND COMPACTION.

GEOSYNTHETIC WALL, TYPE 1
INCL. STATIC DESIGN.
GROUND ACCELERATION COEFFICIENT, A=0.16g TO 0.30g.
HORIZONTAL BACKSLOPE WITH 2 FT. TRAFFIC SURCHARGE.

GEOSYNTHETIC WALL, TYPE 4
STATIC DESIGN ONLY.
GROUND ACCELERATION COEFFICIENT, A=0.15g OR LESS.
HORIZONTAL BACKSLOPE WITH 2 FT. TRAFFIC SURCHARGE.

PERMANENT GEOSYNTHETIC WALLS
TYPICAL CROSS SECTIONS

TOP GEOSYNTHETIC LAYER
2 GEOSYNTHETIC LAYERS (TYP.)
GRAVEL BORROW BACKFILL

APPROXIMATE FINAL BATTER FOR FACE OF GEOSYNTHETIC LAYERS

FINISHED GRADE AFTER CONSTRUCTION OF WALL FACING

SECTION 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.
### Geosynthetic Reinforcement Spacing and Strength

#### Geosynthetic Reinforcement Length and Dowels

<table>
<thead>
<tr>
<th>TOTAL WALL HEIGHT (ft)</th>
<th>FASCIA MOUNTING WIDTH</th>
<th>GEOSYNTHETIC REINFORCEMENT LENGTH</th>
<th>GEOSYNTHETIC REINFORCEMENT SPACING</th>
<th>ROWS OF 24' STRENGTH (N) RECOMMENDED</th>
<th>H (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>TYPE 2</td>
<td>TYPE 3</td>
<td>TYPE 4</td>
<td>TYPE 5</td>
<td>TYPE 6</td>
</tr>
<tr>
<td>TYPE 1</td>
<td>8.5</td>
<td>8.0</td>
<td>8.5</td>
<td>8.5</td>
<td>8.5</td>
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<tr>
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<td>6.2</td>
<td>6.2</td>
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<tr>
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<td>6.1</td>
<td>6.1</td>
<td>6.1</td>
<td>6.1</td>
<td>6.1</td>
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<tr>
<td>TYPE 4</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
</tr>
<tr>
<td>TYPE 5</td>
<td>7.4</td>
<td>7.4</td>
<td>7.4</td>
<td>7.4</td>
<td>7.4</td>
</tr>
<tr>
<td>TYPE 6</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
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<td>7.0</td>
</tr>
</tbody>
</table>

#### Geosynthetic Wall Standard Plan D-3

- **Effective:** April 6, 2009 to December 6, 2009
- **Approved for Publication:** Harold J. Peterfeso

---

**NOTES:**

- The long-term geosynthetic design strength "T" shall be determined in accordance with WSDOT Standard Practice Test 501. For geosynthetic products for which "T" has not been determined.
- "T", "W", and "L" are graphically defined on sheet 1.

**COLUMN "T" IS A REFERENCE FOR STANDARD PLAN D-3.**

---

**PENETRATION WALL TYPES 1 ~ 6**

**STANDARD PLAN D-3**

**SHEET 2 OF 3 SHEETS**

---

**EXPIRES JULY 1, 2007**
1. 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.

2. Place the backfill until the backfill is up to half of the required vertical geosynthetic layer thickness.

3. Complete backfilling until the compacted backfill layer thickness is equal to the required vertical geosynthetic layer thickness.

4. Place a windrow to slightly greater than full lift height against the form.

5. The form may be left in place while constructing the next layer (see note 2), otherwise, reset the form and repeat the sequence.

6. Use of the temporary form system, as detailed in this plan, is optional.

7. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.

NOTES:

1. Use of the temporary form system, as detailed in this plan, is optional.

2. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.

GEOSYNTHETIC WALL CONSTRUCTION SEQUENCE

SECTION VIEW

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

SET FORM ON COMPLETED LIFT.

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

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 THICKNESS.

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

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

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

SHEET 3 OF 3 SHEETS
APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STANDARD PLAN D-3
PERMANENT GEOSYNTHETIC WALL TYPES 1 ~ 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.
 verzierung (maximal 250 Zeichen)
**Typical Section**  

**Moment Slab Table**

<table>
<thead>
<tr>
<th>Slab Length</th>
<th>DAM WALL</th>
<th>AT GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 40'</td>
<td>7-1/2</td>
<td>6-1/2</td>
</tr>
<tr>
<td>Between 40'-0&quot; &amp; 60'-0&quot;</td>
<td>7-1/2</td>
<td>6-1/2</td>
</tr>
<tr>
<td>Between 60'-0&quot; &amp; 80'-0&quot;</td>
<td>7-1/2</td>
<td>6-1/2</td>
</tr>
<tr>
<td>Less than 40'</td>
<td>7-1/2</td>
<td>6-1/2</td>
</tr>
</tbody>
</table>

**Permanent Geosynthetic Wall Single Slope Barrier Standard Plan D-3B**

- **Effective:** April 6, 2009 to December 6, 2009
- **Approved For Publication:** Harold J. Peterfeso, 06-30-04

**Key Notes:**
1. The barrier geometry reference line (B.G.R.L.) is perpendicular to the transverse roadway slope (T.R.S.). For super-elevated transverse roadway slopes, the B.G.R.L. on the low side of the transverse roadway slope shall be perpendicular to the T.R.S. up to a maximum of 5% super-elevation. The B.G.R.L. on the high side shall always be perpendicular to the T.R.S.

2. Junction box & pull box = 8" × 8" × 1'-6" Nema 4.x S.S. (Type-316). Junction box can be recessed 1'-6" max. See special provisions, size, conduit per wiring schedule, B.E. electrical plans.

3. 1½" wall concrete cover — measure the cover as required to accommodate architectural features and finish.


5. The match, detailed by these dimensions and specifications, is required only if the barrier is on wall pages.

6. Pivoting — See rustication detail.

7. For structural details below the match line, see standard plans D-1 and D-2.

8. 1½" expansion joint with premolded joint filler.

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

**Notes:**
- When architectural features are specified.
- Install barrier dummy joints on traffic side only.
- Expansion joint with premolded joint filler.
- For structural details below the match line, see standard plans D-1 and D-2.
- Pivoting — See rustication detail.
- Install barrier dummy joints on traffic side only when architectural features are specified.

**Contact Bridge Office**

Washington State Department of Transportation

**Effective:** April 6, 2009 to December 6, 2009

**Drawing No:** 05-06-01

**Date:** October 19, 2005

**Approved for Publication:** Harold J. Peterfeso, 06-30-04

**Sheet 1 of 1 Sheet**

**Dimensions:**
- 1224.0 x 792.0
- 2" CLR. FROM TOP

**Key Points:**
- Slab length
- Dam wall
- At grade
- Greater than 40'
- Between 40'-0" & 60'-0"
- Between 60'-0" & 80'-0"
- Less than 40'
- 1½" expansion joint with premolded joint filler
- Pivoting — See rustication detail
- Install barrier dummy joints on traffic side only when architectural features are specified.
**MOMENT SLAB CONSTRUCTION JOINT SPACING @ 120'-0" MAX.**

**EXP. JNT.**

1. **EXP. JNT.**
   - 1'-0" MAX. TO 2'-0" MAX.
   - 2'-0" MIN. TO 5'-0" MAX.

2. **EXP. JNT.**
   - 5'-0" MIN. TO 8'-0" MAX.

**BARRIER DUMMY JOINT SPACING @ 8'-0" O.C.**

**REINFORCING STEEL BENDING DIAGRAM**

- All reinforcing steel shown on this plan shall be epoxy-coated.
- All dimensions are cut to out 1-0".

**SHOWN ON WALL**

- Geosynthetic wall
- F-shape barrier

**REMARKS:**

- 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.

**TERMINUS**

- Drawn by: Mark Sujka

**NOTES:**

- Dummy joint detail (typ.)
- Elevation
- Traffic side
- Joint scheme
- Plan view

**TERMINUS**

- Drawn by: Mark Sujka

**NOTES:**

- Dummy joint detail (typ.)
- Elevation
- Traffic side
- Joint scheme
- Plan view

**MOMENT SLAB TABLE**

<table>
<thead>
<tr>
<th>Slab Name</th>
<th>Blade Length</th>
<th>Span at Grade</th>
<th>Span at Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 40'-0&quot;</td>
<td>7'-0&quot;</td>
<td>6'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>Between 30'-0&quot; &amp; 39'-0&quot;</td>
<td>6'-0&quot;</td>
<td>5'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>Between 20'-0&quot; &amp; 29'-0&quot;</td>
<td>5'-0&quot;</td>
<td>4'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>Less than 20'-0&quot;</td>
<td>4'-0&quot;</td>
<td>3'-0&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**PERMANENT GEOSYNTHETIC WALL**

- F-shape barrier

**STANDARD PLAN D-3c**

- Washington State Department of Transportation

**DATE:**

- 04-30-04

**EXPIRES:**

- MAY 19, 2006
NOTES

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

Overall Length

TYPICAL GABION

Unit A

Unit C

Unit B

Unit B

Unit B

Unit B

Unit A

FASTENING ADJACENT BASKETS

LACING DETAIL

Single loop

Double loop

Single loop

Double loop

Single loop

Cross-connecting wire placement, end cells

CROSS-CONNECTING WIRE PLACEMENT, INTERIOR CELLS

MELDED FABRIC

TWISTED FABRIC

1/3H

1/3H

1/3H

1/3H

1/3H

1/3H

1/3H

1/3H

1/3H

1/3H

1/3H

CROSS-CONNECTING WIRE PLACEMENT, END CELLS

CROSS-CONNECTING WIRE PLACEMENT, INTERIOR CELLS

1/3H

1/3H

1/3H

3'

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3'
VERTICAL FACE WALL DESIGN WITH A 300 P.S.F SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL
TYPE 1 AND 15W
STANDARD PLAN D-10.10-01

BAR | #4 | #4 | #4 | #4
---|---|---|---|---
LOCATION | WALL HEIGHT (in) | QUIY. | TOP OF FOOTING  | BOTTOM OF FOOTING
---|---|---|---|---
Cement-Crete, 6" | | | | |
\[ \frac{C}{H} = \frac{1}{2} \times H \]}

NOTES:
1. All concrete shall be Class 4000, except as noted.
2. For bollard requirements, see Standard Plan D-4.
3. When Wall Type 15W (seismic) 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 15W (seismic) is specified, concrete in the table column "Material Quantity" shall be increased by 0.05x x h) Cyal.F.
5. Concrete in the 46 ft wall sections shall be placed separately between expansion joints with a minimum 36 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.1 g.
### Reinforcement Note

1. If truck barrier is used, add 6.130 cu yd of concrete class A-20 for barrier alternate 1 and 6.125 cu yd of concrete class A-20 for barrier alternate 2. See standard plan D-10.18.5D for barrier alternate 2.

2. Add 19 lb of reinforcing steel for barrier alternate 1 or 25 lb of reinforcing steel for barrier alternate 2. See standard plan D-10.18.5D for barrier alternate 2.

---

#### Footing Reinforcement

<table>
<thead>
<tr>
<th>WALL H</th>
<th>BAR F</th>
<th>BAR G</th>
<th>BAR H</th>
<th>BAR I</th>
<th>BAR J</th>
<th>BAR K</th>
<th>MATERIAL QUANTITY</th>
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<tr>
<td>W</td>
<td>b</td>
<td>d</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
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#### Stem Reinforcement

<table>
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<tr>
<th>BAR J</th>
<th>BAR K</th>
<th>MATERIAL QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-7&quot;</td>
<td>4-7&quot;</td>
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</tr>
<tr>
<td>2-7&quot;</td>
<td>4-7&quot;</td>
<td>5.61</td>
</tr>
</tbody>
</table>

#### Slope Face Wall Design

- With a 250 P.S.I. surcharge

---

**Reinforced Concrete Retaining Wall Type 2 and 28W Standard Plan D-10.18.01**

- Sheet 2 of 2 sheets

**Approved for Publication**

Peesa Baidoo 2/29/2020

Washington State Department of Transportation
1. All concrete shall be Class 4000, except as noted.
2. For budding requirements, see Standard Plan D-4.
3. When Wall Type 35W (steelwall) 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 35W (steelwall) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x ft²) CY/LF.
5. Concrete in the 46 foot wall sections shall be placed separately between expansion joints with a minimum of 24 hours period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.1 g.

**REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 35W STANDARD PLAN D-10.20-00**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

Peace Bakofighi, PE
Washington State Department of Transportation
## Dimensions

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<tr>
<th>Wall H</th>
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<th>C</th>
<th>D</th>
<th>H</th>
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<th>Bar (B)</th>
<th>Bar (C)</th>
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## Vertical Face Wall Design

![Vertical Face Wall Design Diagram](image)

### Reinforced Concrete Retaining Wall

**Type 3 and 3BW Standard Plan D-10.20-00**

**Sheet 2 of 2 Sheets**

**Approved for Publication**

*Peavey Bulletin 34*

*Washington State Department of Transportation*

**Effective:** April 6, 2009 to December 6, 2009
NOTES:

1. All concrete shall be Class 4000, except as noted.
2. For bidding requirements, see Standard Plan D-4.
3. When Wall Type 46W (sloped) 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 46W (sloped) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x $f$) CY/FL.
5. Concrete in the 46 W wall sections shall be placed separately between expansion joints with a minimum 24-hour period before placing concrete in the adjacent section.
6. The wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Iterations through 2008. The seismic design of these walls has been completed using an effective PGA of 0.81 g.

REINFORCED CONCRETE
REINFORCING STEEL
STANDARD PLAN D-10.25-00
Sheet 1 of 5 Sheets
APPROVED FOR PUBLICATION

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Peaco Balakin IN 01-06-08
Washington State Department of Transportation
## Vertical Face Wall Design with 2:1 Backslope

### Reinforced Concrete Retaining Wall

| Type 4 and 4AW Standard Plan D-10.25-00 |

#### Sheet 1 of 2 Sheets

---

**Effective:** April 6, 2009 to December 6, 2009

---

### Dimensions

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<th>D</th>
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<th>Stem Reinforcement</th>
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### Bar Size and Spacing

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### Notes

- **Effective:** April 6, 2009 to December 6, 2009
- **Approved for Publication:**
- **Design:**
- **Construction:**
- **Materials:**
- **Quality:**
- **Safety:**
- **Maintenance:**
- **Revisions:**
- **Contact:**
- **Signatures:**

---

**Refer to the original document for detailed specifications and calculations.**
1. All concrete shall be Class 4000, except as noted.
2. For bid solicitations, see Standard Plan 6-4.
3. Concrete in the 45 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.30 g.

VERTICAL FACE WALL DESIGN
WITH 2:1 BACKSLOPE

REINFORCED CONCRETE
RETAINING WALL
TYPE 5
STANDARD PLAN D-10.30-00
### Vertical Face Wall Design with 2:1 Backslope

#### Reinforced Concrete Retaining Wall

**Type 5**

**STANDARD PLAN D-10,30-00**

#### Sheet 2 of 2 Sheets

**APPROVED FOR PUBLICATION**

Pecony Bahaich 93

#### Effective: April 6, 2009 to December 6, 2009

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<th>Wall Height (ft)</th>
<th>Dimensions</th>
<th>Footing Reinforcement</th>
<th>Stem Reinforcement</th>
<th>Material Quantity</th>
<th>Maximum Reinforcement (lb)</th>
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**Bar (K):**

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- 3/4
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**Bar (N):**

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- 3/4
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**Diagram:**
- Radius of curvature
- 12 ft. radius
- 10 ft. radius
- 8 ft. radius

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

**Reinforced Concrete Retaining Wall Type 6 Standard Plan D-10.35-00**

**Sheet 2 of 2 Sheets**

**APPROVED FOR PUBLICATION**

Washington, D.C. Department of Transportation

**Pecon Balsawich &**

**Effective:** April 6, 2009 to December 6, 2009
TYPICAL SECTION

LOCATION

TOP OF FOOTING

MASON RIBBON

W1/2 - 6" MAX. (Typ.)

W2 - 6" LAP SPACE

AND EXTENDING THRU

CONSTRUCTION JOINT

2" CUR

1 1/2" CUR

CONSTRUCTION JOINT WITH

PRESTRESSED SUMMARY

BAR # 94

QUANTITY

1/2" x 1/8" 5
1/2" x 1/8" 7
3/4" x 1/8" 9
3/4" x 13/32" 11
3/4" x 1/8" 11

BOTTOM OF POCKET

REINFORCED CONCRETE
RETAINING WALL

TYPE 8

STANDARD PLAN D-16.4E-01

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

1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. Concrete in the 48 foot wall sections shall be placed separately in expansion joints with a minimum 24 hour period between placing concretes in the adjacent sections.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Institute through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.
<table>
<thead>
<tr>
<th>WALL H</th>
<th>BAR #4</th>
<th>BAR #5</th>
<th>BAR #6</th>
<th>BAR #7</th>
<th>BAR #8</th>
<th>BAR #9</th>
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REINFORCEMENT NOTES:
1. SUPERBAR 4" x 6" mesh, AAD 4.45' of concrete class 400. BAR 4 G承认 FOR BARRIER ALTERNATIVE 1.
2. ADD 0.15' of concrete class 400. BAR 2 G承认 FOR BARRIER ALTERNATIVE 2. SEE STANDARD PLAN D-16.10.

SLOPING FACE WALL DESIGN WITH A 250 PSF SURCHARGE

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-16.46-01
DATE NUMERALS

1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.
2. Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is 3/4".
3. Bridge 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.
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 plank shall be nailed to each stringer with two #1 spikes, number 1 or larger.
7. On 17' spans, stringers shall be 6x16 S1E. On 15' spans, stringers shall be 5x16 S1E. Two-lane bridges shall use thirteen lines of stringers, one-lane bridges shall use seven lines of stringers.
8. Overlay thickness must be sufficient to cover bolts.

Notes:

1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
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.
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8. Overlay thickness must be sufficient to cover bolts.
### Pile Details

#### Notes:
1. Place lifting loops at the lifting points shown in the PILE HANDLING DIAGRAM, Standard Plan E-4a, for the cases stated in the contract.
2. Spirals shall be spliced either by lapping one full turn and bending the end of the spiral to a 180° arc, or by welding, or by the use of a mechanical connector that develops 125% of the minimum yield strength of the spiral. Welding shall meet the requirements of Standard Specification 0-22.3.2-10.
3. All prestressing strands are 1/2” or 0.5” diameter, Grade 270, uncoated strands, AASHTO M225, with a yield strength of 270 ksi (1850 MPa) minimum.
4. A 1/2” diameter, Grade 270, uncoated strand must be field bent in the 120° arc at 30° increments.
5. Strength of concrete shall be 5.0 ksi at release and 7.0 ksi at final.
6. 2 1/2” cover if pile is exposed to salt water.

#### Table of Pile Dimensions

<table>
<thead>
<tr>
<th>Pile Type</th>
<th>D (in.)</th>
<th>Lateral Resistant (in.)</th>
<th>Area (in.²)</th>
<th>Minimum Moment of Inertia (in.⁴)</th>
<th>Maximum Number of Strands</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQUARE</td>
<td>12</td>
<td>45.0</td>
<td>138</td>
<td>1102</td>
<td>2.5</td>
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<td>14</td>
<td>50.0</td>
<td>194</td>
<td>3501</td>
<td>4.0</td>
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<tr>
<td></td>
<td>16</td>
<td>60.0</td>
<td>281</td>
<td>6451</td>
<td>4.5</td>
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<tr>
<td>OCTAGONAL</td>
<td>14</td>
<td>48.4</td>
<td>178</td>
<td>3180</td>
<td>3.5</td>
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<td></td>
<td>18</td>
<td>70.0</td>
<td>325</td>
<td>6700</td>
<td>7.0</td>
</tr>
</tbody>
</table>

#### Spiral Reinforcement

- **Octagonal**: Use 3 wraps of spiral with welded lap splice at end. Spiral is terminated with bend to a 120° arc.
- **Square**: Use 2 wraps of spiral with welded lap splice at end. Spiral is terminated with bend to a 180° arc.

#### Typical Sections

- Octagonal: Use 3 wraps of spiral with welded lap splice at end. Spiral is terminated with bend to a 120° arc.
- Square: Use 2 wraps of spiral with welded lap splice at end. Spiral is terminated with bend to a 180° arc.

#### Additional Information

- **Note 1**: May be field bent (Typ).
- **Note 2**: Spiral weld dimensions.
- **Note 3**: Spiral reinforced with Grade 270, uncoated strands, AASHTO M225, with a yield strength of 270 ksi (1850 MPa) minimum.
- **Note 4**: See Note 7 for lifting loops.
- **Note 5**: See Note 7 for lifting loops.
- **Note 6**: See Note 7 for lifting loops.
- **Note 7**: See Note 7 for lifting loops.
- **Note 8**: See Note 7 for lifting loops.
- **Note 9**: See Note 7 for lifting loops.
- **Note 10**: See Note 7 for lifting loops.

### Additional Information

- **Concrete Piles**
- **Standard Plan E-4**
- **Precast Prestressed Concrete Piles**
- **Effective: April 6, 2009 to December 6, 2009**

**Prepared By:**
- Harold J. Peterfeso

**Washington State Department of Transportation**

**Expiry:** August 23, 2004

**Effective Date:**
- April 6, 2009 to December 6, 2009

**Sheet 1 of 1 Sheet**

**Approval:**
- 04-27-03

**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.
1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.
2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground.
3. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.
4. When directed to remove a lifting loop, cut it off at the bottom of the recess and patch the recess by filling it with 1:2 mortar, finishing it to the level of the pile face. The patch shall be allowed to cure at least 24 hours prior to driving the pile.
5. The length of the formed or drilled hole shall allow for potential cutoff and full development length of the steel reinforcement. The holes must be roughened and filled with epoxy resin.
6. Expose the spiral reinforcement at the pile head and splice with new spiral in accordance with Standard Plan E-4, Note 2.
7. For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E-4.

PILE TO PILE-CAP CONNECTIONS

PILING BUNKING AND SHIPPING SUPPORT DIAGRAMS

PILE CUT-OFF WITH STRANDS EXTENDING 2'-0" MINIMUM

PILE CUT-OFF WITH STRANDS EXTENDING LESS THAN 2'-0"

PILE HANDLING DIAGRAMS

PRECAST PILES, HANDLING NOTES

1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.
2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground.
3. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.
4. When directed to remove a lifting loop, cut it off at the bottom of the recess and patch the recess by filling it with 1:2 mortar, finishing it to the level of the pile face. The patch shall be allowed to cure at least 24 hours prior to driving the pile.
5. The length of the formed or drilled hole shall allow for potential cutoff and full development length of the steel reinforcement. The holes must be roughened and filled with epoxy resin.
6. Expose the spiral reinforcement at the pile head and splice with new spiral in accordance with Standard Plan E-4, Note 2.
7. For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E-4.

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

CEMENT CONCRETE CURBS
STANDARD PLAN F-10.12-00

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
1. The intent of this design is to facilitate the compaction of Hot Mix Asphalt pavement adjacent to a drainage structure.

2. The centerline of the drainage structure may differ from the centerline of the frame and grate.
NOTE: JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.
**Precast Concrete Sloped Mountable Curb**

**Standard Plan F-10.62-01**

**Sheet 1 of 2 Sheets**

**Drawn by:** Bill Berens

**Typical of all Isometric View**

- Inside Corner Block
- Outside Corner Block
- 18" Radius Block
- 24" Radius Block
- 30" Radius Block

- 2" radius
- 3" radius
- 4" radius
- 5" radius

**Notes:**

- **TYPICAL OF ALL TANGENT BLOCK**
- **ISOMETRIC VIEWS**

**End View**

- 18" radius
- 24" radius
- 30" radius

**Top View**

- Inside Corner Block
- Outside Corner Block

**Dimensions:**

- 30" min. to 60" max.
- 1 1/2" CLR.
- #3 Rebar ~ Required only in Tangent Block when length exceeds 30" (1 1/2" CLR. Both Ends)

**Effective:**

- April 6, 2009 to December 6, 2009

**Expiration:**

- June 19, 2008

**Approved for Publication**

- Pasco Bakotich III

**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.
## Curb Radius Table

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<tr>
<td>OVER 60'</td>
<td>USE TANGENT BLOCK, SEE SHEET 1</td>
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*This table lists the calculated dimensions for casting blocks suitable for constructing various curb radius curved blocks, or blocks with different dimensions may be acceptable with prior approval of the engineer.*
The dual faced curb may be constructed by using two precast concrete sloped mountable curbs (longitudinal rails) so long as the installation is consistent with the dimensions shown in the plan.

PRECAST CONCRETE
DUAL FACED
SLOPED MOUNTABLE CURB
STANDARD PLAN F-10.64-02

Approved for Publication

Washington State Department of Transportation
CEMENT CONCRETE SIDEWALK

RAISED EDGE DETAIL

1/2" R.

SIDEWALK ADJACENT TO WALL

SLOPE ROUNDING

VARIES (SEE CONTRACT)

SIDEBANK MAY BE ADJACENT TO A WALL (SEE DETAIL)

SIDEBANK

VARIES 0 - 6" MIN. (SEE CONTRACT)

VARIES 0 - 4" MIN. (SEE CONTRACT)

1/2" R. (TYP.)

2% MAX.

1/4" PREMOLDED JOINT FILLER

Cement concrete sidewalk with raised edge

Cement concrete sidewalk

Adjacent to curb

Slopes rounded ~ when specified in contract

Cement concrete sidewalk

Adjacent to buffer strip

CONTRACTION JOINT

SIDEWALK BUFFER STRIP

(SEE CONTRACT)

PREMOLDED JOINT FILLER

4" WIDE, SMOOTH TROWELED PERIMETER

CEMENT CONCRETE CURB

CURB FACE DETAIL

EXPIRES AUGUST 26, 2007

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
1. 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. To the maximum extent feasible, ramp cross slopes shall not exceed 2%. 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.
6. Curb & Gutter is shown, see Standard Plan F-10.12 for curb details.

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. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 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 Concrete 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 2 WITH LAYOUT
STANDARD PLAN F-40.12-00

Ken L. Smith 03-07-07
Washington State Department of Transportation
RAMP CENTERLINE
3' - 0" MIN.
RAMP
OPENING
5' - 0"
OPENING
3' - 0" MIN.
RAMP
SEE CONTRACT FOR CURB RETURN RADIUS
SIDEWALK
6"
CEMENT CONCRETE CURB
CEMENT CONCRETE PEDESTRIAN CURB
(SEE STD. PLAN F-10.12)
5' - 0" MIN.
2' - 0" TYP.
SIDEWALK RAMP TYPE 3A
CURB, OR CURB AND GUTTER
CEMENT CONCRETE SIDEWALK RAMP TYPE 3A
BUFFER STRIP (TYP.)
3/16"
1 5/8"
2 3/8"
5/8"
7/16"
7/8"
1 7/16"
3/4"
1 1/2"
DETECTABLE WARNING PATTERN DETAIL
THIS PATTERN AREA SHALL BE YELLOW IN COLOR
31805
KEN L. SMITH
02-07-07
Washington State Department of Transportation
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
1. 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.


**NOTES**

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

**CEMENT CONCRETE SIDEWALK RAMP TYPE 3B**

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

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

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

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


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


7. CURB, OR CURB AND GUTTER

8. Detectable Warning Pattern Det. See DETAIL.

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

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

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

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

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


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


7. CURB, OR CURB AND GUTTER

8. Detectable Warning Pattern Det. See DETAIL.
1. This layout is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4B" does not include the adjacent Curb (for Curb & Gutter), the Sidewalk, or the Cement Conc. 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. See 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' × 4'.
The ramp shown on this plan is ideal and assumes optimal roadway geometric design. It assumes a curb height of 6". Adjustments must be made for conditions in the field such as roadway grade, actual curb height, etc.

2. The maximum allowable ramp slope is 12H:1V (8.34% grade). The Federal Highway Administration (FHWA) alone will accept sidewalk ramps with slopes steeper than 12H:1V. Flatter ramp slopes are permissible. Field verify the forms before pouring concrete.

3. To the maximum extent feasible, the ramp cross slope shall not exceed 2%. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

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

5. Layout 1 is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4C" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.

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

7. See Standard Plan F-30.10 for Cement Concrete Sidewalk details, sections, etc.

8. Layout 1 is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4C" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.

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

10. See Standard Plan F-30.10 for Cement Concrete Sidewalk details, sections, etc.
The ramp shown on this plan is ideal and assumes optimal roadway geometric design. A given initial curb height of 6" is first reduced to 4", via the Auxiliary Ramp, staging the final descent to the roadway. Adjustments must be made for conditions in the field such as roadway grade, existing curb height, etc. The dimensions shown are the minimum unless labeled otherwise.

The maximum allowable ramp slope is 12H:1V (8.34% grade). The Federal Highway Administration (FHWA) does not accept sidewalks ramps with slopes steeper than 12H:1V. Flatter ramp slopes are permissible. Field verify the forms before pouring concrete.

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

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

Layouts 1, 2 & 3 require two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 5". The bid item does not include the adjacent Curb (or Curb & Gutter), or Sidewalk.

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 Cement Concrete Sidewalk details, sections, etc.

Notes:
1. The maximum extent feasible, ramp cross slopes shall not exceed 2%.
2. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' x 4'.
3. Avoid placing drainage structures, function boxes or other obstructions in front of ramp access areas.
4. The bid item does not include the adjacent Curb (or Curb & Gutter), or Sidewalk.
5. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.
6. See Standard Plan F-30.10 for Cement Concrete Sidewalk details, sections, etc.
NOTES

1. 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 10' 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 entrance.
CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3 & 4

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

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

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

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

6. Variable message signs using a back and forth motion to allow the message to be rotated to the front or back using a turn signal.

7. Back equation plaque (D10-401) (Use for Single-Face Installations Only)

8. Spur route plaque (D10-501)

9. EMBEDMENT:
   - 3.0' MIN.

10. BOLT AND POST CENTERLINE:
    - D10-1, D10-2, & D10-3
    - MILEPOST SIGN PANEL
    - D10-101, D10-201, & D10-301

11. TIMBER POST:
    - 4X4 (NOM.) TIMBER SIGN POST
    - OR 2"X2" STEEL SIGN POST

12. INSTALL PLAQUE ON BOTH SIDES

13. TIMBER POST:
    - 1/4" DIAM. x 3" HEX HEAD BOLT, NUT & WASHER

14. CENTERLINE:
    - 1/4" DIAM. x 1 1/2" LAG BOLT AND WASHER

15. SIGN AND POST CENTERLINE:
    - D10-4, D10-2, & D10-6
    - MILEPOST SIGN PANEL

16. 4X4 (NOM.) TIMBER SIGN POST OR 2"X2" STEEL SIGN POST

17. REMARKS - SEE NOTE 2

18. DRAWN BY: MARK SUJKA

19. SUPPLEMENTAL PLAQUE ~ MOUNTING DETAIL - SEE NOTE 2

20. INSTALLATION:
    - 4.0' SHOULDER
    - NOT LESS THAN 6.0' MIN. ~ 30.0' MAX.

21. MILEPOST:
    - TYPICAL INSTALLATION
      - FOR SINGLE-FACED SIGNS
      - FOR DOUBLE-FACED SIGNS

22. INSTALLATION:
    - 12.0' MIN. ~ 30.0' MAX.
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.

Notes:
- Backslope: Steeper than 3H:1V, 7' min.
- Slope: Flatter than 3H:1V, 2' min.

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

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

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

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

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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SIGN PANEL
BREAKAWAY SIGN POST
BRACKET

7' - 0" MIN.

"H1" POST HEIGHT

FINISHED GROUND LINE

SIGN BRACE, WHEN REQUIRED

STEEL TUBE SIGN POST, SIZE VARIES - SEE CONTRACT

1" DIAM. NYLON WASHER
- WHEN SIGN FACE HAS TYPE 3 OR 4 SHEETING

5/16" DIAM. HEX HEAD BOLT

1" DIAM. STEEL FLAT WASHER

3/8" HEX HEAD NUT

STEEL LOCK WASHER

EXPLODED VIEW
BREAKAWAY SIGN BRACKET ASSEMBLY

NOTE

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

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

3. For "H1" refer to the Sign Specification Sheet in the Contract.
Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

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

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

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

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

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

STANDARD PLAN G-24.30-00

ELEVATION

TYPE PL SIGN SUPPORT
DUAL POST INSTALLATION

"X" SIGN WIDTH

A  1'-0"  2'-0"  3'-0"
B  3'-0"  4'-0"  5'-0"

"Y" SIGN HEIGHT

C  1'-0"  2'-0"  3'-0"
D  4'-0"  5'-0"  6'-0"

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

VIEW D

DETAIL E

STEEL PIPE CAP (TYP.)

SLIP BASE ASSEMBLY

BOTTOM OF SIGN

FINISHED GROUND LINE

STEEL PIPE CAP

ELEVATION

TYPE PL-U SIGN SUPPORT

"X" SIGN WIDTH

G  6'-0"  7'-0"  8'-0"
H  9'-0"  10'-0"

"Y" SIGN WIDTH

I  3'-0"  4'-0"  5'-0"
J  6'-0"  7'-0"  8'-0"

SIGN PANEL

STEEL PIPE CAP

U-BAR SIGN SUPPORT

SLIP BASE ASSEMBLY

BOTTOM OF SIGN

FINISHED GROUND LINE

ELEVATION

TYPE PL-T SIGN SUPPORT

"X" SIGN WIDTH

K  6'-0"  7'-0"  8'-0"
L  9'-0"  10'-0"

"Y" SIGN WIDTH

M  3'-0"  4'-0"  5'-0"
N  6'-0"  7'-0"  8'-0"

SIGN PANEL

STEEL PIPE CAP

U-BAR SIGN SUPPORT

SLIP BASE ASSEMBLY

BOTTOM OF SIGN

FINISHED GROUND LINE

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1. For "W", horizontal distance from edge of traveled way to center of nearest point, and "V", vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20-50.

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 crush 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 1/2 turn increments, alternately, to a final torque of 40 lbs on each.
Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

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

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 Steel Sign Support Foundations, see Standard Plan G-25.10.
3. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

For Steel Sign Support Foundations, see Standard Plan G-25.10.
For "X", "Y", "H1", "H2", and "H3", 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.

UPDATE AUGUST 9, 2009

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

STANDARD PLAN G-24.60-00

1. **Wide Flange Steel Sign Post (Upper Section)**
   - Initial height is 7' - 0".
   - Hinge plate (Typ.)
   - Equal spacing @ 3' - 0" MAX.
   - Secure steel sign post (Typ.)
   - Windbeam

2. **Wide Flange Steel Sign Post (Lower Section)**
   - Initial height is 3' - 0".
   - Hinge plate (Typ.)

3. **Sign Panel**
   - "H1" post height: 7' - 0" MIN.
   - Hinge plate (Typ.)
   - Equal spacing @ 3' - 0" MAX.

4. **Secondary Sign**
   - Z-bar: 3.00 "
   - Windbeam and sign post connection
   - Breakaway hinge plate

5. **Major Sign**
   - Top of major sign
   - Windbeam and sign post connection
   - Aluminum windbeam and two post clips (Typ.)
   - Breakaway hinge plate

6. **Breakaway Hinge Plate**
   - Top of bolt: 3/16" rivet
   - 3/8" diameter with two flat washers and one locknut per bolt
   - (Attach post clips on both sides of wide flange steel sign post)

7. **Windbeam and Sign Post Connection**
   - Aluminum windbeam
   - Post clips

8. **Perspective View**
   - Edge of traveled way
   - Z-bar: 2.33 "

9. **Isometric View**
   - Windbeam and sign post connection

10. **View C**
    - Breakaway hinge plate
    - Windbeam

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

**Drawing by:** Lisa Cyford

**Effective:** April 6, 2009 to December 6, 2009

**Date:** Pasco Bakotich III

**StV Architect-Engineer**

**Expiration:** August 9, 2009
NOTES

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

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

SIGN INSTALLATION ON SIGNAL AND
LIGHT STANDARDS

STANDARD PLAN G-30.10-00

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SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

MAST ARM MOUNTED LANE USE SIGNS

DIMENSIONS

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>D</th>
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</thead>
<tbody>
<tr>
<td>3' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>7' - 0&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
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<td>9&quot;</td>
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<td>5' - 0&quot;</td>
<td>6&quot;</td>
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LEVEL

SIGNAL OR LIGHT STANDARD

BACK OF SIGN PANEL

SIGNAL OR LIGHT STANDARD

LEVEL

BACK OF SIGN PANEL

MOUNTING BRACKET AND STEEL STRAP

SEE NOTE 1

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

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

FOR SIGN ATTACHMENT, SEE STD. PLAN G-22.10
FOR SIGN ATTACHMENT, SEE STD. PLAN G-24.50
FOR SIGN ATTACHMENT, SEE STD. PLAN G-30.10

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.

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1. Vertical and horizontal clearance requirements shall be as shown on the contract plans.

2. No post splice permitted in lower third of height, nor closer than 3'-0" to bottom chord, except as otherwise noted. No chord shop splice permitted in first two-thirds of the span, except as otherwise noted. A maximum of two splices are permitted in the post. For post or chord shop splice details, see Standard Plan G-70.10.

3. The back-up plates or rings for all full penetration welds shall be welded continuously to the joined pieces. This can be done by either a continuous fillet weld on the backside of the plates, or by a continuous weld in the root of the full penetration weld.

4. All bolt holes shall be drilled, and the diameter shall be 1/16" larger than the nominal bolt diameter, except as noted.

5. All bolt holes shall be drilled, and the diameter shall be 1/16" larger than the nominal bolt diameter, except as noted.

6. Adjust post alignment in plane normal to roadway center line by means of leveling nuts located below base plate to maintain upward slope in cantilever arms. Tighten anchor nuts above base plate to maintain upward slope in cantilever arms. Tighten anchor nuts above base plate in accordance with Standard Specification 8-03.3(33).

7. Variable Message Signs (VMS) exceeding 700 lbs. and/or 200 sq. ft. shall not be installed on cantilever structure.
VERTICAL STRUTS
AT SPAN END ONLY

CAMBER EACH TRUSS
0.002 FT/FT FOR
DOUBLE CANTILEVER (TYP.)

J - 21' - 0" MAX.

CAMBER EACH TRUSS
0.002 FT/FT FOR
DOUBLE CANTILEVER (TYP.)

H = 2' - 0" MIN.

VERTICAL "FAR" TRUSS DIAGONAL (TYP.)

VERTICAL "NEAR" TRUSS DIAGONAL (TYP.)

PANEL LENGTH (4' - 3" MAX.) TO BE
CONSTANT "THROUGHOUT SPAN"

Y/2

Y = 5' - 0" MIN.

1' - 8" MIN. TO
1' - 6" MAX.

SCREEN ~ SEE
DETAIL, SHEET 4

HANDホール ON SIDE
AWAY FROM TRAFFIC

BOTTOM OF BASE PLATE

BASE ELEVATION

ELEVATION

DOUBLE CANTILEVER SIGN STRUCTURE

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FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
HEMISPHERICAL POST FINIAL
1/8" LBB THREADING, INSTALL
AFTER GALVANIZING

3/8" ALUMINUM HOLLOW SET SCREW
WITH BOLT HEAD (TYP.)
(CORROSION RESISTANT METAL
OR COATING AT 80 INTERVALS)

CUT HOLE IN POST
FOR WIDE PLANE
1/8" MAX. CLEARANCE
ALL AROUND

ELEVATION
ROTATED 90° TO SHOW CUTOUT

SECTION THROUGH FINIAL AND POST

FINIAL BRACKET

1016 DIAM. HOLE (TYP.)
(INCH HOLE IN
OPPOSITE PLANE FOR
SINGLE CANTILEVER)

ISOMETRIC
BASE ~ SIDE
BASE ~ TOP
BASE

CHORD TO POST
CONNECTION DETAIL

SYMMETRICAL
ABOUT POST E

1 1/2" DIAM. HOLE
AS close TO pipe
AS POSSIBLE TO
FACILITATE GALVANIZING

5/8" DIAM. HOLE
AS close to pipe
AS POSSIBLE TO
FACILITATE GALVANIZING

7/16" DIAM. BOLTS x 2 1/2" LONG
(HEAVY DUTY NUT AND WASHER (TYP.)
INSTALL BOLTS WITH HEAD TOWARD CHORD

100% MT
DETAIL "D"

1/4" PLATE x 10" x 10"

15/16" DIAM. HOLE (TYP.)
OMIT HOLES IN
OPPOSITE FLANGE FOR
SINGLE CANTILEVER

TYPICAL TRUSS DETAILS
ENDS OF DIAGONALS SHALL BE CUT TO FIT
NEATLY AGAINST CHORDS

TYPICAL TRUSS DETAILS
ENDS OF DIAGONALS SHALL BE CUT TO FIT
NEATLY AGAINST CHORDS

END OF CHORD

1/4" PLATE 1/2" x 1/2"

3/4" PLATE 1/2" x 1/2"

BACK-UP RING

100% MT
SEE WELD
DETAIL "D"

3/4" FLANGE PLATE

2 1/2" DIAM. PIPE (t = 0.276) SPLICE WITH 2 1/2" DIAM.
PIPE (t = 0.203) (SEE CHORD SELECTION TABLE)

3/4" R. (TYP.)
FINIAL BRACKET

5/16" x 1/2" SLOT FOR
3/8" ALLEN SET SCREW

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)

2 1/2" DIAM. PIPE (t = 0.203) (SEE CHORD SELECTION TABLE)

3/4" FLANGE PLATE

1219 DIA. HOLE FOR FOUR 7/8" DIA. BOLTS
(WITH A WASHERS)

100% MT
3/8" WELD DETAIL "G"

3/8" WELD DETAIL "G"

3/8" ALLEN SET SCREW

2" DUAL PIPE (4 - 2/200) SPLICE WITH 2" DUAL
PIPE (4 - 2/200) SPLICE (SEE CHORD SELECTION TABLE)

2 1/2" DIAM. PIPE (t = 0.216) (SEE CHORD SELECTION TABLE)

2" DUAL PIPE (4 - 2/200) SPLICE WITH 2" DUAL
PIPE (4 - 2/200) SPLICE (SEE CHORD SELECTION TABLE)

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

DIAGONAL CONNECTION DETAIL
TYPICAL OF ALL DIAGONALS

1/8" PLATE MIN.
9" x 9"

8" DIAM. BOLT CIRCLE
8 7/8" DIAM. BOLT FOR
8 7/8" DIAM. BOLT CIRCLE

1 1/2" DIAM. PIPE (t = 0.300) SPLICE WITH 3" DIAM.
PIPE (t = 0.216) (SEE CHORD SELECTION TABLE)

EXPRESS NOVEMBER 14, 2008

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
POST BASE DETAILS

- 100% UT SEE WELD DETAIL "G"
- PIPE O.D. 24" (t = 0.969) SPLICE WITH 18" (t = 0.750)
- BACK-UP BAR 1/4" O.D.
- BASE WELD DETAIL
- 2" DIAM. HOLES FOR ANCHOR BOLTS
- INSIDE EDGES SHALL BE ROUND AND SMOOTH ALL AROUND
- DRILL AND TAP FOR 1/4" 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
- INSIDE EDGES SHALL BE ROUND AND SMOOTH ALL AROUND
- REMOVABLE RAIN TIGHT HAND HOLE COVER WITH GASKET - FASTEN WITH TWO STAINLESS STEEL (ASTM F 593) SCREWS
- 5/16" BACK-UP BAR 1/4" O.D.
- PIPE WALL
- PIPE O.D.
- DETAIL "G"
- 1/4" BACK-UP BAR
- BASE WELD

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)
STANDARD PLAN G-60.10-00

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<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200 SF OR LESS</td>
<td>18' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>200 SF ~ 400 SF</td>
<td>16' - 0&quot;</td>
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<tr>
<td></td>
<td>400 SF ~ 1000 SF</td>
<td>14' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>1000 ~ 1499 SF</td>
<td>12' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>1500 AND UP</td>
<td>10' - 0&quot;</td>
</tr>
</tbody>
</table>

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

ANCHOR PLATE ~ SEE DETAIL, SHEET 3
CONCRETE CLASS 4000P
CONSTRUCTION JOINT W/ ROUGHENED SURFACE

VALUES OF Z

1. See Standard Specification Section 6-21.3(9) for construction requirements.
2. Use a template to locate and secure bolts in place during foundation installation.
**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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<tbody>
<tr>
<td>1</td>
<td>GAP VERTICAL</td>
<td>4</td>
<td>9 - 15&quot;</td>
<td>84</td>
<td>STL</td>
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<tr>
<td>2</td>
<td>GAP HOOPS</td>
<td>5</td>
<td>12&quot; - 15&quot;</td>
<td>95</td>
<td>STL</td>
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<tr>
<td>3</td>
<td>SHAFT VERTICAL</td>
<td>12</td>
<td>7/8&quot; WELD CLEARANCES</td>
<td>80</td>
<td>STL</td>
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<tr>
<td>4</td>
<td>SHAFT SPIRAL</td>
<td>1</td>
<td>AS REQUIRED</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>GAP TOP</td>
<td>4</td>
<td>10&quot; - 15&quot;</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

**Material Specifications**

- **SHEET METAL**
  - CLASS 4001
  - CLASS 4002

- **ALL OTHER CONCRETE**
  - AASHTO M 31 GRADE 60

- **ANCHOR ROD**
  - ASTM F 1554 GRADE 105

- **ANCHOR NUT**
  - AASHTO M 31

- **ANCHORAGE GALVANIZING**
  - AASHTO M 312

- **ANCHOR PLATE**
  - ASTM A 36

**Table for Weld Dimensions**

<table>
<thead>
<tr>
<th>DEFORMED BAR</th>
<th>PLAIN STEEL BAR</th>
<th>COLD DRAWN WIRE</th>
<th>DEFORMED BAR</th>
<th>WELD DIMENSIONS (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;4</td>
<td>1/2&quot; DIA.</td>
<td>1/2&quot; DIA.</td>
<td>1/2&quot; DIA.</td>
<td>1/8&quot;</td>
</tr>
<tr>
<td>&quot;8</td>
<td>5/8&quot; DIA.</td>
<td>5/8&quot; DIA.</td>
<td>5/8&quot; DIA.</td>
<td>1/8&quot;</td>
</tr>
<tr>
<td>&quot;10</td>
<td>7/8&quot; DIA.</td>
<td>7/8&quot; DIA.</td>
<td>7/8&quot; DIA.</td>
<td>1/8&quot;</td>
</tr>
</tbody>
</table>

**Column and Shaft Spiral Options**

- **SHOP WELD**
  - S(E) L/2

- **FIELD WELD**
  - S(E) L

- SEE TABLE FOR WELD DIMENSIONS

- COLLECTED SPIRAL LAY SPLICE DETAIL

- 10" (TYP.)

- SPIRAL WELDED LAY SPLICE DETAIL

- "Z" MINUS CLEARANCES AS REQUIRED

- LENGTH 3/4" PLATE (ASTM A 36)

- (NO GALVANIZING REQUIRED)

- MAY BE FIELD BENT (TYP.)

- SPIRAL LAY SPLICE DETAIL

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

- 2" - 6" BOLT CIRCLE

- 2" DIAM. HOLE FOR ANCHOR BOLT (TYP.)

- SPIRAL BAR

- SHOP WELD

- FIELD WELD OR SHOP WELD

- COLUMN AND SHAFT SPIRAL OPTIONS

- "SQUARE" 5'

- "SQUARE" 3'

- "TYP." 3'-8"

- "TYP." 3'-4"

- BENDING DIAGRAM

- ALL DIMENSIONS ARE OUT TO OUT

- 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.
CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)  
FOUNDATION TYPES 2 & 3  
STANDARD PLAN G-60.30-00  
SHEET 1 OF 2 SHEETS

1. See Standard Specification Section 5-21.3(9) for construction requirements.

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

ANCHOR PLATE ~ SEE DETAIL, STD. PLAN G-60.20 SHEET 2

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

CONCRETE SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH OR ALTERNATELY, BACKFILL PLACED AROUND FOUNDATION SHALL BE COMPACTED IN CONFORMANCE WITH STD. SPEC. 2-09.3 (1) E, METHOD 1 OR 4.

ALL FORMWORK SHALL BE REMOVED.

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BAR LIST - TYPES 2 AND 3

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>TOTAL SIGN AREA</th>
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<th></th>
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<td></td>
<td></td>
<td>200 SF OR LESS</td>
<td>&lt;200 SF</td>
<td>200 SF - 400 SF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>QTY.</td>
<td>SIZE</td>
<td>QTY.</td>
<td>SIZE</td>
</tr>
<tr>
<td>1</td>
<td>PEDESTAL HOOP</td>
<td>5</td>
<td>#4</td>
<td>6</td>
<td>#4</td>
</tr>
<tr>
<td>2</td>
<td>FOUNDATION WALL TIES</td>
<td>2</td>
<td>#5</td>
<td>3</td>
<td>#5</td>
</tr>
<tr>
<td>3</td>
<td>FOUNDATION VERTICALS</td>
<td>14</td>
<td>#5</td>
<td>14</td>
<td>#5</td>
</tr>
<tr>
<td>4</td>
<td>PEDESTAL VERTICALS</td>
<td>16</td>
<td>#5</td>
<td>16</td>
<td>#5</td>
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<tr>
<td>5</td>
<td>FOUNDATION WALL HORIZONTALS AT SLOPE</td>
<td>2</td>
<td>#5</td>
<td>2</td>
<td>#5</td>
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<tr>
<td>6</td>
<td>FOUNDATION WALL HORIZONTALS</td>
<td>VARIOUS (SEE PLANS)</td>
<td>VARIOUS (SEE PLANS)</td>
<td></td>
<td></td>
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</tbody>
</table>

VALUES OF Z

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 3</td>
<td>9' - 0''</td>
<td>11' - 0''</td>
</tr>
<tr>
<td></td>
<td>2000 OR GREATER</td>
<td></td>
</tr>
<tr>
<td>TYPE 2</td>
<td>11' - 0''</td>
<td>13' - 0''</td>
</tr>
<tr>
<td></td>
<td>NOT LESS THAN 1500</td>
<td></td>
</tr>
</tbody>
</table>

CONCRETE

| 3000 |

STEEL REINF. BAR

| ASTM A 36 |

ANCHOR NUTS

| AASHTO M 31 |

ANCHOR WASHERS

| AASHTO M 293 |

ANCHOR PLATE

| AASHTO M 291 |

ANCHOR RODS

| ASTM F 1554 |

FOUNDATION WALL TIES

| VARIES |

Pecker & Bakonia's

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CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)

FOUNDATION TYPES 2 & 3

STANDARD PLAN G-60.30-89

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III

09-30-07

WSDOT 10-02

Washington State Department of Transportation

EXPIRES NOVEMBER 14, 2008
**NOTES**

1. Horizontal and vertical clearance requirements shall be as shown in Contract Plans.

2. Horizontal diagonals must join chords where vertical diagonals connect (panel points).

3. Interior diagonals shall be placed at panel points, 47' maximum spacing. Locate symmetrically about centerline of span if possible. An interior diagonal is not required at span ends.

4. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom of chord. No chord shop splices permitted in middle third of span. Maximum of one splice in each end post.

---

**PERSPECTIVE**

**ELEVATION**

**DRAWN BY:** BILL BERENS

**STATE DESIGN ENGINEER**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DATE:**

**EXPIRES NOVEMBER 14, 2008**

---

**MATERIAL SPECIFICATIONS**

- **PLATES:** A588
- **SHAFTS:** A36
- **BOLTS, NUTS, & WASHERS:** Std. spec. bolts
- **PIPE, PLATE & SHAPE GALVANIZING:** ASTM A 588
- **GALVANIZING:**

---

**SIGN BRIDGE FOUNDATION**

- See STD. PLAN G-70.20 & G-70.30

---

**SIGN BRIDGE** (TRUSS-TYPE)

**STANDARD PLAN 0-70.10-60**

SHEET 1 OF 4 SHEETS

---

**SIGN BRIDGE FOUNDATION**

- See STD. PLAN G-70.20 & G-70.30

---

**HORIZONTAL CLEARANCE**

**VERTICAL CLEARANCE**

- **BASE ELEVATION** = Height of shallowest sign on structure, + 1'-0" min.
- **isEqual ELEVATION** = Height of any sign with height greater than base elevation.
- **Y** = Height of any sign with height greater than Y.

---

**INTERIOR DIAGONAL (TYP.)**

**INTERIOR DIAGONAL (TYP.)**

**INTERIOR DIAGONAL (TYP.)**

**VERTICAL DIAGONAL (TYP.)**

**VERTICAL DIAGONAL (TYP.)**

**VERTICAL DIAGONAL (TYP.)**

---

**STRUCTURE DIMENSIONS**

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>DIMENSION</th>
<th>TOP AND BOTTOM CHORD</th>
<th>DIAGONALS</th>
<th>END TRUSS POSTS</th>
<th>END TRUSS STRUTS AND DIAGONALS</th>
<th>TOTAL SIGN AREA (MAX) (SQ. FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80' - 120'</td>
<td>1'-0&quot;</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
<td>1'-0&quot; x 3'-0&quot;</td>
<td>1'-0&quot; x 3'-0&quot;</td>
<td>5.02 x 5.02</td>
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<tr>
<td>91' - 120'</td>
<td>1'-0&quot;</td>
<td>7'-0&quot;</td>
<td>6'-0&quot;</td>
<td>1'-0&quot; x 3'-0&quot;</td>
<td>1'-0&quot; x 3'-0&quot;</td>
<td>5.02 x 5.02</td>
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<tr>
<td>121' - 150'</td>
<td>1'-0&quot;</td>
<td>8'-0&quot;</td>
<td>8'-0&quot;</td>
<td>1'-0&quot; x 3'-0&quot;</td>
<td>2'-0&quot; x 3'-0&quot;</td>
<td>6.02 x 6.02</td>
</tr>
</tbody>
</table>

---

**ALL MEMBERS ARE PIPE. VALUES SHOWN ARE NOMINAL PIPE SIZE AND WALL THICKNESS.**

---

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FINIAL DETAIL

HANDHOLE DETAIL

ELEVATION

TOP

HANDHOLE FRAME

ROUND AND SMOOTH BEND SCREWS

HORIZONTAL DIAGONAL CONNECTION WHEN ALTERNATE JOINT DETAIL IS USED ~ SEE DETAIL, SHEET 3

CHORD TO END POST CONNECTION TYPE Q
USED WHERE NO DIAGONALS CONNECT

DETAILS NOT SHOWN ARE SAME AS CHORD TO END POST CONNECTION TYPE R,
WITH THE 3/4" PLATE STIFFENER ON THE TEE MEMBER.

CHORD TO END POST CONNECTION TYPE R
USED WHERE DIAGONALS CONNECT

ELEVATION

END POST

CHORD

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

BEND FOR BOLTS FIT

PLATE ~ 3/8" THICKNESS, INSTALL AFTER GALVANIZING

3/8" ALLEN HOLLOW SET SCREW WITH DOG POINT (TYP.) (CORROSION RESISTANT METAL OR COATING AT 30° INTERVALS)

DRILL AND TAP WALL FOR 3/8" ALLEN SET SCREW

ELEVATION

DRILL PLUG FOR 3/8" ALLEN SET SCREW

TOP

FINIAL DETAIL

HORIZONTAL DIAGONAL CONNECTION

DRAWN BY: BILL BERENS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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END POST OR CHORD SHOP SPLICE
No post splices permitted in lower third of height, nor closer than 3'-0" to bottom of chord. No chord shop splice permitted in middle third of span. Maximum of one splice in each end post.

END POST OR CHORD SHOP SPLICE
No post splices permitted in lower third of height, nor closer than 3'-0" to bottom of chord. No chord shop splice permitted in middle third of span. Maximum of one splice in each end post.

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**Material Specifications**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Shaft Concrete</td>
<td>Class 4000</td>
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<tr>
<td>Anchor Rods</td>
<td>AASHTO M 31</td>
</tr>
<tr>
<td>Anchor Washers</td>
<td>AASHTO M 232</td>
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<tr>
<td>Anchor Plates</td>
<td>ASTM A 36</td>
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**Table**

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<tr>
<th>Variable</th>
<th>Span Length</th>
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<tr>
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<td>60' TO 90'</td>
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<tr>
<td>Dimension</td>
<td>2'</td>
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<tr>
<td>Bar Spacing</td>
<td>2</td>
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<tr>
<td>Shaft Depth</td>
<td>2' to 9'</td>
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</tbody>
</table>

**Foundation Type 1**

- Construction joint of 4 1/2" x 1 5/8" x 2'-0" shear key
- Top and bottom anchor plates
- 1 1/16" diam. hole (typ.)
- 1' - 3" diam. bolt circle (typ.)
- 1 1/8" diam. hole (typ.)

**Anchor Rods**

- 4' - 0" min. each end
- With 3 washers and 4 heavy hex nuts
- 5/8" x 21" x 21" notched as required to clear shaft reinforcement when D = 4' - 0"

**Shaft**

- Vertical and spiral

**Bar List**

<table>
<thead>
<tr>
<th>Mark</th>
<th>Location</th>
<th>Size</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CAP - TOP AND BOTTOM</td>
<td>5/8&quot;</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>SHAFT - VERTICAL</td>
<td>5/8&quot;</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>TOTAL</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

**Routing Diagram**

- 2'-6" radius
- All dimensions are out to out
- Determine length from plans

**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.

**Expiration**

- November 14, 2008
Concrete finished Surfaces shall be placed directly against undisturbed earth or, alternatively, backfill placed around foundation shall be compacted in accordance with STD. SPEC. SECTION 2-09.3 (1) E, Method 1 or 4. All formwork shall be removed.

Concrete tendon anchorage shall be placed in accordance with STD. SPEC. SECTION 2-09.3 (1) E, Method 1 or 4. All formwork shall be removed.

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Concrete tendon anchorage shall be placed in accordance with STD. SPEC. SECTION 2-09.3 (1) E, Method 1 or 4. All formwork shall be removed.
NOTES:
1. Install Sign Lighting Luminaire (and Bracket) only when required in the Contract.
2. Windbeam and 3" Z-Bar are aluminum. All nuts, bolts, washers, and other hardware shall be stainless steel, except as noted.
3. See Standard Plan G-98.20 (Monochrome), or G-98.30 (Truvox) for additional Overhead Sign Mounting details.
4. Galvanize all non-stainless steel parts.
NOTES:
1. U-Bolts, Washers and Nuts shall be stainless steel, except as noted.
2. See standard Plan G-68.1 for Overhead Sign Lighting details.
3. Galvanize all non-stainless steel parts.

OVERHEAD SIGN MOUNTING (TRUSS STRUCTURE)
STANDARD PLAN G-68.30-00

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009
1. Sign Lighting luminaires shall include a 3/4" threaded aisle entry, a ganged front entry, a door prop, and a mounting hole. Refer to Standard Spec. 8-30-316-19 for additional requirements.

**STANDARD PLAN G-95.10-00**

**MAINTENANCE WALKWAY**

**PLAN**
- Maintenance Walkway
- Gate Stop (Attach to Frame)
- Maintenance Walkway Gate
- Elevations
- End View

**ELEVATION**
- Maintenance Walkway
- Detail A
- Detail B

**NOTES**
2. For mounting the maintenance walkway to a monotube sign bridge, see Standard Plan G-95.20.
3. For mounting the maintenance walkway to a truss-type sign bridge, see Standard Plan G-95.30.
4. Location of railing splice to be determined by fabricator. See "Rail Splice Detail."
STEEL GRATING DETAIL

SECTION C

1/4" TOE PLATE

1/8" TOE PLATE

EVERY FOURTH BEARING BAR AND NEAR ALL TOE PLATE CORNERS

W4 x 13 (TYP.)

BEARING BARS

4" MIN.

1/8" CLEARANCE BETWEEN ENDS OF CROSS BARS

Bearing Bar, 3/16" Min. Thickness (TYP.)

CROSS BAR (TYP.)

PLAN

STEEL GRATING DETAIL

(TAKING OUT SIDES FOR CLARITY)

SECTION G

1/4" TOE PLATE

EVERY FOURTH BEARING BAR AND NEAR ALL TOE PLATE CORNERS

W4 x 13 (TYP.)

BEARING BARS

4" MIN.

1/8" CLEARANCE BETWEEN ENDS OF CROSS BARS

Bearing Bar, 3/16" Min. Thickness (TYP.)

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.
LIVE STAKE INSTALLATION IN RIPRAP

LIVE STAKE INSTALLATION IN QUARRY SPALLS

TYPICAL LIVE STAKE INSTALLATION

LIVE STAKE INSTALLATION ON SLOPES

NOTES:
1. See Plant Material List for size and type of live stake.
2. Do not use ice or shaving for driving stakes.
3. In hard ground use an iron bar or ster drill to prepare the holes for the stakes.
4. Avoid stripping bark or bruising stakes during installation.
5. Fill void around stakes with soil.
1. All angle iron and steel strap shall be galvanized in accordance with AASHTO M 232.

2. Pipe, caps, and T-adapter shall be 1" I.D. white PVC, or primed steel, except the water intake pipe shall be white PVC. Pipe shall be Sch. 40. All pipe joints shall be threaded.

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

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

5. Water level may vary, depending on season.

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

**Crest Gage**

**Standard Plan H-30.10-00**

**Sheet 1 of 1 Sheet**

**NOTES**

**CREST GAGE**

**ISOMETRIC VIEW**

**SECTION A**

**DETAIL A**

**RIGOMETRIC VIEW**

**STATE OF WASHINGTON**

**REGISTERED LANDSCAPE ARCHITECT**

**CERTIFICATE NO. 000860**

**SANDRA L. SALISBURY**

**Pasco Bakotich III**

10-12-07
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.

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.

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.

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.

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

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

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

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.

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

STANDARD PLAN H-70.20-00

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

1. The insert pipe is 1" nominal diameter, Schedule 40 steel pipe, as indicated, all other pipe shown on this plan is 1 1/4" nominal diameter. Schedule 40 steel pipe. All pipe, couplings, and elbows shall be galvanized in accordance with ASTM A 183.

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 low line of a ditch.

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

4. Coat the 1" diam. pipe with grease (petroleum) before sliding the 1 1/4" diam. pipe (steel sleeve until it is to be rotation and to guard against corrosion.

5. The platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.11, Sheet 2. The design features include that accommodate several types of mailbox supports; those stated necessary for assembling the type being installed are required.

6. Match the edges of the mailbox platform to the end of the horizontal pipe mount. Center the mailbox on the platform to ensure it is flush with the mailbox opening, and allow space for installing the house. Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the platform to fit the mailbox. See ALIGNMENT DETAIL.

7. Attach a newspaper box to the pipe with two 1 1/4" muffer clamps spaced 4" apart. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

MAILBOX SUPPORT
TYPE 3
STANDARD PLAN H-70.30-01

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009
HIGH VISIBILITY FENCE

STANDARD PLAN I-10.10-00

ELEVATION

WORK AREA

ELEVATION FENCE ON SLOPE

ENVIRONMENTALLY SENSITIVE AREA BOUNDARY

STAPLE TOP TIE

FENCING MATERIAL

STAPLE TOP TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

SELF-LOCKING TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST

VERTICAL POST

HIGH DENSITY POLYETHYLENE
FABRIC WITH OPEN MESH,
UV RESISTANT, ORANGE COLOR

16" (TYP.)

HIGH VISIBILITY FENCE

STAPLE TOP TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

SELF-LOCKING TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST

VERTICAL POST

HIGH DENSITY POLYETHYLENE
FABRIC WITH OPEN MESH,
UV RESISTANT, ORANGE COLOR

16" (TYP.)

HIGH VISIBILITY FENCE

STAPLE TOP TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

SELF-LOCKING TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST

VERTICAL POST

HIGH DENSITY POLYETHYLENE
FABRIC WITH OPEN MESH,
UV RESISTANT, ORANGE COLOR

16" (TYP.)

HIGH VISIBILITY FENCE

STAPLE TOP TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

SELF-LOCKING TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST

VERTICAL POST

HIGH DENSITY POLYETHYLENE
FABRIC WITH OPEN MESH,
UV RESISTANT, ORANGE COLOR

16" (TYP.)

HIGH VISIBILITY FENCE

STAPLE TOP TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

SELF-LOCKING TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST

VERTICAL POST

HIGH DENSITY POLYETHYLENE
FABRIC WITH OPEN MESH,
UV RESISTANT, ORANGE COLOR

16" (TYP.)

HIGH VISIBILITY FENCE

STAPLE TOP TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

SELF-LOCKING TIE – NYLON 6/6, 50# MIN.
TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST

VERTICAL POST

HIGH DENSITY POLYETHYLENE
FABRIC WITH OPEN MESH,
UV RESISTANT, ORANGE COLOR

16" (TYP.)
Maximize detention of stormwater by placing fence as far away from toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries. Install silt fencing along contours whenever possible. Install the ends of the silt fence to point slightly up-slope to prevent sediment from flowing around the ends of the fence. Perform maintenance in accordance with Standard Specifications 8.01.3(9)A and 8.01.3(15).
**SILT FENCE DESIGN**

- Place sand bags as required around culvert to provide support for silt fence.

**COMPOST BERM DESIGN**

- Compost berm - See Standard Plan I-80.10
- End treatment varies

**NOTE**

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

<table>
<thead>
<tr>
<th>Slope</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>2:1</td>
<td>30'-0&quot;</td>
</tr>
<tr>
<td>3:1</td>
<td>40'-0&quot;</td>
</tr>
<tr>
<td>4:1</td>
<td>20'-0&quot;</td>
</tr>
</tbody>
</table>

### NOTES

1. Wattles shall be in accordance with Standard Specification 9-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification 8-01.3(10).

2. Securely knot each end of Wattles. Abut adjacent Wattles tightly, end to end, without overlapping the ends.

3. Pilot holes may be driven through the Wattles and into the soil when soil conditions require.

4. Live stakes may be used for permanent installation and shall be in accordance with Standard Specification 9-14.5(6).

5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.

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

### WATTLE INSTALLATION ON SLOPE

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

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

When placing Compost Sock on slopes, use Erosion Control Blanket if specified by the Engineer and in accordance with Standard Specification 9-14.8(2). See Standard Plan I-60.10.

Always install Compost Sock perpendicular to slope and along contour lines.

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

Live stakes can be used in addition to wooden stakes and shall be in accordance with Standard Specification 9-14.6(1). See plans for species selection and spacing.
1. Use Standard Specification 8-01.3(b)(c) for additional information.

2. Perform maintenance in accordance with Standard Specification 8-01.3(b)(c).

STRAW BALE BARRIER
STANDARD PLAN 1-30.50-00
Sheet 1 of 1 Sheet
Approved for publication 11-14-07
Washington State Department of Transportation

PLAN

Bales shall be placed in a row with the ends tightly abutting.

STEEL, OR 2x2 WOODEN STAKES (Typ.)

STRAIN STAKES STAND VERTICALLY

FINISH PACK JAY BAILEY WITH STRAND

DRIVE FIRST STAKE AT AN ANGLE TOWARDS THE PREVIOUS BALE TO PROMOTE A TIGHT FIT

SECOND STAKE

STEEL, OR 2x2 WOODEN STAKES (Typ.)

BALE BINDERS

2" x 2" not penetration

ELEVATION

STEEL, OR 2x2 WOODEN STAKE

STRAND BALE

KEY IN BALES TO PREVENT EROSION OR FLOW UNDER BALES - 4" MINIMUM

COMPACT NATIVE MATERIAL TO PREVENT FLOW

FLOW

SECTION A
Prefabricated units may be used in lieu of the design shown on this plan upon approval of the Engineer. Structure shall be constructed such that geotextile material shall be fastened to posts creating a seamless joint.

Ensure that ponding height of water does not cause flooding on adjacent roadways or private property.

Perform maintenance in accordance with Standard Specification 8-01.3(16).

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(16).

NOTES:

1. Prefabricated units may be used in lieu of the design shown on this plan upon approval of the Engineer.
2. Structure shall be constructed such that geotextile material shall be fastened to posts creating a seamless joint.
3. Ensure that ponding height of water does not cause flooding on adjacent roadways or private property.
4. Perform maintenance in accordance with Standard Specification 8-01.3(16).

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT.
1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
**Geotextile Encased Check Dam Installation**

**Standard Plan I-50.10-00**

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**Plan View**

- **Ditch**
- **Check Dam**
- **Staples (Typ.)**
- **Back of Ditch (Typ.)**
- **Front Apron**
- **Rear Apron**

**Section A**

- **Ditch**
- **Check Dam**
- **Staples (Typ.)**
- **Back of Ditch (Typ.)**
- **Front Apron**
- **Rear Apron**

---

**Notes**

1. Geotextile encased Check Dams shall meet the requirements of Standard Specifications 8-01.3(6A) and 9-14.5(4).

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

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

4. Perform maintenance in accordance with Standard Specifications 8-01.3(18).

---

**Geotextile Encased Check Dam Installation Standard Plan I-50.10-00**

**Sheet 1 of 1 Sheet**

**Effective:** April 6, 2009 to December 6, 2009

**DRAWN BY:** Lisa Cyford

**APPREHENDED FOR PUBLICATION**

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**STATE OF WASHINGTON**

**REGISTERED LANDSCAPE ARCHITECT**

**CERTIFICATE NO. 000598**

**MARK W. MAURER**

**Pasco Bakotich III 09-20-07**

---

**NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT.**
NOTE: ROCK CHECK DAMS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

SPILLWAY

SPACE CHECK DAMS:

FLOWLINE

ELEVATION

SANDBAG CHECK DAM

NOTE:

PLACED ROCK CHECK DAMS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

SIDE PROTECTION

SPILLWAY

SPACE CHECK DAMS:

FLOWLINE

ELEVATION

SANDBAG CHECK DAM

NOTE:

PLACED ROCK CHECK DAMS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

SIDE PROTECTION

SPILLWAY

SPACE CHECK DAMS:

FLOWLINE

ELEVATION

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

2. See Standard Specification 8-01.3(3).
1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.

2. Provide Check Slots per manufacturer’s recommendations.

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

**STABILIZED CONSTRUCTION ENTRANCE**

- **ELEVATION**
  - 1' - 0" Depth of 2" - 4" Washed Gravel Backfill
  - 1' - 0" Settling Depth
  - 2' - 0" Settling Storage

- **SECTION A**
  - Temporary Silt Fence
  - Quarries Spalls
  - 4' - 0" Overflow
  - 1' - 0" Overflow Channel

- **ISOMETRIC VIEW**
  - Stabilized Construction Entrance
  - 20' - 0" R MIN.
  - 6' - 0" Min.
  - 5' - 0" Max.
  - 1' - 0" Depth of 2" - 4" Rock
  - 1' - 0" Depth of 3/4" - 1 1/2" Washed Gravel Backfill
  - 2' - 0" Depth of Native Material Constructed by Excavation

- **TEMPORARY SEDIMENT TRAP**
  - 1' - 6" Sediment Storage
  - 1' - 0" Depth Overflow
  - 1' - 0" Depth of 3/4" - 1 1/2" Washed Gravel Backfill

- **EXISTING ROAD**
  - 25' - 0" R MIN.
  - 15' - 0" MIN.

- **PLACE CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION AND A MINIMUM OF 0.15' CRUSHED ROCK UNDER THE SPALLS, FROM THE EDGE OF THE EXISTING ROADWAY TO THE RADIUS RETURNS, OR AS DIRECTED BY THE ENGINEER.**

- **COMPRESSIVE BERM DETAIL**
  - 4" ~ 8" Quarry Spalls
  - As Required ~ 100' Min., except may be reduced to 50' Min. for sites with less than one acre of exposed soil.

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Galvanized steel mast arm - configuration varies with manufacturer.

Luminaire - see Contract for type and number.

Mounting height - roadway to luminaire elevation difference 2%, see Contract.

Vant line length - see Contract.

1/4" galvanized Flexible eyebolt (single or double) with washers and nuts or eyenut.

Bending jumper.

Pole and bracket cable.

Equipment grounding conductor see Standard Plan J-9a.

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.

8" x 8" x 4" NEMA 3R junction box with rain-tight 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.

5/8 " galvanized thimble eyebolt (single or double) with washers and nuts or eyenut.

Bending jumper.

Pole and bracket cable.

Equipment grounding conductor see Standard Plan J-9a.

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.

8" x 8" x 4" NEMA 3R junction box with rain-tight 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.

5/8 " galvanized thimble eyebolt (single or double) with washers and nuts or eyenut.

Bending jumper.

Pole and bracket cable.

Equipment grounding conductor see Standard Plan J-9a.

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.

8" x 8" x 4" NEMA 3R junction box with rain-tight 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.

5/8 " galvanized thimble eyebolt (single or double) with washers and nuts or eyenut.

Bending jumper.

Pole and bracket cable.

Equipment grounding conductor see Standard Plan J-9a.

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.

8" x 8" x 4" NEMA 3R junction box with rain-tight 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.

5/8 " galvanized thimble eyebolt (single or double) with washers and nuts or eyenut.

Bending jumper.

Pole and bracket cable.

Equipment grounding conductor see Standard Plan J-9a.

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.

8" x 8" x 4" NEMA 3R junction box with rain-tight 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.

5/8 " galvanized thimble eyebolt (single or double) with washers and nuts or eyenut.

Bending jumper.

Pole and bracket cable.

Equipment grounding conductor see Standard Plan J-9a.

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.
**TYPE A SERVICE, 120 VOLT**

- Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
- Conduit and conductors, size to utility requirements
- Conduit, 30' MIN
- 30' Class V treated timber pole
- Conduit to pole and strap within 1' above cabinet
- 3" - 6" nipple or warp fitting
- LB conduit body
- Hub and gasket
- Service breaker, 120VAC, 1P S/N
- Weatherhead

PHOTOELECTRIC CONTROL DETAILS

- Photoelectric control
- Conduit to luminaire, size as required
- See Note 5

**TYPE B SERVICE, 120/240 VOLT**

- Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
- Conduit and conductors, size to utility requirements
- Conduit, 42' MIN
- 30' Class V treated timber pole
- Conduit to pole and strap within 1' above cabinet
- 3" - 6" nipple or warp fitting
- Hub and gasket (TYP)
- Service cabinet use metal standoffs to mount to pole

**TYPE C SERVICE, 480 VOLT**

- Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
- Conduit and conductors, size to utility requirements
- Conduit, 28' MIN
- 30' Class V treated timber pole
- Conduit to pole and strap within 1' above cabinet
- 3" - 6" nipple or warp fitting
- Hub and gasket

- Service cabinet
- Use metal standoffs to mount to pole

PHOTOELECTRIC CONTROL DETAILS

- Photoelectric control
- Conduit to luminaire, size as required
- See Note 5

**NOTES**

- See Note 5
- See Note 5
- See Note 5

**EXPIRES JUNE 4, 1999**

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


11. For Type B service wiring diagram, use Standard Plan, “Modified Type B Service.”

12. For Type C service wiring diagram, use Standard Plan, “Type E Service.”

13. See breaker schedule in contract for breaker and contactor sizes.
**Service Cabinet Type B**

**Modified (0 - 200 Amp Type 120/240 Single Phase)**

**Standard Plan J-36**

---

**Effective: April 6, 2009 to December 6, 2009**

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**Note: This plan is not a legal engineering document.**

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**DRAWN BY: MARK SUJKA**

---

**See Standard Spec. 9-29.24, Service Cabinets.**

---

**Washington State Department of Transportation**

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**EXPRESSES MAY 5, 2005**
PEDESTRIAN PUSHBUTTON DETAILS

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

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
(Pedestrian PushButton - Metal Pole)

WOOD POLE INSTALLATION
PPB-W
(Pedestrian PushButton - Wood Pole)

CAST ALUMINUM CONDULET

STANDARD PLAN J-5
APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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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:

- Anchor bolts and data for spacing to be supplied by cabinet manufacturer.
- Shim to plumb
- Locate conduits centrally in foundation
- See Note 3
- #4 hoops
- #4 bar each corner
- #4 hoops
- 6" MIN 1'-6" + 2"
- 6" Cabinet with 6" + 2"
- Cabinet depth 1'-6"
- 2" conduit and caps others as required.
- 3/8" diameter plastic drain
- Locate conduits centrally in foundation
- 1'-6"
- 3/8" diameter plastic drain
- Shim to plumb

PEDESTAL BASE DETAILS

- 4" x 9" pipe flange
- 7 1/2 " DIA bolt circle for at least 4 bolt holes
- 3/4 " DIA each
- 1" to 2"
- 3/8 " diameter plastic drain
- 6" MIN 1'-6" + 2"
- 6" Cabinet with 6" + 2"
- Cabinet depth 1'-6"
- 2" conduit and caps others as required.
- 3/8" diameter plastic drain
- Locate conduits centrally in foundation
- 1'-6"
- 3/8" diameter plastic drain
- Shim to plumb

PAD MOUNT

- Install one spare 2" conduit and caps others as required.
- 3/8" diameter plastic drain
- Locate conduits centrally in foundation
- 1'-6"
- 3/8" diameter plastic drain
- Shim to plumb

PEDESTAL MOUNT

- 4" x 9" pipe flange
- 7 1/2 " DIA bolt circle for at least 4 bolt holes
- 3/4 " DIA each
- 1" to 2"
- 3/8 " diameter plastic drain
- 6" MIN 1'-6" + 2"
- 6" Cabinet with 6" + 2"
- Cabinet depth 1'-6"
- 2" conduit and caps others as required.
- 3/8" diameter plastic drain
- Locate conduits centrally in foundation
- 1'-6"
- 3/8" diameter plastic drain
- Shim to plumb
### 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>
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<tbody>
<tr>
<td>Pole Base Dia</td>
<td>4&quot;</td>
<td>6&quot;</td>
<td>8&quot;</td>
<td>4&quot;</td>
<td>6&quot;</td>
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<tr>
<td>Plate Thickness</td>
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<td>1/2&quot;</td>
<td>1&quot;</td>
<td>1/2&quot;</td>
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<td>2&quot;</td>
<td>2&quot;</td>
<td>2&quot;</td>
<td>2&quot;</td>
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<tr>
<td>Bolt Circle</td>
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<td>1&quot;</td>
<td>1&quot;</td>
<td>1&quot;</td>
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<td>Foundation Depth</td>
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<td>3'</td>
<td>4'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>Foundation Width</td>
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<td>3'</td>
<td>4'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>Foundation Dia</td>
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<td>6&quot;</td>
<td>8&quot;</td>
<td>4&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>nut &amp; washer</td>
<td>4&quot;</td>
<td>4&quot;</td>
<td>4&quot;</td>
<td>4&quot;</td>
<td>4&quot;</td>
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<tr>
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<td>Vertical Rebar</td>
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<tr>
<td>Horizontal Rebar</td>
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</tr>
<tr>
<td>Slipfitter Dia</td>
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<td>2&quot;</td>
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<td>2&quot;</td>
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<tr>
<td>Foundation Pad Thickness</td>
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<td>none</td>
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<tr>
<td>Veh. Head And Ramp Meter</td>
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**NOTE:**
- **Leveling Nut Height**: 1" maximum.
- **Leveling Nuts Not Required For Type PPB Standard**

---

**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>
</tr>
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<tr>
<td>Standard</td>
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<td>Dimensions</td>
<td>Dimensions</td>
<td>Dimensions</td>
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<td>1</td>
<td>TYPE PPB: 4-1/2&quot; Dia x 12&quot; x 4&quot;</td>
<td>TYPE PS: 4-1/2&quot; Dia x 12&quot; x 4&quot;</td>
<td>TYPE I: 4-1/2&quot; Dia x 12&quot; x 4&quot;</td>
<td>TYPE RM: 4-1/2&quot; Dia x 12&quot; x 4&quot;</td>
<td>TYPE FB: 4-1/2&quot; Dia x 12&quot; x 4&quot;</td>
</tr>
</tbody>
</table>

---

**TYPE PPB, PS, & I STANDARD DETAILS**

- **Elevation**
- **Plan**

---

**FOUNDATION DETAILS**

- **2" Clearance**
- **1\(^{1/2}\)" Clearance**
- **Foundation Pad**
- **Foundation Dia**
- **Foundation Width**
- **Foundation Depth**
- **Nut & Washer**
- **Anchor Bolt, Nut, & Washer Sizes**

---

**FOUNDATION DETAILS**

- **Foundation Pad**
- **Foundation Dia**
- **Foundation Width**
- **Foundation Depth**
- **Nut & Washer**
- **Anchor Bolt, Nut, & Washer Sizes**

---

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

---

**APPROVED FOR PUBLICATION**

- **Harold J. Peterfeso**

---

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

- **STATE DESIGN ENGINEER**

---

**NOTE:**
- **This Plan is not a legal engineering document**
- **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.**
STRAIN POLE DIMENSION CHART

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TYPE IV 1900 LB</th>
<th>TYPE IV 2700 LB</th>
<th>TYPE IV 3700 LB</th>
<th>TYPE IV 4800 LB</th>
<th>TYPE IV 5600 LB</th>
<th>TYPE IV 6300 LB</th>
<th>TYPE IV 7200 LB</th>
<th>TYPE V 1900 LB</th>
<th>TYPE V 2700 LB</th>
<th>TYPE V 3700 LB</th>
<th>TYPE V 4800 LB</th>
<th>TYPE V 5600 LB</th>
<th>TYPE V 6300 LB</th>
<th>TYPE V 7200 LB</th>
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<tbody>
<tr>
<td>Pole gauge</td>
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<td>6</td>
<td>6</td>
<td>6</td>
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<td>6</td>
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<tr>
<td>Anchor bolt circle diameter</td>
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<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
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<td>Pole base diameter</td>
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</tr>
<tr>
<td>Base plate diameter</td>
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<td>4</td>
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<td>4</td>
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<td>4</td>
<td>4</td>
<td>4</td>
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</tr>
<tr>
<td>Anchor bolt size</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Anchor plate size</td>
<td>1x36</td>
<td>1x48</td>
<td>1x60</td>
<td>1x72</td>
<td>1x90</td>
<td>1x114</td>
<td>1x138</td>
<td>1x36</td>
<td>1x48</td>
<td>1x60</td>
<td>1x72</td>
<td>1x90</td>
<td>1x114</td>
<td>1x138</td>
</tr>
<tr>
<td>Vertical steel number and size</td>
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<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
<td>1/8</td>
</tr>
</tbody>
</table>

NOTES

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

TYPE IV AND V STRAIN POLE STANDARDS

ATTACHMENT POINT ANGLES

CONNECTION OF WIREWAY AND LIGHT SOURCE

BASE PLATE

CONE SECTION DETAIL

HANDHOLE DETAIL

FOUNDATION DETAIL

STRAIN CLAMP DETAIL

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.
**Notes:**

1. An eight-way expanding anchor may be used as an acceptable alternative to power installed helical screw anchors.

2. If anchor hole diameter is greater than nominal diameter of folded anchors, a 5' cover of 6" to 12" size rock shall be tamped in to replace the disturbed soil immediately above the anchor.

3. See "Strain Clamp Detail" on Standard Plan. "Strain Pole Standards: Type IV and Type V".

**Type IV or Type V Strain Pole Standard**

- **Strain Insulator**: See Detail
- **Strings**: 8'-0" yellow reflective plastic guy guard

**Power Installed Helical Screw Anchor** (See Notes)

**Strain Clamp**: (See Note 3)

See "Strain Clamp Detail" on Standard Plan "Strain Pole Standards: Type IV and Type V".

**1.** An eight-way expanding anchor may be used as an acceptable alternative to power installed helical screw anchors.

**2.** If anchor hole diameter is greater than nominal diameter of folded anchors, a 5' cover of 6" to 12" size rock shall be tamped in to replace the disturbed soil immediately above the anchor.

**3.** See "Strain Clamp Detail" on Standard Plan. "Strain Pole Standards: Type IV and Type V".

---

**Span Wire Installation**

**Standard Plan J-7d**

---

**Elevation Side View Plan**

**ALTERNATE DOWN GUY DETAIL**

**8'-0" yellow reflective plastic guy guard**

**Power Installed Helical Screw Anchor** (See Notes)

**ALTERNATE DOWN GUY DETAIL**

**8'-0" yellow reflective plastic guy guard**

**Power Installed Helical Screw Anchor** (See Notes)

**Strain Insulator**: See Detail

**Strings**: 8'-0" yellow reflective plastic guy guard

**Power Installed Helical Screw Anchor** (See Notes)

**Strain Insulator**: See Detail

**Strings**: 8'-0" yellow reflective plastic guy guard

---

**Deputy State Design Engineer**

Clifford E. Mansfield

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

APPROVED FOR PUBLICATION
TYPE 1 STOP LINE LOOP WIRING DIAGRAM

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1. For Sections A and B, see Standard Plan J-8d.
1. All of the loop lead-in wires shall return to the Junction Box.
2. For Splice Detail, see Standard Plan J-8d.
NOTES:
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

TYPE 3 SAMPLING LOOP WIRING DIAGRAM
(SERIES SPLICE SHOWN)

TYPE 3A STOP LINE LOOP WIRING DIAGRAM
(SERIES SPLICE SHOWN)

TRAFFIC FLOW

TYPE 3 ADVANCE LOOP WIRING DIAGRAM
(SERIES SPLICE SHOWN)
TYPE 3 INDUCTION LOOP

STANDARD PLAN J-8c

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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(1)E.

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.

**CONDUIT SIZING TABLE**

<table>
<thead>
<tr>
<th>LOOP LEAD PAIRS</th>
<th>1/2&quot;</th>
<th>1 1/4&quot;</th>
<th>1 1/2&quot;</th>
<th>2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONDUIT SIZE (IN)</td>
<td>1&quot;</td>
<td>1 1/4&quot;</td>
<td>1 1/2&quot;</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

**INDUCTION LOOP DETAILS**

- **STANDARD PLAN J-8d**
- **SHEET 1 OF 2 SHEETS**
- **APPROVED FOR PUBLICATION**
- **Washington State Department of Transportation**

**EXPIRES MAY 5, 2005**

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1. Install the Junction Box and the lead-in conduit.
2. Sawcut the loop slots and the lead-in slots.
3. Lay out the loop wires starting at the Junction Box, allowing 5' minimum slack.
4. Install the wire in the loop slot as shown.
5. Finish laying out the wire at the Junction Box and identify the leads with the loop number, the "S" for start and the "F" for finish, and the loop series number.
6. Twist each pair of the lead wires 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 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.
ELECTRICAL CONDUIT PLACEMENT

PLAN

SECTION A-A

Conduit reserve area

Conduit

J-box

Conduit reserve area

J-box

Face of guardrail

Foot of curb

Edge of shoulder

Conduit reserve area

Not Steeper than 2:1

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

STANDARD PLAN J-10

DATE

STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION

ELECTRICAL CONDUIT

PLACEMENT

Clifford E. Mansfield
STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

07-18-97

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES SEPT 10, 1998

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Clifford E. Mansfield

07-18-97

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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 stiffener plates shall bear on frame. Mill to bearing seat and perimeter bar for full even contact after fabrication of frame and lid. Lid and frame units with uneven bearing will be rejected.

4. The installed lid and frame shall fill with full even contact 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 lids 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 48 in. × 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.
1. The Junction Box shall be of type 304 stainless steel, welded seam construction: #12 gauge backbox with #2B finish, #12 gauge cover with #4 finish, and #12 gauge 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 and, 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 end bushing on the inside for GRS conduit. Use an end bell bushing on the inside for PVC conduit (See Detail).

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. Use anti-seize compound on all cover fasteners during construction & before final closure.

6. Details shown for box installation in stationary forms.

The Junction Box shall be of type 304 stainless steel, welded seam construction: #12 gauge backbox with #2B finish, #12 gauge cover with #4 finish, and #12 gauge mounting tabs.

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 and, unless adding additional conduit, (See SECTION "B")

Use concrete-tight fittings on the outside of the Junction box conduit connection. Use an insulated, grounded end bushing on the inside for GRS conduit. Use an end bell bushing on the inside for PVC conduit (See Detail).

The System Identification letters shall be 1/16" line thickness formed by engraving, stamping, or with a S.S. weld bead. See Detail.

Use anti-seize compound on all cover fasteners during construction & before final closure.

Details shown for box installation in stationary forms.
1. Conduit pipe placed in retaining wall traffic barrier shall be fitted with Conduit Deflection (CD) Fittings spaced at 12" maximum. The CD Fittings shall be placed at the traffic barrier joint to form with the retaining wall element expansion joints. Also, the conduit shall be used with the CD Fitting "A" to the PVC adapter in the barrier.

2. Install Galvanized Steel (GRS) conduit between the Junction Box (j-box) Type 1 and the CD Fitting "A". GRS conduit shall also be used from the CD Fitting "A" to the PVC adapter in the barrier.

PVC conduit may be used only in stationary-joint barriers. Connect to GRS using a PVC adapter.

3. GRS conduit may be used in all traffic barriers, but it shall be used in all traffic barriers.

KEY NOTES:

1. Junction Box - 5" x 6" x 6" NEMA 4X in stationary-joint barrier, adjustable NEMA 3R in all traffic barier. Junction Box can be increased up to 12" x 12" x 12".

2. Conduit Fitting with Internal Bonding Jumper - Type DX for definition of 20" & 30" movement.

3. Where conduit exits from a structure, wrap the conduit pipe for 1'-0" on each side from the cutting point. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed at 1" minimum overlap.

4. 1'-0" long, 3/4" thick expanded cell foam sleeve around conduit and conduit fitting. After placing the wire, duct tape and ends to seal, and prevent concrete from bonding with fitting and conduit.

5. Where conduit is routed across a joint, wrap the conduit pipe for 1'-0" on each side of joint. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed at 1" minimum overlap.

6. 10' long section of GRS Conduit.

CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL

STANDARD PLAN J-10b

Sheet 1 of 1 SHEET

APPROVED FOR PUBLICATION

Petru Balanich, Jr. 03-10-08
Washington State Department of Transporation
1. Install a Conduit Deflection (CD) Fitting "A" at the exit from the barrier. Install a Conduit Deflection Fitting "B" to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-16a for Conduit Deflection Fitting details.

2. Install Galvanized Rigid Steel (GRS) conduit between the Junction Box Type 1 and the CD Fitting(s) "A". GRS conduit shall also be used from the CD Fitting(s) "A" to the PVC adapter in the barrier.

PVC conduit may be used only in stationary-form barriers. Connect to GRS using a PVC adapter.

GRS conduit may be used in stationary-form barriers, but it shall be used in all forms barrier.

3. See Standard Plan J-14d for additional information on Single Slope Concrete Barrier.

KEY NOTES:

1. Junction Box – 8" x 6" x 10" HESSA 4x4 in stationary-form barrier, adjustable HESSA 5x5 in all forms barrier (junction box can be accessed up to 1/3). See Standard Plan J-16a.

2. Where conduit in a structure is routed across a road joint with continuous reinforcing steel, install preformed joint filler and wrap the conduit pipe for 4" - 6" on each side of joint. Pipe-wrap tape shall be 2" wide, 10 mil thick, & installed with 1" min. overlap.

3. 17° long section of GRS Conduit.

CONDUIT INSTALLATION IN SINGLE SLOPE CONCRETE BARRIER (DUAL FACE) STANDARD PLAN J-16a

Sheet 1 of 1 Sheet

Approved for Publication

Clemm Berndt
6-10-08

Washington State Department of Transportation
NOTES:
1. The Traffic Data Collection Loop spacing shall be 10’ - 6’ 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’ - 6’ from the edge of lane, see Detail “A”.
2. Type 2 Advanced Induction Loops may also be used, see standard Plan J-15b.
3. The loops and side arms shall be cut in the final lift of asphalt.
4. For concrete pavement lanes with asphalt shoulders, install all of the Placo 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’ or the conduct wire plus 2’, whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduct wire plus 1/4’.
6. All the wire leads are installed, seal the end of the conduct with Conduit Seals. See the Spool Proofsheet 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 meet with the Engineer 10 days prior to the beginning of any installation activity.
Lanes 1 - (driving lane) - Loop L1, Pezzo P1, Pezzo P2, Loop L2
Lanes 2 - (driving lane) - Loop L3, Pezzo P3, Pezzo P4, Loop L4
Lanes 3 - (driving lane) - Loop L1, Pezzo P1, Pezzo P2, Loop L2
Lanes 4 - (driving lane) - Loop L3, Pezzo P3, Pezzo P4, Loop L4
Lanes 6 - (driving lane) - Loop L5, Pezzo P5, Pezzo P6, Loop L8

NOTES:
1. The Traffic Data Collection Loops shall be centered inside lanes without an adjacent shoulder; the loop is laid adjacent to shoulder. 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-48.
3. The loop and side sensor shall be cut in the final lift of asphalt.
4. For concrete pavement lanes with asphalt shoulders, install all of the Pezzo sensor and conduit in the concrete lane. Also for concrete movement lanes install the loop 4" to 6" away from the expansion joints.
5. The shoulder notch length along the roadway shall be 4' or the conduit plus 2", whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit plus 1½'.
6. After all of the road lanes are installed, and the end of the conduit with Control Panel, See the Special Provisions in this contract for the materials 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 8-30 for conduit installation.
8. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. See Standard Specification 8-30 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.

INDUCTION LOOP / PEZZO AXLE SENSOR NUMBER IDENTIFICATION
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 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 the cabinet.

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.

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 the cabinet.

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.
5. Place 2" duct tape along length of both sides of the sensor slot. Tape 1/16" away from the slot.

6. Visually inspect sensor to ensure it is straight without any twists or curls. Check passive cables for bare wire. Check lead attachment for cracks or gaps. Check the data sheet to ensure the correct sensor is being installed. Class 1 Piezo Axle sensor for Weigh-in-Motion, and Class 2 Piezo Axle sensor for Permanent Traffic Recorder.

7. Place the sensor on the tape next to the slot. Handle the sensor with clean latex (or equivalent) gloves.

8. Clean the sensor with the grit of a steel wool or emery pad. Wipe it down with isopropyl alcohol and a clean, lint free cloth.

9. Use the 3/4" brackets.

10. Place the sensor in the slot in the road. The end of the sensor should be at least 2" from the end of the slot, and should not touch the bottom or the sides of the slot. The lead attachment end should also not touch the bottom or the sides of the slot.

11. If any of the 3/4" brackets do not fit snugly against the sides of the slot or are loose, replace them with a 1" bracket.

12. Starting at the lead attachment end, position the sensor so that it is parallel to the surface of the road, approximately 3/8" below the surface of the road. At this depth, the installation brackets are 1/8" below the surface of the road.

13. Visually inspect the length of the sensor to ensure that it is at a uniform depth along its length and that it is level (not twisted, canted or bent).

14. Run the passive wire the length of the home run slot. Place the polypropylene rope under and over the passive cable (inside the slot). This will keep the grout from running out into the deeper home run slot.

15. Place all of the induction loops to the site specifications.


17. Using a low speed mixing drill (400 rpm) and a mixing paddle, premix the grout for 2 minutes or until smooth. Add hardener to the grout and mix according to the manufacturer's instructions.

18. Pour the grout into the slot using a small bead. Make sure that the grout flows under the sensor slowly, eliminating air pockets. Start at the end and pour towards the lead attachment. Repeat until the slot is completely full of grout, at least to 2" passes (approximately 1/2" thick each).

19. Place all of the induction loops to the site specifications.

20. Remove the tape as soon as the final grout pour is complete.

21. Run the passive wire the length of the home run slot. Place the polypropylene rope under and over the passive cable (inside the slot). This will keep the grout from running out into the deeper home run slot.

22. Allow the loop sealant and the grout for both sensor installations to fully cure (45-60 minutes) before opening to traffic.
1. The Loop and Piezo leads in all Junction Boxes and Cabinets are to be color-coded. Use colored tape on each specific wire, see table. Wrap the tape on the wires approximately 6″ beyond conduit in all Junction Boxes.

2. The maximum load in the Cabinet is 5 Amps.

3. The Cabinet may be pedestal or pad mount, see Standard Plan J-6c for details.


6. COLOR CODED LABELS ON ALL WIRES
   SEE COLOR CODE IDENTIFICATION TABLE
   AND NOTE 1

SOLDERED COMPRESSION CONNECTION

SEE SPECIAL PROVISIONS IN THE CONTRACT
FOR SPLICE KIT ENCLOSURE.

SEE STANDARD SPECIFICATION
9-29 FOR SPLICE REQUIREMENTS

THE LOOP AND PIEZO LEADS IN ALL JUNCTION BOXES AND CABINETS ARE TO BE COLOR-CODED. USE COLORED TAPE ON EACH SPECIFIC WIRE, SEE TABLE. WRAP THE TAPE ON THE WIRES APPROXIMATELY 6″ BEYOND CONDUIT IN ALL JUNCTION BOXES.

THE MAXIMUM LOAD IN THE CABINET IS 5 AMPs.

THE CABINET MAY BE PEDISTAL OR PAD MOUNT, SEE STANDARD PLAN J-6c FOR DETAILS.

SEE SPECIAL PROVISIONS IN THE CONTRACT FOR THE CABINET DIMENSIONS. SEE STANDARD SPECIFICATION 8-20 FOR OTHER REQUIREMENTS.

FOR GROUNDING DETAILS, SEE STANDARD PLAN J-9a. SEE STANDARD SPECIFICATION 8-20 FOR OTHER REQUIREMENTS.
This plan depicts the Steel Light Standard types and terms commonly referred to in the contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

1. The Luminaire Pole height shall not exceed 50' (H1).

2. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

3. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.


NOTES:
1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer.

TAPER NOTE
End Taper (on approach from opposing traffic):
20' (longitudinal) = use on one-way roadways, or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.

BASED ON FIELD CONDITIONS, STEEL LIGHT STANDARD PLACEMENT CAN BE ADJUSTED WHEN APPROVED BY THE PROJECT ENGINEER.

The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer. See Standard Plan J-28.30 for foundation details and construction methods. See Standard Plan J-28.50 for pole base and hand hole details.

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The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer. See Standard Plan J-28.30 for foundation details and construction methods. See Standard Plan J-28.50 for pole base and hand hole details.

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BASED ON FIELD CONDITIONS, STEEL LIGHT STANDARD PLACEMENT CAN BE ADJUSTED WHEN APPROVED BY THE PROJECT ENGINEER.

The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer. See Standard Plan J-28.30 for foundation details and construction methods. See Standard Plan J-28.50 for pole base and hand hole details.
**Embankments**

**Section View Case A**
- Slopes 3H:1V thru 3H:1V (Max)
- Not steeper than 2H:1V slope
- Edge of shoulder
- Slip base level
- Slip base
- Steel light standard foundation
- Fore slope 4H:1V or flatter
- Ditch sections

**Section View Case B**
- Slopes flatter than 3H:1V
- Edge of shoulder
- Slip base level
- Slip base
- Steel light standard foundation
- Fore slope steeper than 4H:1V (3H:1V max)
- Culvert — see contract plans for size and location (separate bid item)

**Ditch Sections**

**Case C**
- Fore slopes 4H:1V or flatter
- Culvert — see contract plans for size and location (separate bid item)
- Edge of shoulder
- Steel light standard foundation
- Back slope
- Level
- Filled material

**Case D**
- Fore slope steeper than 4H:1V (3H:1V max)
- Culvert — see contract plans for size and location (separate bid item)
- Edge of shoulder
- Steel light standard foundation
- Back slope
- Level
- Hand hole

**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.
DITCH BOTTOM

TRAFFIC CURB

TRAFFIC BARRIER
(BEAM GUARDRAIL SHOWN)

CASE E
SECTION VIEW

CASE G
SECTION VIEW

CASE H
SECTION VIEW

CASE F
SECTION VIEW

STANDARD PLAN J-28.24-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STEEP SLOPES
2H:1V OR FLATTER
BEHIND TRAFFIC BARRIER

SLOPES 2H:1V OR FLATTER
BEHIND TRAFFIC BARRIER

SLOPES STEEPER THAN 2H:1V
BEHIND TRAFFIC BARRIER
(SPECIAL DESIGN FOUNDATION)

MIN.

MAXIMUM EXPOSED CONCRETE EQUALS THE RATIO
OF THE GRADE OF THE EXISTING SLOPE TIMES
THE DIAMETER OF THE FOUNDATION

NOTES

and construction methods.

2. See Standard Plan J-28.80 for pole base and
hand hole details.

PROVIDE 2.0' MIN. LEVEL GRADE TO
PREVENT BUILD-UP OF DEBRIS
AROUND BASE

EDGE OF SHOULDER
/ FACE OF CURB

HAND HOLE

STEEL LIGHT STANDARD FOUNDATION

STEEL LIGHT STANDARD FOUNDATION

STEEL LIGHT STANDARD FOUNDATION

4.0' MIN.

SLOPE STEEPER THAN 3H:1V
(TOE OF BACK SLOPE)

OUTSIDE OF DESIGN CLEAR ZONE

4.0' MIN.

OUTSIDE OF DESIGN CLEAR ZONE

OUTSIDE OF DESIGN CLEAR ZONE

90 DEGREES TO EDGE OF SHOULDER

EDGE OF SHOULDER

EDGE OF SHOULDER

HAND HOLE

HAND HOLE

FIXED BASE

FIXED BASE

STEEL LIGHT STANDARD FOUNDATION

STEEL LIGHT STANDARD FOUNDATION

STEEL LIGHT STANDARD FOUNDATION

3.0' MIN. FOR BEAM GUARDRAIL
4.0' MIN. FOR CONCRETE BARRIER TYPE 2

3.0' MIN. FOR BEAM GUARDRAIL
3.0' MIN. FOR BEAM GUARDRAIL

3.0' MIN. FOR BEAM GUARDRAIL

4.0' MIN. FOR CONCRETE BARRIER TYPE 2

4.0' MIN.

4.0' MIN.

4.0' MIN.

4.0' MIN.

3.0' MIN. FOR BEAM GUARDRAIL

4.0' MIN. FOR CONCRETE BARRIER TYPE 2

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.

2. The Strap Template shall be held in place by nuts, 6" from the top of the foundation
   and 3" from the bottom of the anchor bolts. 18 heavy-duty hex nuts and 6 round
   washers are required for a Slip Base assembly. 18 heavy-duty hex nuts and 6 plate
   washers are required for a Fixed Base assembly.

3. Use Steel Light Standard Foundation Type A on level ground or slopes not exceeding
   4H:1V. Use Type B for slopes steeper than 4H:1V, but not exceeding 2H:1V. Slopes
   steeper than 2H:1V shall require a special design.

4. These foundations are designed for a minimum of 2,000 PSF (TYPE A) or 1,500 PSF
   (TYPE B) allowable lateral bearing pressure for the soil. A special foundation shall be
   required for soil with lower allowable lateral bearing pressure than 1,500 PSF.

5. The Luminaire Pole height shall not exceed 50' (H1).

6. Slip Bases shall not be installed on 80' (H1) poles with Double Mast Arms, nor on
   poles weighing more than 1000 lbs.

7. Slip Bases are not required on poles placed outside of the Design Clear Zone, nor on
   poles installed behind traffic barriers.

8. Foundations constructed within Ecology Embankments shall be increased in depth by
   the depth of the Ecology Embankment.

9. Exposed portions of the foundation shall be formed to create a smooth finished
    surface. All forming shall be removed upon completion of foundation construction.

10. For excavation, concrete placement, and backfill options, see METHOD 1 and
     METHOD 2 on Sheet 2 of 2.

11. The Anchor Bolts shall be high strength steel, manufactured from ASTM A449, with
    heavy hex nuts and hardened washers. Galvanize the Anchor Bolts according to
    AASHTO M222.

12. The foundation shall meet the requirements of Standard Specification Sect. 5-20.3(R).

**CONSTRUCTION METHODS**

**METHOD 1**
NO SUBSURFACE FORM

This option is only used when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Place paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation. After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

**METHOD 2**
METAL (SURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" diameter, corrugated metal (pipe) form. The corrugated metal form shall not extend more than 6" below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

See Standard Plans J-28.34 and J-28.28 for maximum heights of exposed foundation when no embankment widening is to be installed.

Place the concrete foundation. After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
1. B7 (111) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.

2. Galvanizing shall be in accordance with AASHTO M 111.

3. See Standard Plans C-8b, C-14h, and J-28.40 for foundation and base plate requirements when light standards are mounted on cementitious traffic barrier.

4. See Standard Specification Section 6-03.3 (33) and 8-20.3 (4) for the torque requirements for all of the Anchor Bolt installations. Install 1-inch diameter Clamping Bolt in all Slip Bases to a torque of 25 Foot-Pounds - See Standard Specification Section 8-20.6 (13A).


6. The final height of the anchor bolts must be below the top of the anchor plate assembly to ensure proper function of the slip base.

7. Apply grout even with the bottom of the anchor plate after plumbing the Luminare Pole.

8. Bolt can protrude 5/8” max. with a min. of 2 threads exposed above nut.

9. Round Washers (TYP.) - Size to match anchor bolt. (See Table, STD. Plan J-28.30)
1. 60’ (H1) poles with double mast arms or poles weighing in excess of 1000 lbs. shall not be installed on a Slip Base.

2. The Slip and Anchor Plates shall be manufactured from ASTM A572 GR.50 or ASTM A588. All Slip Plates machined surfaces shall be finished smooth.

3. The Clamping Bolts shall be high strength steel, manufactured from AASHTO M164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M232.


5. Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

6. Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or installing luminaire poles.

7. EXPLODED ISOMETRIC VIEW

8. TABLE OF CLAMPING BOLTS

9. STEEL LIGHT STANDARD ANCHOR/SLIP PLATE FOR SLIP BASE

10. STANDARD PLAN J-28.42-00

11. SHEET 1 OF 1 SHEET
STEEL LIGHT STANDARD ELBOW DETAIL
FOR LUMINAIRE POLES WITH SINGLE MAST ARM 12' OR LESS, AND
DOUBLE MAST ARMS 8' OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.

1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111.

EXPLODED ISOMETRIC VIEW

1. SEE CONTRACT PLAN FOR SLOPE OF PARAPET FACE.
2. SEE STANDARD PLAN 435.05 FOR EXHANGER DETAIL.
3. SEE STANDARD PLAN J-28.42 FOR LUMINAIRE ANCHORAGE DETAILS.

1. 1/4" (TYP.) DIAMETER HOLE (TYP.)
2. 1' - 3" DIAM.
3. BOLT CIRCLE 9"
4. 1/2" DIAM. WEEP HOLE
5. 5/16" × 1/2" FLAT HEAD MACHINE SCREW WITH LOCK WASHER (TYP.)
6. 3/16" THICK PREFORMED "FABREEKA" FABRIC PAD WITH 5" DIAM. HOLE.
7. CEMENT TO FLANGE PLATE AND TRIM OUTSIDE EDGE FLUSH.
8. 5/16" × 1/2" FLAT HEAD MACHINE SCREW W/ LOCK WASHER (TYP.) (STAINLESS STEEL)
9. TAP FOR BOLT (TYP.)
10. 1/2" DIAM.
11. 8 1/2" X 3/16" (17" MIN. LONG) 1/2" ДиАМ. WEEP HOLE
12. SEES BRIDGE PLANS FOR LUMINAIRE ANCHORAGE DETAILS.
13. 1/2" DIAM. H. S. BOLT W/ HARDENED LOCK WASHER AND NUT (TYP.) 1/2" ДиАМ. WEEP HOLE
14. 3 1/2" X 3/16" THICK STEEL BAND (TYP.)
15. BEND TO FIT
16. THE FACE SHALL BE FLAT AFTER FABRICATION.
17. TO PREVENT A SEAL BETWEEN THE BARRIER AND THE ELBOW.

STANDARD PLAN J-28.46-00
STEEL LIGHT STANDARD ELBOW MOUNTING ON BRIDGE & RETAINING WALL

TYPICAL SECTIONS

PASSO BAKOTICH III
08-07-07
PASCO BAKOTICH III
08-07-07
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. Pole Base Plate for a Slip Base design shall be 1 1/4" steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" manufactured from ASTM A36. All Pole Base Plates notched surfaces shall be finished smooth.


3. Galvanizing shall be in accordance with AASHTO M 111.

4. See Standard Plan C-46b, C-44h and J-28.80 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barriers.

5. See Standard Plan J-28.82 for details when Slip Base is required.

6. Pole Base Plate for a Slip Base design shall be 1 1/4" steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" manufactured from ASTM A36. All Pole Base Plates notched surfaces shall be finished smooth.


8. Galvanizing shall be in accordance with AASHTO M 111.


10. See Standard Plan J-28.82 for details when Slip Base is required.

11. Pole Base Plate for a Slip Base design shall be 1 1/4" steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" manufactured from ASTM A36. All Pole Base Plates notched surfaces shall be finished smooth.


13. Galvanizing shall be in accordance with AASHTO M 111.


16. Pole Base Plate for a Slip Base design shall be 1 1/4" steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" manufactured from ASTM A36. All Pole Base Plates notched surfaces shall be finished smooth.


18. Galvanizing shall be in accordance with AASHTO M 111.


21. Pole Base Plate for a Slip Base design shall be 1 1/4" steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" manufactured from ASTM A36. All Pole Base Plates notched surfaces shall be finished smooth.


23. Galvanizing shall be in accordance with AASHTO M 111.


NOTES:
1. See Standard Plans C-8b and C-14h for foundation and anchor bolt details.
2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.
4. Install grout after plumbing the pole.

1” MIN. POLE WALL

POLE BASE PLATE

CONDUCTOR ATTACHMENT DETAIL
CONDUCTOR ATTACHMENT BRACKET = 1/4” THICK STEEL, 2” WIDE × 4” LONG

GROUNDING BOLT T = Rim Plate Thickness by Luminaire Pole Fabricator

t = Size of fillet weld by Luminaire Pole Fabricator

1. See Standard Plans C-8b and C-14h for foundation and anchor bolt details.
2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.
4. Install grout after plumbing the pole.

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NOTE:
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 support members shall be 3/16" minimum thick steel C, L, or T shapes, welded to the lid. Exact configurations vary among manufacturers.

4. A 1/4"-20 UNC x 3/4" S.B. ground stud shall be welded to the bottom of each lid; include 2 S. B. nuts and 2 flat washers.

5. The hinges shall allow the lid to open 180°.

6. Bolts and nuts shall be liberally coated with anti-seize compound.

7. Connect an equipment bonding jumper to steel conduit bonding for G&R 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 post with a 5/8"-11UNC x 3/4" S.B. bolt, nut, and flat washer. Equipment Bonding Jumper shall be 86 min. ≈ 4 of threaded bonded copper.

8. The System identification bands shall be 1/8" thick, formed by engraving, stamping, or with a 0.8 used brass, grid of diamond pattern before forming bands. See System Identification Detail.

9. See the Standard Specifications for alternative reinforcement and size of concrete.


11. Capacity ≈ conduit diameter = 24".

12. Use bolded attachment to provide a method of marking, installing, and covering by using a mechanical process in lieu of welding. Attachment Tab shall detail a typical component arrangement, actual configuration of assembly will vary among manufacturers. Use approved reinforcement shop drawing for specifics.

13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vault and Pull boxes shall not be placed within the traveled way or paved shoulders. All Junction boxes, Cable Vault and Pull boxes placed within the traveled way or paved shoulders shall be heavy-duty.
NOTES:
1. See contract for head type, mounting height and orientation.
2. All nipples, fittings and center piece shall be 1-1/2" diameter.
3. Install regrasping gaskets suitable for ring when furnished with order.
4. Extends wire sheath, a minimum of 1" inside all signal and sign housings, and terminal compartments.
5. Apply bead of silicone around the perimeter of all top cap openings prior to installation of the top cap assembly.

SIGNAL HEAD MOUNTING DETAILS POLE AND POST MOUNTINGS
STANDARD PLAN J-78.10-00

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION
1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder or the traveled way. Use a 6" thick lid for new Pull Box Installations. Use a 6" thick Heavy Duty Lid when converting a Standard Duty Pull Box into a Heavy Duty Pull Box in the paved shoulder or the traveled way and no overlay is called for in the contract. Otherwise, use contract plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Pull Box and Lid when placed in unserved areas.

3. The diamond pattern shall be 3/16" minimum thick.

4. A 1/4-20 UNC x 3/4" x 8.8 screw shall be attached to the Standard Duty Lid and coated with anti-seize compound. Provide a 3/8" diameter screws hole in the suitable iron lid gasket (Heavy Duty Lid) with 1/4-20 UNC x 1 1/4" x 8.8 bolts, 2 1/2" diameter screw, and 2 1/2" screws for the Bonding Jumper.

5. Connect a Bonding Jumper to the steel conduit bushing for GFI conduit and connect the steel conduit bushing (jumper to the equipment ground at the threaded bessel ground insert. Connect the equipment grounding conductor in the PVC conduit (to the ground) to the thread ground insert. The bonding jumper shall be 60 cm x 40 cm of stranded aluminum copper between the lid and the frame of the Heavy Duty Lid and from the Heavy Duty Lid to the threaded bessel ground insert. The Bonding Jumper shall be 60 cm x 40 cm of stranded aluminum copper between the lid on a Standard Duty Box and the threaded bessel ground insert. See contract plans for Bonding Jumper requirements.

6. The system identification label shall be 1/8" thick material forming by engraving, lacquering, stamping or with a weld bead. See SYSTEM IDENTIFICATION DETAIL, Standard Plan J-424.10. Castle iron lid lettering shall be recessed.

7. Current conductors shall be Class 4000.

8. Plastic plugs shall be put into the lid before illiteracy and the lid installation.

9. Gauge (plane and Bobbin) 40" (65)."

10. Excessive materials, place 6" crushed surfacing and per Street. Specification Section 9-29.5.08. Field bent for the threading bar to allow conduit to enter the Pull Box. Field bend bar into piece, wire tie to 3 pieces and cast commercial concrete (commercial concrete only allowed for box bottoms in wall construction).

11. The drawings depict a typical Pull Box assembly. Referring not shown. Each manufacturer's Pull Box assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.
1. The Heavy Duty Lid shall be used when a Cable Vault is placed in the paved shoulder of the traveled way. Use a 5/8" thick lid for new Cable Vault installations. Use a 3/4" thick Heavy Duty Lid when converting a Standard Duty Cable Vault into a Heavy Duty Cable Vault in the paved shoulder of the traveled way and no overlay is called for in the contract.

2. Use Standard Duty Cable Vault and Lid when placed in unpaved areas.

3. The diamond pattern shall be 5/32" minimum thick.

4. A 1/4" - 20 UNC × 3/4" 9.8 grade stud with a 3/4" head and 2.85" female shall be installed to the Standard Duty Lid and sealed with anti-seize compound. Provide a 5/8" diameter x 1/8" deep hole in the cable vault lid (Heavy Duty Lid) with 1/2" - 13 UNC × 1 1/4" 5.8 bolt, 2.85" female washer and 2.85" nut for the Bonding Jumper.

5. Connect a Bonding Jumper to the steel conduit bushing for GR&R conduct and connect the steel conduit bushing to the equipment ground at the traveled hole ground insert. Connect the equipment grounding conductor to the PCC and GR&R conduct to the ground plate. The ground plate shall be 56 mm x 10 mm (1/4") of threaded stainless steel between the lid and the ground plate and 56 mm x 10 mm (1/4") of threaded stainless steel to the ground plate. The bonding jumper shall be 56 mm x 10 mm (1/4") of threaded stainless steel between the lid and the ground plate. The bonding jumper shall be 56 mm x 10 mm (1/4") of threaded stainless steel between the lid and the ground plate. The bonding jumper shall be 56 mm x 10 mm (1/4") of threaded stainless steel between the lid and the ground plate.

6. The system identification markers shall be 1/8" thick symbols formed by engraving, etching, stamping, or by a word bond, see SYSTEM IDENTIFICATION DETAIL, Standard Plan J-00.10. Ducommun ins lid bonding shall be recessed.

7. Cement concrete shall be Class C010.

8. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

9. Capacity - soil density = 60% (in).

10. Excavate material, plastic film, then crushed backfilling and fill. See Specification Section 30.20.9. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault. Field bond R&R reinforcing bar to allow conduit into the Cable Vault.

11. This drawing depicts a typical Cable Vault assembly. Reinforcing bar shown. Each manufacturer's Cable Vault assembly will vary. Refer to the manufacturer's shop drawings for all information and the actual arrangement.
**RURAL ROADS & URBAN ARTERIALS**

**RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS**

### SPEED LIMITS (MPH)

- **35 / 40 MPH**
- **40 / 50 MPH**
- **50 / 70 MPH**

### CHANNELIZING DEVICE SPACING

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<th>Posted Speed (MPH)</th>
<th>In Taper (Feet)</th>
<th>In Tangent (Feet)</th>
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<td>25 / 50</td>
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### SIGN LOCATION

- **Road Closed**
- **Road Work Ahead**
- **Temporary Double Yellow Centerline**
- **Temporary White Edge Line**
- **Stream or Other Obstruction**

### LEGEND

- **CHANNELIZING DEVICES**
  - Barricade - Type 3 R
  - Barricade - Type 3 L
- **TEMPORARY IMPACT ATTENUATOR**
- **SIGN LOCATION**

### CHANNELIZING DEVICES

### NOTES

1. **Sign sequence is the same for both directions of travel. Adjust for the direction of roadway curves.**
2. **Flashing Warning Lights (Type B per MUTCD) and/or flags may be used to call attention to the advance Warning Signs.**
3. **Existing conflicting pavement markings and signs that are no longer applicable shall be removed or obliterated. Temporary pavement markings shall be used to denote bypass detour.**
4. **Raised pavement markers and/or temporary guideposts may be used on bypass as directed by the Engineer.**
5. **Steady Burning Warning Light (Type C per MUTCD) shall be used to mark Channelizing Devices at night.**
6. **Where advisory speed is 30 mph or less, reverse turn signs should be used. Other curves or turn Warning Signs may be substituted to depict roadway alignment.**
7. **Temporary barriers and end treatments shall be crashworthy.**
8. **To improve visibility, consider use of temporary illumination at closure points.**
9. **For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual MB-05.**
10. **Consider using a PCMS for additional advance warning.**

---

**FOR LOCAL AGENCY USE ONLY**

**NOT FOR USE ON STATE ROUTES**
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 Blazors shall be installed throughout the detour, as appropriate.
4. Signage 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.

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This plan is intended for use on roadways when traffic volumes create sufficient gaps for motor vehicles to yield. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark Channelizing Devices at night. Adequate sight distance shall be provided for drivers to see opposing traffic, otherwise use flaggers and/or Temporary Signal. Extend Channelizing Device taper across shoulder ~ recommended. Post mount signs when in place for 3 days or longer. For speed limit 35 mph or higher replace W1-3R with W1-4R. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05. Consider using a PCMS for additional advance warning.
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 Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

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.

For local agency use only not for use on state routes.

Ken L. Smith
02-15-07
Deputy Director
Washington State Department of Transportation
Channelizing Devices are recommended along centerline to separate traffic from work operation. Devices are required at tapers to shift traffic movement between lanes and to protect all flagging stations. Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-06.

**LONGITUDINAL BUFFER SPACE = B**

**BUFFER DATA**

**TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)**

**VEHICLE TYPE**
- Loaded weight

4-YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.

**MINIMUM WEIGHT:**
- 15,000 LBS.
- 250' 35/64
- 500' 35/64
- 800' 35/64

**35 (1)**
- E
- E
- E
- E
- E

**SIGN SPACING = X (1)**

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<th>IN TANGENT (FEET)</th>
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**1. ALL SIGN SPACINGS MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, ETC.**

**2. THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.**

**CHANNELIZING DEVICE SPACING**

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<tr>
<td>75 / 50</td>
<td>36</td>
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**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. Existing conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary, and signs shall be post mounted for long term projects.

3. Strobe-Burn Warning Lights (Type C, MUTCD) shall be used to mark Channelizing Devices at night.

4. For speed limits of 30 mph or less, sign W1-3 shall be used in lieu of sign 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' O.C.

8. For signs sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual WSB-02.

**NOTES**

- 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.
- Existing conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary, and signs shall be post mounted for long term projects.
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- For speed limits of 30 mph or less, sign W1-3 shall be used in lieu of sign W1-4.
- Island device taper (L/3) across shoulder — recommended.
- Portable Changeable Message Sign (PCMS) — recommended.
- Channelizing Device spacing for the downstream taper option shall be 20' O.C.
- For signs sizes refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual WSB-02.
**LONGITUDINAL BUFFER SPACE = B**

**MINIMUM TAPER LENGTH = L (FEET)**

**CHANNELIZING DEVICE SPACING**

**SIGN SPACING**

**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 Stopping Distance.

2. Extend design taper (L/3) across shoulder — recommended.

3. Portable Changeable Message Sign (PCMS) — recommended.

4. Traffic Safety Drums for all tapers on high speed roadway — recommended.

5. Traffic Drums in closed lane every 1000’ — recommended.

6. Channelizing Device spacing for the downstream taper option shall be 20’ O.C.

7. Use advanced notice for any overwidth loads prior to lane closures for alternative routes if applicable — recommended.

8. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual MB-05-08.

---

**STANDARD PLAN K-24.20-00**

**FOR LOCAL AGENCY USE ONLY**

**NOT FOR USE ON STATE ROUTES**

---

**STATE DESIGN ENGINEER**

**APPROVED FOR PUBLICATION**

**Ken L. Smith**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

---

**DATE**

**EXPIRES AUGUST 9, 2007**

**SHEET 1 OF 1 SHEET**

---

**LEGEND**

- **SHAPE LOCATION**
- **CHANNELIZING DEVICES**
- **PROTECTIVE VEHICLE = RECOMMENDED**
- **PORTABLE CHANGEABLE MESSAGE SIGN**
- **ARROW PANEL**
- **EXISTING EDGE STRIPE**
- **EXISTING LANE STRIPE**
- **TEMPORARY TRAFFIC CONTROL DEVICES**

---

**ADDRESS (SHEET 1)**

**ADDRESS (SHEET 1)**

**ADDRESS (SHEET 1)**

---

**DEPARTMENT OF TRANSPORTATION**

**APPROVED FOR PUBLICATION**

**Ken L. Smith**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

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**DATE**

**EXPIRES AUGUST 9, 2007**

**SHEET 1 OF 1 SHEET**

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**LEGEND**

- **SHAPE LOCATION**
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- **TEMPORARY TRAFFIC CONTROL DEVICES**

---

**ADDRESS (SHEET 1)**

**ADDRESS (SHEET 1)**

**ADDRESS (SHEET 1)**
LONGITUDINAL BUFFER SPACE = B

BUFFER DATA
TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>POSTED SPEED (MPH)</th>
<th>ROUGH WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 YARD DUMP TRUCK, SURFACE TRUCK, PLAT BED, ETC.</td>
<td>35 / 40 / 45 / 48 / 55 / 60</td>
<td>65,000 LBS.</td>
</tr>
</tbody>
</table>

MINIMUM TAPER LENGTH = L (FT)

<table>
<thead>
<tr>
<th>LANES / SPEED (MPH)</th>
<th>POSTED SPEED (MPH)</th>
<th>TAPER LENGTH (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-12</td>
<td>35 / 40 / 45</td>
<td>100</td>
</tr>
<tr>
<td>11-12</td>
<td>35 / 40 / 45</td>
<td>100</td>
</tr>
<tr>
<td>12-14</td>
<td>35 / 40 / 45</td>
<td>100</td>
</tr>
</tbody>
</table>

SIGN SPACING = X (1)

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>CHANNELIZING DEVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-12</td>
<td>15 (250')</td>
</tr>
<tr>
<td>11-12</td>
<td>15 (250')</td>
</tr>
<tr>
<td>12-14</td>
<td>15 (250')</td>
</tr>
</tbody>
</table>

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 / 30</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>40 / 45</td>
<td>40</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. 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 10 O.C.

8. For signs sizes 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.

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' 35/64 ~ 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.
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. 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.
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Portable Changeable Message Sign (PCMS) ~ recommended.

3. Prohibit turns as necessary for traffic conditions.

4. For signs size refer to Manual on Uniform Traffic Control Device (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
**NOTES**

1. A Protective Vehicle is recommended whenever 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 assist workers with an adjacent Roll-Ahead distance.

2. If an existing signal is present, the signal shall be set to "red flash mode" or turned off during flagging operations.

3. Extend device taper (L/3) across shoulder - recommended.

4. Law enforcement officer may be used in lieu of flaggers to control intersection traffic.

5. Closing lanes in advance of flagging location when multiple lanes are on approach leg - recommended.

6. Maintain a minimum of one excess point for each business within the Work Area limits.

7. Consider using a PCML, field located in advance of signing, on the five lane roadway.

8. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

9. A four sign sequence is required with posted speed 40 mph or higher. A standard left turn warning sign reflecting the road condition or work operation may be used in place of the "WORKERS" sign. An acceptable alternative would be to repeat any of the signs from the sequence.

---

**LONGITUDINAL BUFFER SPACE = B**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>35</th>
<th>30</th>
<th>25</th>
<th>20</th>
<th>15</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH (FEET)</td>
<td>155</td>
<td>100</td>
<td>65</td>
<td>45</td>
<td>30</td>
<td>20</td>
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**BUFFER DATA**

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>POSTED SPEED (MPH)</th>
<th>35</th>
<th>30</th>
<th>25</th>
<th>20</th>
<th>15</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 YARD DUMP TRUCK, SERVICE TRUCK, PLANT, ETC.</td>
<td>40'</td>
<td>30'</td>
<td>25'</td>
<td>30'</td>
<td>40'</td>
<td>30'</td>
<td></td>
</tr>
</tbody>
</table>

**MINIMUM TAPER LENGTH = L**

<table>
<thead>
<tr>
<th>LANE WIDTH (FT)</th>
<th>POSTED SPEED (MPH)</th>
<th>35</th>
<th>30</th>
<th>25</th>
<th>20</th>
<th>15</th>
<th>10</th>
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<tbody>
<tr>
<td>10</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>270</td>
<td>450</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>11</td>
<td>110</td>
<td>100</td>
<td>230</td>
<td>280</td>
<td>450</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>13</td>
<td>130</td>
<td>100</td>
<td>240</td>
<td>340</td>
<td>490</td>
<td>600</td>
<td>650</td>
</tr>
</tbody>
</table>

**CHANNELIZING DEVICE SPACING**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FT)</th>
<th>IN TANGENT (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 / 40</td>
<td>25</td>
<td>60</td>
</tr>
<tr>
<td>35 / 30</td>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>

---

**LEGEND**

- ROAD WORK AHEAD
- BE PREPARED TO STOP
- W20-1
- W20-2A
- W20-3A
- W20-7A
- W21-1

**SIGN SPACING = X (1)**

- RURAL HIGHWAYS: 40 / 30 MPH: 100 ft.
- RURAL ROADS: 25 / 20 MPH: 150 ft.
- RURAL ROADS, URBAN ARTESIALES: 25 / 20 MPH: 150 ft. (see distance)
- URBAN STREETS: 20 MPH OR LESS: 100 ft.
- ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE.

1. All sign spacing may be reduced in urban areas to fit roadway conditions.

2. This sign spacing may be reduced in urban areas to fit roadway conditions.

---

**FOR LOCAL AGENCY USE ONLY NOT FOR USE ON STATE ROUTES**

**INTERSECTION - LANE SHIFT ON FIVE LANE TWO-WAY LEFT TURN LANE STANDARD PLAN K-30.40-01**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III

Washington State Department of Transportation

P 10-13-07
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 through capacity by eliminating right turns from the open through lane.

3. Prohibit turns as necessary for traffic conditions.

4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.

5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.

6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

7. For signs, refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

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.
### Notes

1. If the work space extends across a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).  
2. The normal procedure is to close the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left turn having significant left-turning movements, then the left lane may be reopened as a turn bay for left turns only, as shown.  
3. Prohibit turns as necessary for traffic conditions.  
4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.  
5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.  
6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.  
7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

**Road Work Area**

- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead

**Sign Location**

- Temporary Traffic Arrow ~ Optional
- Arrow Panel
- Barricade ~ Type 3R

**Channelizing Device Spacing**

<table>
<thead>
<tr>
<th>Posted Speed (MPH)</th>
<th>In Taper (Feet)</th>
<th>In Taper (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 / 55</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

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

- 55
- 550
- 605
- 660

**Legend**

- **H**: Sign Location
- **C**: Channelizing Device
- **T**: Temporary Traffic Arrow ~ Optional
- **A**: Arrow Panel
- **B**: Barricade ~ Type 3R

**Table**

<table>
<thead>
<tr>
<th>Minimum Taper Length = L (Feet)</th>
<th>Post Speed (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>45 / 55</td>
</tr>
<tr>
<td>550</td>
<td>35 / 45</td>
</tr>
<tr>
<td>605</td>
<td>25 / 30</td>
</tr>
<tr>
<td>660</td>
<td>20 / 10</td>
</tr>
</tbody>
</table>

**Figure**

- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead

**Compliance Date**

- 12/09/12
- 12/09/12
- 12/09/12
- 12/09/12
- 12/09/12

- **End Road Work**
- **End Road Work**
- **End Road Work**

**W20-1**

- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead

**W20-5L**

- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead
- Road Work Ahead

**W4-2R**

- Temporary Traffic Arrow ~ Optional
- Barricade ~ Type 3R

**Legend**

- **H**: Sign Location
- **C**: Channelizing Device
- **T**: Temporary Traffic Arrow ~ Optional
- **A**: Arrow Panel
- **B**: Barricade ~ Type 3R

**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. Prohibit turns as necessary for traffic conditions.
2. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades 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 M55-06A.
### Road Design Guidelines

**NOTES:***

1. All signs are black on orange unless designated otherwise.

2. Minimum taper length = L (feet)

3. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.

4. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.

5. For long-term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used.

6. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**Legend:**
- H = Sign Location
- • = Channelizing Device
- ▵ = Barricade - Type 3 L
- - - = Obliterated Marking

**Minimum Taper Length = L (feet):**

<table>
<thead>
<tr>
<th>Minimum Taper Length = L (feet)</th>
<th>Posted Speed (MPH)</th>
<th>Minimum Taper Length (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 / 40</td>
<td>35 / 50</td>
<td>90</td>
</tr>
<tr>
<td>25 / 30</td>
<td>25 / 30</td>
<td>90</td>
</tr>
</tbody>
</table>

**Channelizing Device Spacing:**
- Posted Speed (MPH) | Minimum Taper (feet) | Minimum Taper (feet) |
- 25 / 30            | 35 / 50            | 90                          |
- 25 / 40            | 25 / 30            | 90                          |
- 25 / 30            | 25 / 20            | 90                          |

**Minimum Taper Length = L (feet):**

- 25 / 40: 35 / 50
- 25 / 30: 25 / 30
- 25 / 30: 25 / 20

**Sign Spacing:**

- Rural Roads: 60 / 60 MPH
- Rural Roads & Urban Arterials: 55 / 50 MPH
- Urban Streets: 35 / 20 MPH

---

**Approvals:**

- Ken L. Smith, State of Washington, Engineer (05-15-07)

---

**Drawn By:** Elena Brunstein

---

**For Local Agency Use Only:**

- Not for use on State Routes

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**Effective Date:**

- April 6, 2009 to December 6, 2009
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 size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

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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. 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 size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

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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.

Channelizing Device spacing for the downstream taper option shall be 20’ O.C.

No Encroachment on the traveled lane is permitted. If Encroachment is necessary, the lane shall be closed (see Standard Plan K-24.20).

Signs to be post mounted for long term projects.

For signs 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. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

3. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

SIGN SPACING = X (1)

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TAPER (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 / 30</td>
<td>35 / 64</td>
<td>35 / 64</td>
</tr>
<tr>
<td>35 / 40</td>
<td>35 / 64</td>
<td>35 / 64</td>
</tr>
<tr>
<td>40 / 50</td>
<td>35 / 64</td>
<td>35 / 64</td>
</tr>
<tr>
<td>50 / 60</td>
<td>35 / 64</td>
<td>35 / 64</td>
</tr>
<tr>
<td>60 / 70</td>
<td>35 / 64</td>
<td>35 / 64</td>
</tr>
</tbody>
</table>

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NOTE:
1. In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance Warning Sign and the Work Area should not exceed 5 miles.
2. In those situations where the distance between the advance signs 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 signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

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.

In those situations where the distance between the advance signs and the Work Area is 2 to 5 miles, a Supplemental Distance plaque should be used with the ROAD WORK AHEAD sign.

No encroachment into traffic lane is permitted with this plan.

Work vehicle and Shadow vehicle shall use Warning Beacons.

Shadow vehicle shall maintain 600' to 1000' of sight distance to approaching traffic.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
SIGN SPACING = X (1)

<table>
<thead>
<tr>
<th>Description</th>
<th>Speed Limit</th>
<th>Sign Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Roads</td>
<td>25 MPH</td>
<td>100'</td>
</tr>
<tr>
<td>Rural Roads &amp; Urban Arterials</td>
<td>35 / 40 MPH</td>
<td>35/64</td>
</tr>
<tr>
<td>Rural Roads, Urban Arterials,</td>
<td>25 / 30 MPH</td>
<td>35/64</td>
</tr>
<tr>
<td>Residential &amp; Business Districts</td>
<td>45 / 55 MPH</td>
<td>35/64</td>
</tr>
</tbody>
</table>

(1) All sign spacing may be adjusted to accommodate at-grade intersections and driveways.
(2) Sign spacing may be reduced in urban areas to fit roadway conditions.

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 size, refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-06.

SIGN LOCATION
LEGEND
ROAD WORK AHEAD
W20-1
WORK AREA

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

WORK BEYOND THE SHOULDER
STANDARD PLAN K-40.80-00

EXPIRES AUGUST 9, 2007

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1. Implement this plan when the initial roadway assessment is complete and determined to be passable with caution.


3. Spot hazards shall be marked with barricades or channelizing devices to alert motorists.

4. For signs refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

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.

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 size 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

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1. For long term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

2. For Hot Mixed Asphalt Pavement, a temporary striping tape shall be installed in conjunction with DO NOT PASS and "PASS WITH CARE" sign locations.

3. Temporary roadside delineation with Channelization Devices is optional. The appropriate taper length shall be L/2. See Standard Plan K-24.20 for minimum taper length (L).

4. For long term projects a channelization/pavement marking plan should be implemented.

5. Temporary Raised Pavement Marker (TRPM) may be used on a pattern spacing 5' O.C. to simulate a solid line.
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.

<table>
<thead>
<tr>
<th>Class A</th>
<th>Construction Signage Installation</th>
<th>Standard Plan K-80.10-00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heights</td>
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<tr>
<td></td>
<td>To Bottom of Sign (No Supplemental Plaque)</td>
<td>To Bottom of Supplemental Plaque (When Required)</td>
</tr>
<tr>
<td>Rural</td>
<td>6' Minimum</td>
<td>6' Minimum</td>
</tr>
<tr>
<td>Urban</td>
<td>7' Minimum</td>
<td>6' Minimum</td>
</tr>
</tbody>
</table>
WARNING LIGHT ATTACHMENT DETAIL

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 approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.

5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.

6. When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.

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 approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.

5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.

6. When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.
AREA CLOSED TO TRAFFIC

USEABLE TRAFFIC LANE

ROAD CLOSURE AT INTERSECTION

MIN. 2' MIN.

TYPE 3L BARRICADE

STRIPES ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

TYPE 3R BARRICADE

ROAD CLOSURE AT OTHER LOCATIONS

WORK AREA

TYPE 3L BARRICADE

DRAWN BY: LISA CYFORD

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The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2' wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.

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TYPE 1 ANCHOR

Temporary installation of Precast Concrete Barrier Type 2 (STD. PLAN C-8) and Temporary Concrete Barrier (F-Shape) (STD. PLAN K-80.30) on cement concrete pavement or bridge deck

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 base barrier.

Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

Type 1 Anchor Pin Locations

2 1/2" diam. pinning hole (TYP.) - ONLY REQUIRED ON TRAFFIC SIDE OF BARRIER

Type 3 Anchor

Temporary installation of Precast Concrete Barrier Type 2 (STD. PLAN C-8) and Temporary Concrete Barrier (F-Shape) (STD. PLAN K-80.30) on Hot Mix Asphalt Pavement

Use Type 3 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 base barrier.

Adjust the location of the Type 3 Anchors to avoid the main reinforcing in the deck when drilling holes.

Use shims to properly fit the Type 3 Anchors to the barrier and roadway surfaces.

Upon removal of the Type 3 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

Use shims to properly fit the Type 3 Anchors to the barrier and roadway surfaces.

Upon removal of the Type 3 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

Adjust the location of the Type 3 Anchors to avoid the main reinforcing in the deck when drilling holes.

Use shims to properly fit the Type 3 Anchors to the barrier and roadway surfaces.

Upon removal of the Type 3 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

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. 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.

6. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.

7. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

8. Use shims to properly fit the anchors to the barrier and roadway surfaces.

9. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

NOTES:

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.

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7. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

8. Use shims to properly fit the anchors to the barrier and roadway surfaces.

9. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.

2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts which mark the angle point of any sudden change in topography.

3. Wood anchors (for wood posts) shall be 2x4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

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The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.

2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts which mark the angle point of any sudden change in topography.

3. Wood anchors (for wood posts) shall be 2x4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

Wire anchors (for wood posts) shall be 2x4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.

2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts which mark the angle point of any sudden change in topography.

3. Wood anchors (for wood posts) shall be 2x4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.

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The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.

2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts which mark the angle point of any sudden change in topography.

3. Wood anchors (for wood posts) shall be 2x4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.
Wire Fence Types 1 & 2 and Wire Gates

Standard Plan L-10.10-00

Effective: April 6, 2009 to December 6, 2009

Wood Posts and Braces

Brace Post (Typ.)

Wood Brace (Typ.)

Brace Wire (Typ.)

Brace (Typ.)

Wood Anchor (Typ.)

Wood Frame (Typ.)

Gate Post (Typ.)

Corner Post (Typ.)

Corner Brace (Typ.)

End Post (Typ.)

End Bracing (Wire Fence Type 1 Shown)

Gate Brace (Typ.)

Intermediate Bracing / Pull Post (Wire Fence Type 1 Shown)

Intersection Bracing (Wire Fence Type 1 Shown)

Wood Posts and Braces

Brace Post (Typ.)

Wood Brace (Typ.)

Brace Wire (Typ.)

Brace (Typ.)

Wood Anchor (Typ.)

Wood Frame (Typ.)

Gate Post (Typ.)

Corner Post (Typ.)

Corner Brace (Typ.)

End Post (Typ.)

End Bracing (Wire Fence Type 1 Shown)

Gate Brace (Typ.)

Intermediate Bracing / Pull Post (Wire Fence Type 1 Shown)

Intersection Bracing (Wire Fence Type 1 Shown)

Wood Posts and Braces

Brace Post (Typ.)

Wood Brace (Typ.)

Brace Wire (Typ.)

Brace (Typ.)

Wood Anchor (Typ.)

Wood Frame (Typ.)

Gate Post (Typ.)

Corner Post (Typ.)

Corner Brace (Typ.)

End Post (Typ.)

End Bracing (Wire Fence Type 1 Shown)

Gate Brace (Typ.)

Intermediate Bracing / Pull Post (Wire Fence Type 1 Shown)

Intersection Bracing (Wire Fence Type 1 Shown)

Wood Posts and Braces

Brace Post (Typ.)

Wood Brace (Typ.)

Brace Wire (Typ.)

Brace (Typ.)

Wood Anchor (Typ.)

Wood Frame (Typ.)

Gate Post (Typ.)

Corner Post (Typ.)

Corner Brace (Typ.)

End Post (Typ.)

End Bracing (Wire Fence Type 1 Shown)

Gate Brace (Typ.)

Intermediate Bracing / Pull Post (Wire Fence Type 1 Shown)

Intersection Bracing (Wire Fence Type 1 Shown)

Wood Posts and Braces

Brace Post (Typ.)

Wood Brace (Typ.)

Brace Wire (Typ.)

Brace (Typ.)

Wood Anchor (Typ.)

Wood Frame (Typ.)

Gate Post (Typ.)

Corner Post (Typ.)

Corner Brace (Typ.)

End Post (Typ.)

End Bracing (Wire Fence Type 1 Shown)

Gate Brace (Typ.)

Intermediate Bracing / Pull Post (Wire Fence Type 1 Shown)

Intersection Bracing (Wire Fence Type 1 Shown)

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Brace Post (Typ.)

Wood Brace (Typ.)

Brace Wire (Typ.)

Brace (Typ.)

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Wood Brace (Typ.)

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Brace (Typ.)

Wood Anchor (Typ.)

Wood Frame (Typ.)

Gate Post (Typ.)

Corner Post (Typ.)

Corner Brace (Typ.)

End Post (Typ.)

End Bracing (Wire Fence Type 1 Shown)

Gate Brace (Typ.)

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Intersection Bracing (Wire Fence Type 1 Shown)

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Brace Post (Typ.)

Wood Brace (Typ.)

Brace Wire (Typ.)

Brace (Typ.)

Wood Anchor (Typ.)

Wood Frame (Typ.)

Gate Post (Typ.)

Corner Post (Typ.)

Corner Brace (Typ.)

End Post (Typ.)

End Bracing (Wire Fence Type 1 Shown)

Gate Brace (Typ.)

Intermediate Bracing / Pull Post (Wire Fence Type 1 Shown)

Intersection Bracing (Wire Fence Type 1 Shown)
POST AND RAIL SPECIFICATIONS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>NOM. SIZE</th>
<th>SECTION</th>
<th>WEIGHT (lb/ft)</th>
<th>WEIGHT (lb/ft)</th>
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<td>1.60</td>
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<td>BRACE</td>
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</table>

# POST AND RAIL SPECIFICATIONS

### 1. POST AND RAIL SPECIFICATIONS

- **Post Specifications**
  - **Nominal Size**: 2 1/2" DIA
  - **Material**: Roll Formed
  - **Height**: 8.10 ft
  - **Weight**: 3.26 lb/ft

- **Brace Specifications**
  - **Nominal Size**: 2" DIAM
  - **Material**: Roll Formed
  - **Height**: 6.00 ft
  - **Weight**: 1.60 lb/ft

### 2. Method of Fastening

- **Stretcher Bar to Post**:
  - Type 3: 2' - 6" from top
  - Type 4: 3' - 0" from top

- **Tension Wire**:
  - Type 3: 2' - 6" from top
  - Type 4: 3' - 0" from top

- **Tension Cable**:
  - Type 3: 5' 0" from top
  - Type 4: 5' 0" from top

### 3. Notes

- 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.

---

**Approvals**

- **DATE**: 02-07-07
- **STATE DESIGN ENGINEER**: Ken L. Smith
- **WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

---

**Sheet 1 of 2 Sheets**

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**LEGAL ENGINEERING DOCUMENT**

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1. All glare screen posts shall be 1 5/8" × 2 1/4" Galvanized Steel H-Columns.

2. Post Bolts shall be:
   - On Timber Posts: Hex head bolt 5/8-16 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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GLARE SCREEN TYPE 1
DESIGN A
STANDARD PLAN L-40.10-00

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DRAWN BY:  LISA CYFORD

APPROVED FOR PUBLICATION
Ken L. Smith  02-21-07
Washington State Department of Transportation

END OR CORNER, (SPACE) POST DETAIL

PULL POST (WITHIN RUN) DETAIL

EFFECTIVE: APRIL 6, 2009 TO DECEMBER 6, 2009
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NOTES:

1. Lines shown on the plans or specified in the standard provisions, unless pavement markings shall be used for supplementing or substituting the painted pavement markings shown herein. See the standard plans for lane, shoulder, and fire lane.

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 herein. See the Standard Plans for RPM supplement and substitution patterns.

The channelization shown on this plan assumes optimal geometric design. The dimensions may vary to fit existing conditions. See Contract.

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown herein. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal geometric design. The dimensions may vary to fit existing conditions. See Contract.
**RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION**

**STANDARD PLAN M-1.80-02**

**SHEET 1 OF 1 SHEET**

**NOTES**

1. Where shown on the plans or specified in the Special Provisions, raised pavement markings 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 geometry design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

- **L** = Lane Width
- **R** = Ramp Lane Width

---

**TABLE**

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<tr>
<th>Posted Mainline Speed</th>
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<td>70 MPH</td>
<td>1.627</td>
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**35 MPH**

**40 MPH**

**45 MPH**

**50 MPH**

**55 MPH**

**60 MPH**

**65 MPH**

**70 MPH**

---

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Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 60' 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.

The acute angle of the diagonals shall always point in the direction of mainline traffic.
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.
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**

**Reduced Taper Lengths - Symmetrical Widening**

*For limited use in urban areas with posted speeds of 40 mph or less*

- **Stopping Point for Left Turn Lane**
- **Wide Lane Line**
- **Double Center Line (Yellow)**
- **Approach Taper**
- **White Edge Line**
- **Center Line**
- **No Pass Line**

**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. **L = 12' Typical Lane Width.** See Contract for specified lane widths.

**Legend**

- **Type 2L Traffic Arrow**

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER L</th>
<th>DIMENSION H</th>
<th>APPROACH TAPER M</th>
<th>DIMENSION K</th>
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<td>20 MPH</td>
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**Optional Marked Deceleration Taper**

*For limited use in urban areas*

**Reduction Taper Lengths - Symmetrical Widening Left of Centerline**

- **Stopping Point for Left Turn Lane**
- **Wide Lane Line**
- **Double Center Line (Yellow)**
- **Approach Taper**
- **White Edge Line**
- **Center Line**
- **No Pass Line**

**Additional Notes**

- **White Edge Line**
- **No Pass Line**

**General Notes (continued)**

- **Standard Plan M-3.20-01**

**Expiry:**

- Expires August 9, 2007

**Additional Information:**

- **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 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 2L locations shown, in which case, substitute the Arrow as per the LANE MESSAGE DETAIL.

**LEGEND**

<table>
<thead>
<tr>
<th>Pointed Speed</th>
<th>Approach Taper C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>50'</td>
<td>120'</td>
</tr>
<tr>
<td>24 MPH</td>
<td>60'</td>
<td>160'</td>
</tr>
<tr>
<td>25 MPH</td>
<td>60'</td>
<td>160'</td>
</tr>
<tr>
<td>30 MPH</td>
<td>75'</td>
<td>200'</td>
</tr>
<tr>
<td>35 MPH</td>
<td>80'</td>
<td>245'</td>
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<tr>
<td>40 MPH</td>
<td>90'</td>
<td>300'</td>
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<tr>
<td>45 MPH</td>
<td>100'</td>
<td>360'</td>
</tr>
<tr>
<td>50 MPH</td>
<td>110'</td>
<td>450'</td>
</tr>
<tr>
<td>55 MPH</td>
<td>120'</td>
<td>540'</td>
</tr>
<tr>
<td>60 MPH</td>
<td>130'</td>
<td>630'</td>
</tr>
</tbody>
</table>

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**APPROVED FOR PUBLICATION:**

Washington State Department of Transportation

**SHEET 1 OF 4 SHEETS**
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 = 12' Typical Lane Width. See Contract for specified lane widths.

LEGEND

Type 2R Traffic Arrow
Type 3L Traffic Arrow

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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.

HIGH OCCUPANCY VEHICLE (HOV) LANE SYMBOL
LAYOUT

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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.
**NOTE:**

1. In areas where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (paper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In areas where there is a crossing, bridge, or other structure on the path that does not support or accommodate a vehicle, (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.
See contract for location and material requirements.

DIMENSIONS SHOWN ARE APPROXIMATE. SEE CONTRACT.

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.

STOP LINE

LAYOUT

EDGELINE

LANE LINE OR ROADWAY CENTERLINE

TOTAL MARKING AREA (PER 12' WIDE LANE) = 111.59 SQ.FT.
TOTAL MARKING AREA (PER 12' WIDE LANE) = 109.75 SQ.FT.

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Ken L. Smith 01-30-07
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.

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ALTERNATIVE PARKING STALL MARKINGS

1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Pedestrian Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6" long.


LEGEND

- Reserved Parking Sign and post with PESHA Plain, if indicated (see Sign Fabrication Manual)
- Access Pedestrian Space Symbol
- Manufactured wheel stop
- Detectable Warning Pattern

PARKING SPACE LAYOUTS
STANDARD PLAN N-17.10-02
Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION
Peaco, R. October 2, 2009
Washington State Department of Transportation
NOTES:

1. Dotted Extension Line shall be the same color as the line it is extending.

2. Edge Line shall be white on the right edge of traveled way, and yellow on the left edge of traveled way (on one-way roadways). Solid Lane Line shall be white.

3. The distance between the lines of the Double Center Line shall be 12" everywhere, except 4" for left turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-State Routes) may specify a 4" distance for all locations.

4. Wide Lane Line shall be white.

5. Wide Line shall be yellow or white as specified in the Plans.
See Standard Plan M-20.10 for pattern and color requirements.

PROFILED PLASTIC
(Broken line)
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 \(-W=8\)"

EMBOSSED PLASTIC
(Solid or Broken line)
FOR:
- CENTER LINE & LANE LINE
- NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE
- REVERSIBLE LANE LINE
- WIDE BROKEN LANE LINE

PROFILED EMBOSSED PLASTIC
(Solid or Broken line)
FOR:
- CENTER LINE & LANE LINE
- NO-PASS LINE
- TWO-WAY LEFT-TURN CENTER LINE

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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.

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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-20.40-01**

**DRAWN BY:** ADAM COCHRAN

**DATE:** 01-30-07

**APPROVED FOR PUBLICATION:**

Ken L. Smith

Washington State Department of Transportation

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**EFFECTIVE:** APRIL 6, 2009 TO DECEMBER 6, 2009

**DETAIL A:**
- **TYPE 2YY RPM (TYP.)**
- **40’ - 0” SPACING**
- **DOUBLE CENTER LINE (YELLOW)**
  - Narrow Pattern
- **40 RPM SPACING**
- **LEFT TURN LANE**
- **WIDE LANE LINE**

**DETAIL B:**
- **TYPE 2YY RPM (TYP.)**
- **40’ - 0” SPACING**
- **DOUBLE CENTER LINE (YELLOW)**
  - Narrow Pattern
- **40 RPM SPACING**

**DETAIL C:**
- **TYPE 2YY RPM (TYP.)**
- **20’ - 0” SPACING**
- **ALTERNATIVE LINE DETAIL**
- **TWO-WAY LEFT-TURN CENTER LINE**
- **INSIDE EDGE OF LANE**

**DETAIL D:**
- **DOUBLE CENTER LINE (YELLOW)**
  - Narrow Pattern
- **20’ RPM SPACING FOR DECELERATION TAPER**

**DETAIL E:**
- **DOUBLE CENTER LINE (YELLOW)**
  - Narrow Pattern
- **TYPE 2YY RPM (TYP.)**
- **40’ RPM SPACING**

**EXPIRES AUGUST 9, 2007**
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).
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 FOR HIGH SPEED ROADWAYS
STANDARD PLAN M-34.22-01

MARKING AREA
17.44 SQ.FT.

TYPE 2R (RIGHT)
TRAFFIC ARROW

MARKING AREA
17.93 SQ.FT.

TYPE 2L (LEFT)
TRAFFIC ARROW

MARKING AREA
17.93 SQ.FT.

DRAWN BY: MARK SUJKA

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SYMBOL MARKINGS
TRAFFIC ARROWS FOR
HIGH SPEED ROADWAYS
STANDARD PLAN M-24.20-01

SYMMETRICAL ABOUT CENTERLINE

GRID IS 4" SQUARE

MARKING AREA
35.88 SQ.FT.

TYPE 6L (LEFT) TRAFFIC ARROW

SYMBOL & LANE CENTERLINE

MARKING AREA
35.88 SQ.FT.

3' - 0"
7' - 0"

ELLIPSE "A" AXIS

ELLIPSE "B" AXIS

CENTER POINT OF ELLIPSES

MARKING AREA
45.17 SQ.FT.

TYPE 6R (RIGHT)
TRAFFIC ARROW

SYMMETRICAL ABOUT CENTERLINE

MIRROR IMAGE OF TYPE 6L
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)
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

STANDARD PLAN M-24.40-01

SYMBOL & LANE MARKING AREA 19.58 SQ.FT.

DRAWN BY: MARK SUJKA

SYMMETRICAL ABOUT CENTERLINE
GRID IS 4" SQUARE

MARKING AREA M-24.40-01
MARKING AREA 23.14 SQ.FT.

SYMMETRICAL ABOUT CENTERLINE
MARKING AREA 15.94 SQ.FT.

SYMMETRICAL ABOUT CENTERLINE
MARKING AREA 15.94 SQ.FT.

SYMMETRICAL ABOUT CENTERLINE
MARKING AREA 19.58 SQ.FT.
AERIAL SURVEILLANCE MARKERS

HALF MARKER (1/2 MILE INTERVAL)

FULL MARKER (1 MILE INTERVAL)

PAVED SHOULDER

MARKING AREA = 1.76 SQ.FT.

MARKING AREA = 3.38 SQ.FT.

PAVED SHOULDER

MARKING AREA = 6.00 SQ.FT.

MARKING AREA = 11.73 SQ.FT.

STOP LINE

1' - 6" ~ UNLESS NOTED OTHERWISE IN CONTRACT

LENGTH VARIES ~ SEE CONTRACT

MARKING AREA = 0.56 SQ.FT.

MARKING AREA = 1.06 SQ.FT.

DRAINAGE STRUCTURE INLET

CROSS CULVERT

EDGE LINE

CENTERLINE OF CROSS CULVERT

ANGLE OF CROSS CULVERT

EDGE LINE

MARKING AREA = 0.69 SQ.FT.

CROSS CULVERT

DRAINAGE MARKING

4" TYP.

90°

90°

2' - 0"

1' - 6"

MARKER MARKINGS

MISCELLANEOUS

STANDARD PLAN M-24.60-02

SHEET 1 OF 2 SHEETS

DRAWN BY:  MARK SUJKA

APPROVED FOR PUBLICATION

DATE

STATE DESIGN ENGINEER

Washington State Department of Transportation

SYMBOL MARKINGS

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Ken L. Smith

02-06-07
ACCESS PARKING SPACE SYMBOL (STANDARD)
GRID IS 4" SQUARE
MARKING AREA = 3.09 SQ.FT.
ACCESS PARKING SPACE SYMBOL (MINIMUM)
GRID IS 4" SQUARE
MARKING AREA = 1.41 SQ.FT.

ACCESS PARKING SPACE SYMBOL (STANDARD)
WITH BLUE BACKGROUND AND WHITE BORDER
MARKING AREA = 9.76 SQ.FT.
ACCESS PARKING SPACE SYMBOL (MINIMUM)
WITH BLUE BACKGROUND AND WHITE BORDER
MARKING AREA = 18.69 SQ.FT.

SYMBOL MARKINGS

<table>
<thead>
<tr>
<th>SYMBOL MARKING</th>
<th>TYPE 1</th>
<th>TYPE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>YIELD AHEAD SYMBOL</td>
<td>5' - 0&quot;</td>
<td>2' - 0&quot;</td>
</tr>
<tr>
<td>YIELD LINE SYMBOL</td>
<td>5' - 0&quot;</td>
<td>2' - 0&quot;</td>
</tr>
</tbody>
</table>

MARKING AREA

<table>
<thead>
<tr>
<th>TYPE 1</th>
<th>TYPE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LESS THAN 45 MPH</td>
<td>20.00 SQ.FT.</td>
</tr>
<tr>
<td>45 MPH OR GREATER</td>
<td>30.00 SQ.FT.</td>
</tr>
<tr>
<td>LESS THAN 45 MPH</td>
<td>6.76 SQ.FT.</td>
</tr>
<tr>
<td>45 MPH OR GREATER</td>
<td>9.00 SQ.FT.</td>
</tr>
</tbody>
</table>

GRID IS 4" SQUARE
MARKING AREA = 0.75 SQ.FT.
MARKING AREA = 3.00 SQ.FT.

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NOTES

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" × 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 guardposts are required.

GUIDE POST TYPE DEFINITIONS ~ REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>GUIDE POST TYPE</th>
<th>REFLECTIVE SHEETING</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE W</td>
<td>WHITE/WHITE</td>
</tr>
<tr>
<td>TYPE Y</td>
<td>WHITE/YELLOW</td>
</tr>
<tr>
<td>TYPE WW</td>
<td>WHITE/WHITE</td>
</tr>
<tr>
<td>TYPE YY</td>
<td>YELLOW/YELLOW</td>
</tr>
</tbody>
</table>

GUIDE POSTS & BARRIER DELINEATORS

STANDARD PLAN M-40.10-00

<table>
<thead>
<tr>
<th>COMBINATION ANGLE (deg)</th>
<th>REFLECTANCE ANGLE (deg)</th>
<th>SPECIFIC INTENSITY (cd/ft-c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>0°</td>
<td>120</td>
</tr>
<tr>
<td>0°</td>
<td>30°</td>
<td>96</td>
</tr>
</tbody>
</table>

NOTE 2

Spacing of Barrier Delineators shall be as shown in the plans.

The housing or bracket can be flexible or rigid, molded from a durable plastic or other durable material approved by the engineer, and shall be attached to the barrier with an adhesive recommended by the manufacturer. The attachment point on the barrier surface shall be free of dirt, curing compound, moisture, paint, or any other matter that would adversely affect the adhesive bond.

The reflective surface shall be rectangular or trapezoidal.

Reflective Sheeting: 12 square inches minimum surface area; Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.

Plastic Reflector: 9 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:

<table>
<thead>
<tr>
<th>OBSERVATION ANGLE (deg)</th>
<th>REFLECTION ANGLE (deg)</th>
<th>SPECIFIC INTENSITY (cd/ft-c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>0°</td>
<td>120</td>
</tr>
<tr>
<td>0°</td>
<td>30°</td>
<td>96</td>
</tr>
</tbody>
</table>
NOTES:


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

3. "S" dimension shown on Standard Plan M-40.40 or 100', whichever is smaller.

4. One half of "S" dimension shown on Standard Plan M-40.40 or 50', whichever is smaller.

5. Two spaces at 100'.

6. Three equal spaces when R < 75', four equal spaces when R ≥ 75'.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet maximum.

**Reflective Sheeting Applications**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>TYPE</th>
<th>FACING TRAFFIC</th>
<th>BACK SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>G1</td>
<td>WHITE</td>
<td>WHITE</td>
</tr>
<tr>
<td>G1</td>
<td>G2</td>
<td>WHITE</td>
<td>WHITE</td>
</tr>
<tr>
<td>G2</td>
<td>G2</td>
<td>WHITE</td>
<td>GREEN</td>
</tr>
</tbody>
</table>

**Legend**

- TYPE W
- TYPE Y
- TYPE WW

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1. The first guide post is positioned "S" distance from the beginning of curvature.
2. If the last guide post beyond the curve is 1/2 "S" or more, no additional posts are required.
3. If the last guide post beyond the curve is less than 1/2 "S", one additional post is required.
1. Locate the Initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the Initial Guide Post shall be 50 feet max.

2. Locate the Initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the Initial Guide Post shall be 50 feet max.

SHOULDER RUMBLE STRIP
TYPE 1
FOR DIVIDED HIGHWAYS
STANDARD PLAN M-60.10-00

SHEET 2 OF 4 SHEETS

DRAWN BY:  MARK SUJKA

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BEGIN RUMBLE STRIP ON RIGHT SHOULDER AT END OF ACCELERATION TAPER

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

60' MIN.

SINGLE LANE ON-CONNECTION

MEDIAN CROSSOVER

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

MEDIAN SHOULDER
OUTSIDE SHOULDER

SHOULDER TAPER DETAIL

STRUCTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH

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

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

END RUMBLE STRIP ON LEFT SHOULDER ADJACENT TO BEGGINING OF ON RAMP

SAFE LANE LINE

SHOULDER RUMBLE STRIP
ON OUTSIDE SHOULDER

SHOULDER TAPER DETAIL

END RUMBLE STRIP ON LEFT SHOULDER ADJACENT TO BEGGINING OF ON RAMP

SAFE LANE LINE

450' 600'

SHOULDER RUMBLE STRIP
ON MEDIAN SHOULDERS

MEDIAN CROSSOVER

SHOULDER RUMBLE STRIP
ON OUTSIDE SHOULDER

SHOULDER TAPER DETAIL

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

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

END RUMBLE STRIP ON LEFT SHOULDER ADJACENT TO BEGGINING OF ON RAMP

SAFE LANE LINE

SHOULDER RUMBLE STRIP
ON OUTSIDE SHOULDER

SHOULDER TAPER DETAIL

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

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SHOULDER RUMBLE STRIP
TYPE 1
FOR DIVIDED HIGHWAYS
STANDARD PLAN M-60.10-00

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1. Center Line Rumble Strip installation requires a minimum distance of 12 feet from Center Line to edge of paved shoulders.

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.
EIGHT FOOT HIGH LETTERS AND NUMERALS
ARE SHOWN ON A FOUR-INCH SQUARE GRID
FOR USE ON ROADWAYS WITH A POSTED SPEED OF 45 MPH OR MORE.