Standard Plans

M 21-01
August 5, 2013
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Washington State Department of Transportation
Engineering and Regional Operations
Development Division, Design Office
PO Box 47329
Olympia, WA 98504-7329

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

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

Contact the **Design Standards Team** at:

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Transportation Building

Olympia, WA 98504-7329.

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

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<td>M-40.50-00</td>
<td>Guide Post Placement Bridges</td>
<td>9/20/07</td>
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<tr>
<td>M-40.60-00</td>
<td>Guide Post Placement Miscellaneous</td>
<td>9/20/07</td>
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<tr>
<td>M-60.10-01</td>
<td>Shoulder Rumble Strip Type 1 for Divided Highways</td>
<td>6/3/11 4 Sheets</td>
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<tr>
<td>M-60.20-02</td>
<td>Shoulder Rumble Strip, Types 2, 3, and 4, for Undivided Highways</td>
<td>6/27/11 2 Sheets</td>
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<td>CenterLine Rumble Strip</td>
<td>5/11/11 2 Sheets</td>
</tr>
<tr>
<td>M-80.10-01</td>
<td>Traffic Letter and Numeral Applications</td>
<td>6/3/11 2 Sheets</td>
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<tr>
<td>M-80.20-00</td>
<td>Traffic Letters and Numerals (High Speed Roadways)</td>
<td>6/10/08</td>
</tr>
<tr>
<td>M-80.30-00</td>
<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
</tr>
</tbody>
</table>
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.

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

LATH FOR SLOPE REFERENCES

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

DAYLIGHT CATCH (CUT 0.0 FEET)
FILL (0.1 FEET)
SIDE SLOPE TO A 2% ROADWAY SLOPE (50H:1V)
DISTANCE FROM C (16.2 FEET)

SLOPE TREATMENT (ST) STAKE
FOR CUT SECTIONS

DAYLIGHT (D/L) STAKE

SLOPE STAKE
FRONT
BACK

SURVEY STAKES
STANDARD PLAN A-10.10-00
FILL FROM CATCH POINT TO BEGINNING OF SECOND SLOPE (3.8 FEET)
SLOPE RATIO (2H:1V)
FILL TO SUBGRADE SHOULDER (2.25 FEET)
SLOPE RATIO (4H:1V)
DISTANCE FROM CATCH POINT TO BOTTOM OF DITCH (2.4 FEET)
SIDE SLOPE RATIO (4H:1V)
DISTANCE FROM CATCH TO SUBGRADE (2.25 FEET)
SLOPE RATIO (2H:1V)
FILL TO TOP OF CONCRETE BASE (1.1 FEET TO TOP OF FOUNDATION)
FILL TO FINISH GRADE (CURB ELEVATION) (0.73 FEET)
STAKE FOR DITCH CONSTRUCTION
STAKE FOR FOUNDATION OF LUMINAIRES, SIGNALS OR SIGN STRUCTURES
SLOPE LATH FOR CURB SECTION

FILL TO SUBGRADE (0.35 FEET)
FILL TO CURB ELEVATION (Curb Elevation) (0.73 FEET)
DISTANCE FROM CATCH TO CURB (14.3 FEET)
SIDE SLOPE RATIO (2H:1V)
STAKE FOR DRAINAGE
STAKE FOR CURB/GUTTER

LUMINAIRE NUMBER (23)
LINE DESIGNATION
HUNDRED FOOT INCREMENTS

PLAN SHEET NUMBER (4)
STRUCTURE NOTE NUMBER (15)
DITCH SECTION ALIGNMENT STATIONING
OFFSET TO CENTER OF BASE (10 FEET)
FILL TO TOP OF CONCRETE BASE (1.1 FEET TO TOP OF FOUNDATION)
DISTANCE FROM CATCH POINT (28.7 FEET)
SLOPE RATIO (2H:1V)
STAKE FOR DITCH CONSTRUCTION
STAKE FOR FOUNDATION OF LUMINAIRES, SIGNALS OR SIGN STRUCTURES

STANDARD PLAN A-10.10-00
Sheet 2 of 2 sheets
APPROVED FOR PUBLICATION
Washington State Department of Transportation
Pasco Bakotich III 08-07-07
2013 TO AUGUST 3, 2014
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

1. The Brass Disc will be furnished by the State.

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

3. The hole shall be 32" minimum in depth or 6" below the deepest recorded frost line. All loose material shall be removed from the bottom of the hole so that the concrete is placed on firm undisturbed earth.

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

5. The Brass Disc shall be rotated so it can be read while the observer is facing north.

6. When the concrete is set, cover the entire monument with moist earth and leave for three days.

7. To replace a Public Land Survey System (PLSS) corner, consult a licensed Professional Land Surveyor (PLS).
CONCRETE BASE

PLAN VIEW

RISER RING DIMENSIONS

<table>
<thead>
<tr>
<th>SIZE</th>
<th>1 1/2&quot;</th>
<th>2&quot;</th>
<th>3&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diam.</td>
<td>10 1/2&quot;</td>
<td>9 1/2&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

SECTION

RISER RING

SECTION

COVER

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>CASE</td>
<td>60 LBS</td>
</tr>
<tr>
<td>COVER</td>
<td>19 LBS</td>
</tr>
<tr>
<td>TOTAL</td>
<td>79 LBS</td>
</tr>
</tbody>
</table>

SECTION OF LETTER

CASE

MONUMENT CASE AND COVER

STANDARD PLAN A-10.30-00

ISOMETRIC

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakitch III 10-05-07

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CASE</td>
<td>60 LBS</td>
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<td>COVER</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>79 LBS</td>
</tr>
</tbody>
</table>

SECTION OF LETTER

CASE

MONUMENT CASE AND COVER

STANDARD PLAN A-10.30-00

ISOMETRIC

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakitch III 10-05-07
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.

### Slope Treatment

#### Standard Plan A-20.10-00

<table>
<thead>
<tr>
<th>Cut Slope (H : V)</th>
<th>Typical Section</th>
<th>Level Ground Line</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TYPICAL SECTION</td>
<td>LEVEL GROUND LINE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASCENDING GROUND LINE</td>
<td>ROADWAY EXCAVATION</td>
</tr>
<tr>
<td></td>
<td>DESCENDING GROUND LINE</td>
<td>ROADWAY EXCAVATION</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>L = 10'</td>
<td>L = 5'</td>
</tr>
</tbody>
</table>

#### Slope Treatment Requirements

- For Class A slopes, use the following:
  - 1:5 slope treatment not required
  - 2:1 slope treatment not required
  - 3:1 slope treatment not required
  - 4:1 slope treatment not required
  - 5:1 slope treatment not required

- For Class B slopes, use the following:
  - 1:5 slope treatment not required
  - 2:1 slope treatment not required
  - 3:1 slope treatment not required
  - 4:1 slope treatment not required
  - 5:1 slope treatment not required

### State of Washington

- Registered Landscape Architect
- Mark W. Maurer
- Certificate No. 000598

### Washington State Department of Transportation

- Pasco Bakitch III
- 08-31-07

- Effective: August 5, 2013 to August 3, 2014
1. **Concrete Slope Protection**

   **Section A**
   - Existing Soil
   - Pneumatically Placed or Cast-in-Place Cement Concrete

   **Section B**
   - Elevation Slope
   - Slope Protection beyond Outer Extremity of Bridge
   - Footing
   - Equal Spacing 6' Centers Min. 8' Centers Max.

2. **Typical Section**

   - Bottom Edge of Slope Protection Follows Bottom of Ditch
   - Edge of Shoulder
   - Footing
   - 10 Gage 6" x 6" Wire Mesh Reinforcement Centered in Concrete (See Std. Spec. 6-07.7)
   - Pneumatically Placed or Cast-in-Place Cement Concrete

3. **Plan**

   - Dummy Joint (Typ.)
   - Slope Protection
   - Outer Extremity of Bridge
   - Extend Slope Protection 6" Beyond Outer Extremity of Bridge

4. **Notes**

   - The plan is not a legal engineering document but an electronic duplicate of the original signed by the engineer and approved for publication.
   - A copy may be obtained upon request.

5. **Certification**

   - Sandra L. Salisbury
   - Certificate No. 000880

6. **Standard Plan**

   - Standard Plan A-30.10-00

7. **State of Washington**

   - Registered Landscape Architect

8. **Approval**

   - Pasco Baketic III
   - Certification: 11-8-07
   - Washington State Department of Transportation
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.
Maximum anchor spacing (A) for debris and impact loads required as per table for a minimum allowable anchor capacity of 20,000 lbs. Systems subjected to snow loads may require narrower maximum spacing.

- Hexagonal mesh must meet minimum requirements of ASTM A975 for gabions.
- U-Section of wire rope clip must be applied to the dead end, and saddle of wire rope clip must be applied to the live end of the rope as shown.
- All wire rope loops shall include a standard weight thimble.

### Section View

- **Maximum Anchor Spacing (A)**
  - Table:
    | Distance (H) | Anchor Spacing (A) |
    |--------------|--------------------|
    | 0' - 100'   | 50                 |
    | 100' - 200' | 35                 |
    | 200' - 300' | 20                 |

- **Maximum Length - Top Horizontal Support Rope (B)**
  - Table:
    | Distance (H) | Rope Length (B) |
    |--------------|-----------------|
    | 0' - 100'   | 400             |
    | 100' - 200' | 200             |
    | 200' - 300' | 100             |
    | 300'        | 75              |

- **Wire Rope Detail**
  - Distances X, Y, Z and torque to comply with manufacturer's specifications.
NOTE:
1. The "U" shape or "V" shape are both acceptable.
2. Wire sizes shown are minimum required.
3. All wire intersections are to be welded.
4. Basket must be firmly attached to existing or new base.
5. Dowels and Tie Bars shall be held firmly in the above welded assembly.
6. Do not clip Spreader Wires.
TYPICAL ISOLATION JOINT GUIDELINES

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>FEATURE</th>
<th>EDGES, FLANGES OR LIPS IN THE PAVEMENT SECTION</th>
<th>CONTINUOUS VERTICAL FACE THROUGH THE PAVEMENT SECTION</th>
<th>distancia FROM NEAREST TRANSVERSE JOINT</th>
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<tbody>
<tr>
<td>A</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td></td>
<td>&gt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>D</td>
<td>GRATE INLET. CATCH BASIN OR CONCRETE INLET *</td>
<td></td>
<td>USE</td>
<td>&lt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>E</td>
<td>GRATE INLET. CATCH BASIN OR CONCRETE INLET *</td>
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<td>USE</td>
<td>&lt; 4 FT FROM JOINT</td>
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<tr>
<td>F</td>
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<td>USE</td>
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</tr>
<tr>
<td>G</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td></td>
<td>&lt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>J</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td></td>
<td>&gt; 4 FT FROM JOINT</td>
</tr>
</tbody>
</table>

* WITH RECTANGULAR GRATE CAST INTO ADJUSTMENT SECTION.

PLAN

TYPICAL APPLICATIONS

ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER

EDGES, FLANGES OR LIPS IN PAVEMENT SECTION

CONTINUOUS VERTICAL FACE THROUGH THE PAVED SECTION

PCC PAVEMENT ISOLATION JOINTS

STANDARD PLAN A-40.15-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 08-11-09

STATE DESIGN ENGINEER

WASHINGTON State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

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

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

3. The contractor shall avoid sawing out concrete at all locations. For details 1 and 2, the construction tolerance to locate the saw cut is 1/4" (0 min. to 1/2" max.) from the concrete.
1. All edges of the approach slab shall have 1/2" radii except the longitudinal edge of the preceding placement 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. Sawcut joints shall terminate 1'-0" before reaching edge of slab and must be saw cut as soon as possible after placement of concrete.

   (A) Approach slabs less than 40' wide -- no joint is required.

   (B) Approach slabs wider than 40' -- one or more joints are required to divide the slab into approximately 24' wide sections.

3. The minimum lap splice of #5 is 2'-0". V #5 is 2'-6". V #6 is 3'-0". And #6 is 3'-3". All lap splices shall be staggered so that no more than 50% of rebar is spliced at the same location. Lap splices shall be located within the middle half of the bridge approach slab. Optional splices are allowed for (AP1) V #6.

4. The approach slabs and their lane lines shall be constructed along with the bridge approach slabs.

5. The minimum thickness of the approach slab is determined by the subgrade conditions.

6. The approach slabs shall be constructed with a minimum overall thickness of 8".

7. Use of precast concrete slabs is not required.

8. The maximum overall thickness of the approach slab is 12".

9. The approach slabs shall be designed to meet the requirements of the Standard Specifications for Roadway Sections.

10. The approach slabs shall be placed in accordance with the Longitudinal Cracking Control Joint Details.

11. The approach slabs shall be placed in accordance with the Transverse Construction Joint Details.

12. The approach slabs shall be placed in accordance with the Local Agency Plan.

13. The approach slabs shall be placed in accordance with the Local Agency Design.

14. The approach slabs shall be placed in accordance with the Local Agency Specifications.

15. The approach slabs shall be placed in accordance with the Local Agency Drawings.

16. The approach slabs shall be placed in accordance with the Local Agency Details.

17. The approach slabs shall be placed in accordance with the Local Agency Standards.
NOTE

Paint the metal components of the approach expansion anchor with one coat of inorganic zinc paint conforming to either Standard Specification Section 8-08.1(2) or be galvanized in accordance with AASHTO M 232.
EMBANKMENT WIDENING
AT BRIDGE END
WITH WING WALL
STANDARD PLAN A-50.10-00

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

ELEVATION

PLAN

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

CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER

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

SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION

Pasco Bakitch III  11-17-08
STATE DESIGN ENGINEER
Washington State Department of Transportation
EMBANKMENT WIDENING
AT BRIDGE END WITH
"L" SHAPE ABUTMENT

BEAM GUARDRAIL TYPE 21
TRANSITION SECTION TYPE 21
- SEE STANDARD PLAN C-25.20

BEAM GUARDRAIL TYPE 1
- SEE STANDARD PLAN C-3

EDGE OF SHOULDER
(CURB LINE)

EDGE OF EMBANKMENT
WIDENING

23'-0" TAPER

9'-0"

3'-0"

PLAN

ELEVATION

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

PRECAST GIRDER

3'-0" (MIN.) OR
SEE CONTRACT PLANS

"L" SHAPED ABUTMENT

RETAINING WALL OR CURTAIN WALL
(OR ACCORDING TO PLANS)

RETAINING WALL OR CURTAIN WALL
(OR ACCORDING TO PLANS)

RETAINING WALL OR CURTAIN WALL
(OR ACCORDING TO PLANS)

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION

Pasco Bakotich III

11-17-08

Sheet 1 of 2 sheets

Effective: August 5, 2013 to August 3, 2014
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

LONGITUDINAL EXISTING TRANSVERSE JOINT

EXISTING CEMENT CONCRETE PAVEMENT

NEW CEMENT CONCRETE PAVEMENT

NEW DOWEL BAR

SAWED GROOVE

SEE STD. PLAN A-40.10 FOR TRANSVERSE JOINT DETAILS

SEE STD. PLAN A-40.10 FOR LONGITUDINAL JOINT DETAILS

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

NOTES

1. Install tie bars along longitudinal joints 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 M171) or building paper along the longitudinal joint between partial panel replacement and existing panel.

3. Place new dowel bars between existing dowel bars. Don't place any dowel bars closer than 1' - 0" from edge of concrete panel.

SECTION A

NEW CONCRETE PAVEMENT

NEW DOWEL BAR

SAWED GROOVE

SEE STD. PLAN A-40.10

1/2 CONCRETE PAVEMENT DEPTH

3" z

9" ~

NEW DOWEL BAR = 1 1/2" DIA. x 18"
PLAN VIEW
DOWEL BAR RETROFIT
FOR TWO LANE DIVIDED HIGHWAY (ONE WAY TRAFFIC)
FOR EACH LANE IN UNDIVIDED HIGHWAY (TWO WAY TRAFFIC)

SECTION A

SECTION B

SECTION C

DOWEL BAR RETROFIT FOR CEMENT CONCRETE PAVEMENT
STANDARD PLAN A-60.20-02

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-02-11
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

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

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

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

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

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

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

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

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

4. For typical rebar repairs, when the reinforcement has greater than 20% section loss (or damage), remove concrete a minimum of 2'-6" on each side of section loss, and replace with new supplemental reinforcement, same diameter as original, adjacent and parallel to the deficient bar, extending 2'-3" beyond each end of section having 20% section loss.
**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>15&quot;</td>
</tr>
<tr>
<td>CPSSP * (STD. SPEC. 9-05.20)</td>
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</tr>
<tr>
<td>SOLID WALL PVC (STD. SPEC. 9-05.12(1))</td>
<td>15&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC (STD. SPEC. 9-05.12(2))</td>
<td>15&quot;</td>
</tr>
</tbody>
</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

**NOTES**

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

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

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

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

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

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

7. All pickup holes shall be grouted full after the basin has been placed.
NOTE
1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot, shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.

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

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

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

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

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

7. All pickup holes shall be grouted full after the basin has been placed.
NOTES
1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot, shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.

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

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

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

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

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

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

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

### CATCH BASIN DIMENSIONS

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>48”</td>
<td>4”</td>
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<td>12”</td>
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### PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER</th>
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<td>120”</td>
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<tr>
<td>144”</td>
<td>78”</td>
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1. Corrugated Polyethylene Storm Sewer Pipe (Standard Specification 9-05.20)
2. (Standard Specification 9-06.12(1))
3. (Standard Specification 9-06.12(2))
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 riser 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
   - 0.064" Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.064" Corrugated Aluminized Steel Drain Pipe
   - 0.060" Aluminum alloy flat sheet, in accordance with ASTM B 209, 5052 H32 or EPS High Density Polyethylene Storm Sewer Pipe

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

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

6. 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 ZG32A; or cast iron in accordance with ASTM A 48, Class 308.

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

9. Alternative shear gate designs are acceptable if material specifications are met and flange bolt pattern matches.
1. See Contract for size and location of all pipes and orifices.
2. Baffle wall shall have #4 Bar at 12" spacing each way.
3. Precast baffle shall be keyed and grouted in place.
4. Bottom orifice plate shall be galvanized steel with a minimum thickness of 1/4". Attach orifice with 1/2" stainless steel bolts.
5. Upper flow orifice plates and elbows shall be aluminum, aluminized steel or galvanized steel. Galvanized steel shall have Treatment 1.
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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</table>

MANHOLE TYPE 1

STANDARD PLAN B-15.20-01

APPROVED FOR PUBLICATION
Pasco Bakotic III  02-07-12
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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MANHOLE TYPE 2
STANDARD PLAN B-15.40-01

APPROVED FOR PUBLICATION
Pasco Bakotich III 02-07-12
Washington State Department of Transportation

MODEL OF REAL PROPERTY

STATE DESIGN ENGINEER

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.
3. No steps are required when height is 4' or less.

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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</table>

MANHOLE TYPE 3

STANDARD PLAN B-15.60-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 02-07-12
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.

LIMIT OF EXCAVATION
1H : 2V SLOPE (MAX.)

UNDERGROUND DRAINAGE
GEOTEXTILE, MODERATE
SURVIVABILITY, CLASS A

GROUND LINE

DISTANCE VARIES
SEE CONTRACT

TOE OF SWALE SLOPE / BOTTOM OF SWALE

CIRCULAR FRAME (RING) - SEE STANDARD PLAN B-30.70
CIRCULAR GRATE - SEE STANDARD PLAN B-30.80

TOE OF DRYWELL SLOPE / BOTTOM OF SWALE (TYP.)

ADJUSTMENT SECTION (TYP.)

CONE SECTION - SEE NOTE 1

UNDISTURBED SOIL

NATIVE BACKFILL

GREEN BACKFILL
FOR DRYWELL

GRAVEL BACKFILL
FOR DRYWELL

GROUND LINE

LIMIT OF EXCAVATION
1H : 2V SLOPE (MAX.)

FOUR 6" DIAM. DRAIN HOLES (TYP.)
POSITIONED NOT TO INTERFERE
WITH REINFORCING BARS

TOE OF SWALE SLOPE / BOTTOM OF SWALE

TOE OF SWALE SLOPE / BOTTOM OF SWALE

PLAN VIEW

INTEGRAL BASE DETAIL

CUTAWAY ELEVATION VIEW

DRAINAGE PORT (TYP.) - SEE NOTE 2

STANDARD PLAN B-20.20-02

DRAINAGE PORT (TYP.) - SEE NOTE 2

STANDARD PLAN B-20.20-02

DRAINAGE PORT (TYP.) - SEE NOTE 2

STANDARD PLAN B-20.20-02

DRAINAGE PORT (TYP.) - SEE NOTE 2
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. Connect inlet pipe to structure using precast hole or core drilled hole.
4. For depths over 16'-2" use 72" x 8" Alternative Precast Footing.
5. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. For depths over $16' - 2"$ use $72" \times 8"$ Alternative Precast Footing.
4. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of $1 \frac{1}{2}"$ minimum and $2"$ maximum.
NOTES

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

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

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

4. Bolt-down capability is required on all frames, grates and covers, unless specified in the Contract. Provide two holes in the frame that are vertically aligned with the grate slots. The frame shall accept the 5/8" x 11 NC x 2" allen head cap screw by being tapped, or other approved mechanism. The location of bolt-down holes varies among manufacturers. 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. This plan is not intended to show the specific details necessary to fabricate the castings depicted in this drawing.
**FRAME AND VANED GRATE**

**PIECE 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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<td>CPSSP* (STD. SPEC. 9-05.20)</td>
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<tr>
<td>SOLID WALL PVC (STD. SPEC. 9-05.12(1))</td>
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</tr>
<tr>
<td>PROFILE WALL PVC (STD. SPEC. 9-05.12(2))</td>
<td>15&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 18". Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.

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

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

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

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

7. All pickup holes shall be grouted full after the inlet has been placed.
1. This frame is designed to accommodate 20” x 24” grates or covers as shown on Standard Plans B-30.20, B-30.30, B-30.40, and B-30.50.

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

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

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

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

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

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

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

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

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

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

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

3. For frame details, see Standard Plan B-30.10.
1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 5/8" - 11 NC x 2" Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

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

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

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

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

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

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

7. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1.5 times the horizontal scale (1H:1.5V).
NOTES
1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-20.20 and B-20.80.
Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 199.

TYPICAL ORIENTATION FOR ACCESS AND STEPS

RECTANGULAR ADJUSTMENT SECTION

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.

CIRCULAR ADJUSTMENT SECTION

MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES

STANDARD PLAN B-30.90-01

Washington State Department of Transportation

APPROVED FOR PUBLICATION

Pasco Bakotich III 09-20-07

STATE DESIGN ENGINEER

DATE

EXPIRES JULY 1, 2002

NOTE
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.

NOTES

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

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

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

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

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

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

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

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


BAR LIST

<table>
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<th>MARK</th>
<th>LOCATION</th>
<th>QTY.</th>
<th>SIZE</th>
<th>LENGTH</th>
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<td></td>
</tr>
<tr>
<td>13</td>
<td>SIDE WALL</td>
<td>4</td>
<td>14' - 6&quot;</td>
<td></td>
<td>HOOP</td>
</tr>
</tbody>
</table>

BENDING DIAGRAM

ALL DIMENSIONS ARE OUT TO OUT

GRATE INLET TYPE 2

STANDARD PLAN B-35.40-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-08-06
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-08-06
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
ELEVEN EQUAL SPACES

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

GRATE "A"
(Approximate weight 215 lbs)

GRATE "B"
(Approximate weight 215 lbs)
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.

4. Frame and Grates shall be Ductile Iron.

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.

4. Frame and Grates shall be Ductile Iron.
6" MIN.

2" MIN.

SEE CONTRACT FOR BACKSLOPE DETAILS

DIKE INSTALLATION FOR PREFERRED SLOPE

SECTION ON DITCH LINE

NOTES
1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.
2. Bevel or round exposed concrete edges 1/2".
3. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.
4. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.
5. All pickup holes shall be grouted full after the inlet has been placed.
6. The steel angles shall be set so that each bearing bar of the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface. For grates, see Standard Plan B-50-20.
7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.
8. The inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.
9. Precast inlets shall be marked with the manufacturer's identification on the inside of the structure in some readily accessible location.

1/2" DIAM. x 4" STEEL STUD - PLACE ALONG SUPPORT AS SHOWN FOR ANGLES

4" x 3" x 3/8" STEEL PLATE - TACK WELD TO ANGLE

4" x 3" x 1/2" x 35 1/4" STEEL ANGLE

1/4" 1/2" DIAM. STEEL STUD - PLACE ALONG SUPPORT AS SHOWN FOR ANGLES

5 1/2" x 1" x 1/4" STEEL ANGLE

END

ANCHOR STUD OPTION

GRATE SUPPORT DETAIL
(FOUR SUPPORTS REQUIRED)

ISOMETRIC (SHOWN WITH TYPE 1 GRATE)

DROP INLET TYPE 1

STANDARD PLAN B-45.20-00

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-01-06
STATE DESIGN ENGINEER
Washington State Department of Transportation

EXECUTIVE: AUGUST 5, 2013 TO August 3, 2014
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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.
3 1/2" x 1/2" x 34 1/2" STEEL PLATE (TYP.)

OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING

SECTION A

3 1/2" x 3 1/2" x 5/16" x 33 1/4" STRUCTURAL TUBING (TYP.)

GRIND TOP AND BOTTOM FLUSH AFTER WELDING

SECTION B

3 1/2" x 1/2" x 34 1/2" STEEL PLATE (TYP.)

SECTION C

OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING

TYPE 2

TYPE 1

TYPE 3

GRATES FOR DROP INLET

STANDARD PLAN B-50.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Effective: August 5, 2013 to August 3, 2014

Harold J. Peterfeso 06-01-06

State Design Engineer

EXPRESS JULY 1, 2007

Sheet 1 of 1 Sheet

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

CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS

<table>
<thead>
<tr>
<th>PIPE</th>
<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCULAR PIPE (DIAM.)</td>
<td>12&quot; to 24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td></td>
<td>30&quot; to 96&quot;</td>
<td>DIAM. /2</td>
</tr>
<tr>
<td></td>
<td>102&quot; to 180&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>PIPE ARCH (SPAN)</td>
<td>16&quot; to 36&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>METAL ONLY</td>
<td>43&quot; to 142&quot;</td>
<td>SPAN /3</td>
</tr>
<tr>
<td></td>
<td>148&quot; to 200&quot;</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

PIPE ZONE BEDDING AND BACKFILL
STANDARD PLAN B-55.20-00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Harold J. Peterfeso  06-01-06
STATE DESIGN ENGINEER
Washington State Department of Transportation

APPROVED FOR PUBLICATION

EXPRES JLI 4, 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 W1.4 × W1.4 (10 Gage) Steel Welded Wire Fabric or one wrap for 
any of the following sizes:
- 6 × 6 W2.1 × W2.1 (8 Gage)
- 6 × 6 W2.9 × W2.9 (8 Gage)
- 4 × 4 W2.9 × W2.9 (6 Gage)
- 4 × 4 W4.0 × W4.0 (4 Gage)

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

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

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

CONCRETE COLLAR OPTION

COUPLING BAND OPTION
### Coupling Band Dimension Table

(All dimensions are in inches)

<table>
<thead>
<tr>
<th>Band Type</th>
<th>Corrugation Pitch x Depth</th>
<th>Pipe Dia.</th>
<th>Min. W</th>
<th>Gasket Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steel</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2 2/3 x 1/2 OR 3 x 1</td>
<td></td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2 OR 3 x 1</td>
<td></td>
<td>12</td>
<td>O-RING</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
<td>12</td>
<td>O-RING</td>
</tr>
<tr>
<td>J</td>
<td>2 2/3 x 1/2</td>
<td></td>
<td>12</td>
<td>BUTYL</td>
</tr>
<tr>
<td></td>
<td>* 3 x 1</td>
<td></td>
<td>12</td>
<td>BUTYL</td>
</tr>
<tr>
<td>K</td>
<td>2 2/3 x 1/2</td>
<td></td>
<td>54</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>* 3 x 1</td>
<td></td>
<td>54</td>
<td>SLEEVE</td>
</tr>
<tr>
<td><strong>Aluminum</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2 2/3 x 1/2 OR 3 x 1</td>
<td></td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2</td>
<td></td>
<td>12</td>
<td>O-RING</td>
</tr>
<tr>
<td></td>
<td>* 3 x 1</td>
<td></td>
<td>12</td>
<td>O-RING</td>
</tr>
<tr>
<td>K</td>
<td>2 2/3 x 1/2</td>
<td></td>
<td>54</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>* 3 x 1</td>
<td></td>
<td>54</td>
<td>SLEEVE</td>
</tr>
</tbody>
</table>

* *Pipe Arch Only*
NOTES

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

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

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

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

ALLOWABLE HEIGHTS OF COVER

<table>
<thead>
<tr>
<th>SPAN</th>
<th>RISE</th>
<th>12 GAGE THICK CORRUGATED METAL COVER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MIN.</td>
</tr>
<tr>
<td>6'-8&quot;</td>
<td>7'-1&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>6'-10&quot;</td>
<td>8'-2&quot;</td>
<td>5&quot;</td>
</tr>
</tbody>
</table>

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

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

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

4. Designed for H-20 live load and maximum allowable soil pressure of 6 Kips per square foot.
Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.
1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4H:1V. When slopes are between 4H:1V and 6H:1V, shape the slope in the vicinity of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.

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

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

NOTES

THERMOPLASTIC PIPE

CONCRETE PIPE

METAL PIPE

FOR CULVERTS 30" DIAMETER OR LESS

BEVELED END SECTIONS

STANDARD PLAN B-70.20-00

APPROVED FOR PUBLICATION

Harold J. Peterfeso

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EXPEDITED J.07, 2007

APPROVED FOR PUBLICATION
### NOTES

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

2. Skirt sections shall be made in one piece for round pipe with a diameter of 12" to 24" inclusive and for pipe arches with a rise of 10" to 20" inclusive. Skirt sections for larger sizes of pipes may be multiple pieces in conformance with the tabulated values shown.

3. Design A end sections for 42" thru 84" diameter and 49" x 33" thru 83" x 57" arch with annular corrugations and all helically corrugated pipe arch include one foot of pipe length as a connector section. The connector section shall be attached to the end section by welds, rivets or bolts and shall be the same thickness as the end section.

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

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

---

### PIPE ARCH

<table>
<thead>
<tr>
<th>PIPE ARCH</th>
<th>THICKNESS (INCHES)</th>
<th>DIMENSIONS (INCHES)</th>
<th>END SECTION SLOPE (H/V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>17</td>
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<td>0.060</td>
</tr>
<tr>
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<td>15</td>
<td>0.064</td>
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</tr>
<tr>
<td>24</td>
<td>18</td>
<td>0.064</td>
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</tr>
<tr>
<td>28</td>
<td>20</td>
<td>0.064</td>
<td>0.075</td>
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<td>0.075</td>
</tr>
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<td>49</td>
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<td>57</td>
<td>38</td>
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<tr>
<td>83</td>
<td>57</td>
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### PIPE

<table>
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<tr>
<th>PIPE</th>
<th>THICKNESS (INCHES)</th>
<th>A</th>
<th>H</th>
<th>L</th>
<th>W</th>
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<td>40</td>
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<td>8</td>
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<td>45</td>
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<td>52</td>
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<tr>
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<td>90</td>
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<td>36</td>
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<td>14</td>
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<td>90</td>
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<td>18</td>
<td>45</td>
<td>127</td>
<td>138</td>
<td>158</td>
</tr>
</tbody>
</table>
1. The variable dimension indicated for the height of step for step mitered pipes shall conform to the manufacturers recommendations unless specified differently on the plans or in the Special Provisions.
2. Reinforcing steel shall have 1 1/2" min. 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".
NOTES

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

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

3. Bevel culvert pipe to match side slope.

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

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

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

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

3. Slope shall match Side Slope, 6H:1V preferred, not steeper than 4H:1V.
1. All pipes or pipe arches shall be attached as shown in CONNECTOR DETAIL.

2. When a Toe Plate Extension is required, it shall be the same gage as the End Section. The dimensions shall be 8" high, and 6" less than the overall width. Install centered, and lapped 2", fasten with 3/8" x 3/4" galvanized bolts on 12" maximum centers.

3. Cross Drainage Bar and Safety Bars shall be 3" Schedule 40 galvanized steel pipe. Cross Drainage Bars shall be placed a maximum 30" apart.

4. Slotted holes for safety bar attachment shall be provided on end sections.

5. Number of Safety Bars required will vary depending upon the length of the end section.

---

**NOTES**

**METAL END SECTIONS FOR CIRCULAR PIPES**

<table>
<thead>
<tr>
<th>Pipe Diameter (Inches)</th>
<th>Minimum Thickness (Gage A)</th>
<th>Overall Width (Inches)</th>
<th>Dimensions (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7/16&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>0.109</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>42</td>
<td>0.109</td>
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<td>0.109</td>
<td>12</td>
<td>9</td>
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<td>54</td>
<td>0.109</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>60</td>
<td>0.109</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

**METAL END SECTIONS FOR ARCHED PIPES**

<table>
<thead>
<tr>
<th>Pipe Arch Dimensions</th>
<th>Minimum Thickness (Gage A)</th>
<th>Overall Width (Inches)</th>
<th>Dimensions (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7/16&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>0.109</td>
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<td>36</td>
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<tr>
<td>42</td>
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<td>9</td>
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<tr>
<td>48</td>
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</tr>
<tr>
<td>60</td>
<td>0.109</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

*SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"
1. As an alternative connection on 15" through 24" pipe, a 1" wide strap of 16 gage or 12 gage galvanized steel, fastened with a 1/2" diam., 6" long galvanized bolt and square head nut, may be used.

2. Number of safety bars required will vary depending upon the length of the end section.
CONCRETE CURB
- TYPE MAY VARY

PLANTING STRIP

CONCRETE SIDEWALK

ROADWAY

(TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT)

CONCRETE SIDEWALK

PLANTING STRIP

ROADWAY

(RUNOFF DRAINAGE)

TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT

CONCRETE CURB
- TYPE MAY VARY

PLANTING STRIP

CONCRETE SIDEWALK

ROADWAY

(TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT)

CONCRETE CURB
- TYPE MAY VARY

PLANTING STRIP

CONCRETE SIDEWALK

ROADWAY

(TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT)

CONCRETE CURB
- TYPE MAY VARY

PLANTING STRIP

CONCRETE SIDEWALK

ROADWAY

(TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT)

CONCRETE CURB
- TYPE MAY VARY

PLANTING STRIP

CONCRETE SIDEWALK

ROADWAY

(TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT)

CONCRETE CURB
- TYPE MAY VARY

PLANTING STRIP

CONCRETE SIDEWALK

ROADWAY

(TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT)

CONCRETE CURB
- TYPE MAY VARY

PLANTING STRIP

CONCRETE SIDEWALK

ROADWAY

(TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT)
VERTICAL CONNECTION
STANDARD PLAN B-85.10-01
FOR SANITARY SEWER USE

ELEVATION

SECTION A

COMMERCIAL CONCRETE

SECTION B

6" WYE

6" WYE

6" SEWER PIPE

6" SINGLE BRANCH WYE
FOR TWO CONNECTIONS

45° BEND

PLUG

45° BEND

30" x 30" MIN.

6" x (SEWER SIZE) TEE

6" (SEWER SIZE) TEE

VARIABLE

VARIABLE

30" MIN.

4" TYP.
NOTES

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

2. Mark location of sewer stub in accordance with Contracting Agency requirements.
4" OR 6" SEWER PIPE (SEE CONTRACT)

24" x 24" x 24" CONCRETE BLOCK OR CONTROLLED DENSITY FILL

45° BEND

TEE

SEWER MAIN

FOR SANITARY SEWER USE

STANDING SIDE SEWER CONNECTION

STANDARD PLAN B-85.30-00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Harold J. Peterfeso 06-01-06
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EXPRESS JULY 1, 2007

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

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

1/2" PLAN

SECTION A

CAST IRON RING AND COVER

45° BEND

FIBER JOINT PACKING

8" INCH SEWER CLEAN-OUT

FOR SANITARY SEWER USE
ONE LENGTH OF DUCTILE IRON PIPE (CLASS 50) TO SOLID BEARING WHEN SPAN IS MORE THAN 48 inches.

FLEXIBLE JOINT
BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER

COMMERCIAL CONCRETE BLOCK - Poured in place

DUCTILE IRON DROP CONNECTION

TYPICAL MANHOLE FOUNDATION CONSTRUCTION

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

MORTAR DAM OR PLUG AS REQUIRED BY ENGINEER

TYPICAL MANHOLE FOUNDATION CONSTRUCTION

COMMERCIAL CONCRETE - Poured in place

CONCRETE ENCASED DROP CONNECTION

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

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

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

<table>
<thead>
<tr>
<th>SIZE</th>
<th>TEST PRESSURE (PSI)</th>
<th>THRUST AT FITTINGS IN POUNDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>4&quot;</td>
<td>250</td>
<td>3,140</td>
</tr>
<tr>
<td>6&quot;</td>
<td>250</td>
<td>7,070</td>
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<tr>
<td>8&quot;</td>
<td>250</td>
<td>12,555</td>
</tr>
<tr>
<td>10&quot;</td>
<td>250</td>
<td>19,635</td>
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<tr>
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<td>250</td>
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<td>38,485</td>
</tr>
<tr>
<td>16&quot;</td>
<td>250</td>
<td>50,265</td>
</tr>
</tbody>
</table>

SOIL TYPE | SAFE BEARING LOAD (PSF)
--- | ---
MUCK, FEAT, ETC. | 0
SOFT CLAY | 1,000
SAND | 2,000
SAND AND GRAVEL | 3,000
SAND AND GRAVEL CEMENTED WITH CLAY | 4,000
HARD SHALE | 10,000

CONCRETE THRUST BLOCK
STANDARD PLAN B-90.40-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Harold J. Peterfeso 06-08-06
Washington State Department of Transportation
**Two Tie Rods with Turnbuckles**

*Thread 6"*

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

**Four Tie Rods with Turnbuckles**

*Thread 6”*

**Blocking for 45° Vertical Bends**

### Dimension Table

<table>
<thead>
<tr>
<th>Pipe Diam.</th>
<th>Test Pressure (PSI)</th>
<th>Bend Angle</th>
<th>Concrete Volume (Ft³)</th>
<th>Cube Size (Ft³)</th>
<th>Tie Rod Diam.</th>
<th>Tie Rod Embedment</th>
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</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>250</td>
<td>11.25°</td>
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<td>5/8&quot;</td>
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<tr>
<td></td>
<td></td>
<td>22.5°</td>
<td>12</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>45°</td>
<td>22</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6&quot;</td>
<td>250</td>
<td>11.25°</td>
<td>14</td>
<td>2.4</td>
<td>5/8&quot;</td>
<td>17&quot;</td>
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<td></td>
<td></td>
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<td>27</td>
<td>3.0</td>
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<tr>
<td></td>
<td></td>
<td>45°</td>
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<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>2.9</td>
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<td></td>
<td>22.5°</td>
<td>48</td>
<td>3.6</td>
<td></td>
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<td></td>
<td>45°</td>
<td>89</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>11.25°</td>
<td>38</td>
<td>3.4</td>
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<td>75</td>
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<tr>
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<td>250</td>
<td>11.25°</td>
<td>55</td>
<td>3.8</td>
<td>5/8&quot;</td>
<td>17&quot;</td>
</tr>
<tr>
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<td>22.5°</td>
<td>108</td>
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<td>45°</td>
<td>200</td>
<td>5.8</td>
<td>7/8&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>14&quot;</td>
<td>250</td>
<td>11.25°</td>
<td>75</td>
<td>4.2</td>
<td>5/8&quot;</td>
<td>17&quot;</td>
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<tr>
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<td></td>
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<td>5.3</td>
<td>3/4&quot;</td>
<td>20&quot;</td>
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<tr>
<td></td>
<td></td>
<td>45°</td>
<td>272</td>
<td>6.5</td>
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<td>17&quot;</td>
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<tr>
<td></td>
<td></td>
<td>22.5°</td>
<td>192</td>
<td>5.8</td>
<td>7/8&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45°</td>
<td>355</td>
<td>7.1</td>
<td>1 1/8&quot;</td>
<td>30&quot;</td>
</tr>
</tbody>
</table>

**NOTE**

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

---

**Concrete Thrust Block for Convex Vertical Bends**

**Standard Plan B-90.50-00**

**Effective:** August 5, 2013 to August 3, 2014

---

**Harold J. Peterfeso**

06-08-06

State Design Engineer

Washington State Department of Transportation

---

**Expires July 4, 2007**
**MEDIAN BARRIER (SINGLE SLOPE CONCRETE BARRIER SHOWN)**
- See section below for use with concrete barrier type 2

**SECTION A**

**PIPE (TYPICAL)**
- See contract

**FINISHED GRADE**

**CONCRETE BARRIER TYPE 2**
- See section A

**MEDIAN BARRIER**

**PLAN VIEW**

**FINISHED GRADE**

**FRAME AND DUAL VANED GRATES (TYP.)**
- See standard plan B-46.40

**HMA OR CONCRETE**
- See contract for surface details

**GRATE INLET TYPE 2 (TYP.)**
- See standard plan B-35.40

**UNIT 7/" (TYP.)**
- See standard plan B-36.40

**PRECAST CEMENT CONCRETE ADJUSTMENT SECTIONS (TYP.)**
- As required

**CONCRETE BARRIER TYPE 2 SECTION**
- See section A

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
1. The beam guardrail type, post type, beam guardrail transition section type, connection type, and bridge traffic barrier shape may vary from that shown on this plan.

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

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

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

5. See Contract Plans for length of Curb.

NOTES
NOTES

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

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

3. Beam Guardrail post spacing for Types 1 through 4 shall be 6'-3" on centers.

4. Timber blocks shall be toe-nailed to the post with a 1/6" galvanized nail to prevent block rotation.

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

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

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

---

BEAM GUARDRAIL RAILING BLOCK

TABLES:

- TYPES 1 & 2: 5/8" 1/8" button head bolt W/7/32" oval grip & recessed hex nut
- TYPES 3 & 4: 5/8" 1/8" button head bolt W/7/32" oval grip & recessed hex nut
- TYPES 1 & 2: 5/8" + 1/4" button head grip bolt W/7/32" oval grip & recessed hex nuts (eight required per splice)

ASSEMBLY DETAIL:

- TIMBER POST: All mounting and splice hardware same as for timber post except as noted
- STEEL POST: W6 x 9 or W6 x 15

---

STANDARD PLAN C-1

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakotich III

DATE: 06-16-11

STATE DESIGN ENGINEER

SHEET 1 OF 2 SHEETS

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

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

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

3. Type 10 shall be 8x8 timber or W6x9. Type 11 shall be 10x10 timber or W6x15. For additional details see Standard Plan C-1b.

SPLICE BOLT SLOT (TYP.)
- 29/32" X 2 1/2"

POST BOLT SLOT (TYP.)
- 3/4" X 3 3/4"

EXPANSION SECTION

TYPE 10

5/8" X 18" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT

5/8" X 1 1/4" BUTTON HEAD SPLICE
BOLT WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT - TWELVE
REQUIRED PER SPLICE

TIMBER BLOCK
FOR STEEL POST

5/8" X 10" BUTTON HEAD
BOLT W/ 7/32" OVAL GRIP &
HEX NUT W/ CUT WASHER

TYPE 11

5/8" X 25" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT

5/8" X 1 1/4" BUTTON HEAD SPLICE
BOLT WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT - TWELVE
REQUIRED PER SPLICE

WOOD POST ASSEMBLY

STEEL POST ASSEMBLY

TYPE 10 AND 11

NOTES

1. Type 10 post shall be 8x8 timber or W6x9. Type 11 post shall be 10x10 timber or W6x15. For additional details see Standard Plan C-1b.

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

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

SPLICE BOLT SLOT (TYP.)
- 29/32" X 2 1/2"

POST BOLT SLOT (TYP.)
- 3/4" X 3 3/4"

EXPANSION SECTION

TYPE 10

5/8" X 18" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT

5/8" X 1 1/4" BUTTON HEAD SPLICE
BOLT WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT - TWELVE
REQUIRED PER SPLICE

TIMBER BLOCK
FOR STEEL POST

5/8" X 10" BUTTON HEAD
BOLT W/ 7/32" OVAL GRIP &
HEX NUT W/ CUT WASHER

TYPE 11

5/8" X 25" BUTTON HEAD BOLT
WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT

5/8" X 1 1/4" BUTTON HEAD SPLICE
BOLT WITH 7/32" OVAL GRIP AND
RECESSED HEX NUT - TWELVE
REQUIRED PER SPLICE

WOOD POST ASSEMBLY

STEEL POST ASSEMBLY

TYPE 10 AND 11

NOTES

1. Type 10 post shall be 8x8 timber or W6x9. Type 11 post shall be 10x10 timber or W6x15. For additional details see Standard Plan C-1b.

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

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

SPLICE BOLT SLOT (TYP.)
- 29/32" X 2 1/2"

POST BOLT SLOT (TYP.)
- 3/4" X 3 3/4"
NOTES
1. Wood posts for all guardrail placement plans shall be 6 x 8 except where noted otherwise.
2. Lower hole is for Rub Rail of Type 2 and Type 3 Beam Guardrail.
3. W6 x 9 steel posts and timber blocks are alternates for 6 x 8 timber posts and blocks. W6 x 15 steel posts and timber blocks are alternates for 10 x 10 timber posts and blocks.
4. Holes shall be located on approaching traffic side of web.
5. When “Beam Guardrail Type – __ Ft. Long Post” is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" min. high and 3/4" wide at the location where the letter “H” is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4". For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor’s responsibility to ensure that the stamped numbers remain visible.
6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.
TYPE 20

2 2 1/2"

See Detail A

See Detail B

0-2 Post (See Note 1)

DETAIL A

3/8" DIA x 1 1/2" hex head bolt with hex nut and 1 1/4" square x .138" washer

DETAIL B

1/2" DIA x 1 1/2" hex head bolt with hex nut. Guardrail rests on top of bolt.

NOTES

1. For post details see Standard Plan, "Beam Guardrail Posts and Blocks".
INTERMEDIATE GUARDRAIL
POST CONNECTION
DETAILS
(Type A shown)

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

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

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE</th>
</tr>
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<tbody>
<tr>
<td>70</td>
<td>15 : 1</td>
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<tr>
<td>60</td>
<td>14 : 1</td>
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<td>45</td>
<td>10 : 1</td>
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<tr>
<td>40 OR LESS</td>
<td>9 : 1</td>
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GUARDRAIL PLACEMENT
STANDARD PLAN C-2a

Sheet 1 of 1

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-21-06

STATE DESIGN ENGINEER

DATE: 05/2006
APPLIED CURRENT DRAFTING STANDARDS: WASH

EXPRESS JULY 24, 2006

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
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 first 6'8" post of the Beam Guardrail Transition Section Type 16, and by lapping 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 6' - 3" thrie beam section in its place.

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

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

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

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

---

**ANCHOR PAY LIMIT**

- See Note 3

---

**BEAM GUARDRAIL PAY LIMIT**

- 1'-0" MIN.
- 3'-0" MIN.

---

**CASE 10A**

**EDGE OF SHOULDER**

**TWO-WAY TRAFFIC**

**VARIES**

- See Contract

---

**CASE 10B**

**EDGE OF SHOULDER**

**ONE-WAY TRAFFIC**

**VARIES**

- See Contract

---

**CASE 10C**

**EDGE OF SHOULDER**

**ONE-WAY TRAFFIC**

**VARIES**

- See Contract

---

**GUARDRAIL PLACEMENT**

**STANDARD PLAN C-2d**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**Harold J. Peterfeso**

**DATE**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
NOTES

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

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

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

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

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

6. Attach the standard wood block to the rail using two 5/8" x 4" lag bolts.
NOTES
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, Neck Post Bridge Rail System, see Contract.
2. SRT terminal shown. For terminal type and details, see Contract and applicable standard plans.
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
4. See Standard Plan "Beam Guardrail Posts and Blocks".

Direction of Traffic

CASE 14

GUARDRAIL PLACEMENT

STANDARD PLAN C-2h

APPROVED FOR PUBLICATION

Donald K. Nelson
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
1. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
See Table

**CASE 16**

Anchor pay limit (see Note 1)
Beam Guardrail pay limit
Terminal pay limit (SRT shown) (see Note 2)
See Note 5

Varies (see contract)

Edge of shoulder

One Way Traffic

**CASE 17**

Anchor pay limit (see Note 1)
Beam Guardrail pay limit
Terminal pay limit (SRT shown) (see Note 2)
See Note 5

Varies (see contract)

Edge of shoulder

Two Way Traffic

**CASE 18**

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

Curb face extension line

See Note 4

One Way Traffic

---

**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.

---

**FLARE RATE TABLE**

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---

GUARDRAIL PLACEMENT

STANDARD PLAN C-2j

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

APPROVED FOR PUBLICATION
Clifford E. Mansfield
DEPUTY STATE DESIGN ENGINEER

6/12/98

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EXPIRES MAY 3, 2000
GUARDRAIL PLACEMENT
12'-6" SPAN
STANDARD PLAN C-2k
NOTES
1. See Standard Plan C-1b for additional details.
2. One-way traffic layouts are identical to the two-way layout with the exception that only the posts trailing the span need to be CRT’s with double blocks.

ELEVATION

CASE 21

SECTION A

GUARDRAIL PLACEMENT 25' SPAN

STANDARD PLAN C-2o

APPROVED FOR PUBLICATION
Clifford E. Mansfield 07-13-01
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
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. Radii dimensions shall be etched into plate replacing the letters "HI" shown on the Identification Plate Detail. Digits shall be 1½ MIN height and ¾ MAX width.
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.
NOTE

1. Install Extruded Curb at face of Guardrail. See Standard Plan F-10.40 for details.
BEAM GUARDRAIL TRANSITION SECTION TYPE 2 - PAY LIMIT

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

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

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

6' - 6" LONG, 10x10 POSTS WITH 6x8 BLOCKS

TYPE 2

BEAM GUARDRAIL TRANSITION SECTION TYPE 4 - PAY LIMIT

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

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

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

6' - 0" LONG, 6x8 POST WITH STANDARD BLOCK (TYP.)

TYPE 4 FOR 45 MPH AND BELOW

BEAM GUARDRAIL TRANSITION SECTION TYPE 5 - PAY LIMIT

1' - 3" MAX.

FOUR SPACES @ 1' - 6 3/4"

TOTAL LENGTH = 6' - 3"

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

6' - 0" LONG, 6x8 POST WITH STANDARD BLOCK (TYP.)

TYPE 5

BEAM GUARDRAIL TRANSITION SECTION TYPE 6 - PAY LIMIT

8' - 0" POST SPACING

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

TOTAL LENGTH = 25' - 0"

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

5' - 0" LONG, 6x8 POST WITH STANDARD BLOCK

TYPE 6
NOTES

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

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

3. When thrie beam is installed at the face of rigid bridge rail, an HMA ramp is required from the roadway surface to the top of the bridge curb or sidewalk. The slope of the ramp shall be 20H : 1V or flatter.
1. See Contract for the number of thrie beam sections for Beam Guardrail Type 11.
2. If the distance from the end of the Beam Guardrail Type 11 to the column/structure exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" nested section of thrie beam to reduce the distance to less than 6'-3".
3. Install Extruded Curb (See Standard Plan F-10.40) at face of Guardrail.
4. Attach the standard block to the rail using two 5/8" x 4" lag bolts.
NOTES

1. Unless otherwise indicated in the contract, the SRT - 350 (12.5, 8 Post) as manufactured by Trinity Industries, Inc., or a FLEAT 350 as manufactured by Road Systems Inc., shall be installed per manufacturer's recommendations. If specified in the Contract, the FLEAT TL2 as manufactured by Road Systems, Inc. shall be installed per manufacturer's recommendations.

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

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

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

1. An ET-PLUS (TL3) as manufactured by Trinity Industries, Inc. or an SKT-350 as manufactured by Road Systems Inc. shall be installed according to manufacturer’s recommendations. When a TL2 terminal is specified in the contract an ET-PLUS (TL2) as manufactured by Trinity Industries, Inc. or an SKT-TL2 as manufactured by Road Systems, Inc. shall be installed according to manufacturer’s recommendations.

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

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

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

5. Length for ET-PLUS (TL3) and SKT-350 is 50'. Length for ET-PLUS (TL2) and SKT-TL2 is 25'.
**Plan Beam Guardrail Bull Nose Terminal - Design 1**

**Plan Beam Guardrail Bull Nose Terminal - Design 2**

**Note**

1. For W-Beam applications extend the rail from the bullnose terminal by using a "Reducer Element Type C" followed by a standard Post and Block, spaced at 3' - 1 1/2". Continue runs with standard 6' - 3" post spacing. For additional details see Standard Plans C-20.10 and C-25.20.
NOSE CABLE ANCHOR PLATE

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

NOSE CABLE ANCHOR PLATE

ANCHOR CABLE AND PLATE
SEE STANDARD PLAN C-4f

3 - 1 1/2" ARC LENGTH
AT FACE OF RAIL (TYP.)

NOSE CABLE
2 REQUIRED

U-BOLT CABLE CLIPS AT MIDDLE AND QUARTER
POINTS OF RAIL - 2B REQUIRED
SEE RAIL ELEMENT DETAIL

NOSE CABLE ANCHOR PLATE

PLAN - THREE BEAM NOSE

CABLE BEARING PLATE
TWO 1" NUTS
AND WASHER

STEEL FOUNDATION
TUBE

POST 1L AND 1R

CABLE BEARING PLATE

THREE BEAM

NOSE CABLE ASSEMBLY

SECTION A

NOSE CABLE CLIP ASSEMBLY

SECTION B

BEAM GUARDRAIL
BULL NOSE TERMINAL

STANDARD PLAN C-4f

SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 07/12

WASHINGTON
STATE
DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
SLOTTED THRIE BEAM RAIL ELEMENT #1
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)

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

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

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

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

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

4. Eight 5/8" x 1 1/2" machine bolts with hex nut and washer. Place washer on face side of rail.

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

6. Toe-nail bearing plate with 10d nail at corners to prevent turning.

7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.
ANCHOR RAIL WASHER

ANCHOR CABLE

1/4" Hole (eight required)
3" x 2 1/4" x 1/2" End plate

ELEVATION

SECTION B-B

ANCHOR PLATE
(See Note 1)

3 1/2" x 1" x 8" plate
tack welded to 3/8" plate

BEARING PLATE

BEAM GUARDRAIL ANCHOR
TYPE 1

STANDARD PLAN C-6

APPROVED FOR PUBLICATION

Donald K. Nelson 05/30/97
STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

Sheet 2 of 2 Sheets
NOTES

1. Rail section and W8 x 18 steel post shall be fabricated to receive 5/8" hex head bolts as shown.

2. All bolts shall be high strength 5/8" hex head bolts with anchor rail washers.
NOTES
1. For 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 V-beam to steel pipe with 5/8" x 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 to a minimum of 100 ft-lbs.

Bean guardrail pay limit

Anchor pay limit

6'-3"

End Section Design G

See Note 2

Two 3/4" nuts and washers (see Note 5)

Anchor plate (see Note 3)

12" 16"

18"

1/4"

1/4"

Steel pipe

Cable clips (6 required)

Torque nuts to 50 ft-lbs.

Bearing plate (see Note 3)

Standard 2" ID pipe sleeve (12-1/4"

2"

2"

Two 1" nuts and washers (see Note 5)

Anchor Post Assemblies (see Note 4)

Type 5 Anchor

BEAM GUARDRAIL ANCHOR

TYPE 5

STANDARD PLAN C-6d

APPROVED FOR PUBLICATION

Donald K. Nelson
05/30/97

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

1. For details, see Standard Plan, "Beam Guardrail Anchor Type 7".

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.
**NOTES**

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

2. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. 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.
NOTES

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

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

DESIGN C (THRIE BEAM)

DESIGN D (THRIE BEAM)

DESIGN F (THRIE BEAM)

DESIGN G (THRIE BEAM)
NOTES

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

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

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

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

- **2 1/2" MIN.**
- **2 1/2" MAX.**

- **Plate Washer**
  - 1/8" Thick

- **2" MIN.**
  - 2 1/2" MAX.

- **2" MIN.**
  - 2 1/2" MAX.

- **1" DiAM. Pin With Rounded Bottom Edges**

**See Note 3**

**BARRIER TERMINAL**

- **9' - 4 3/4"** for **10' - 0" Long Barrier Section**
- **11' - 10 3/4"** for **12' - 0" Long Barrier Section**

**Barrier Section ReInforcing Steel Bending Diagram**

- **9' - 4 3/4"** for **10' - 0" Long Barrier Section**
- **11' - 10 3/4"** for **12' - 0" Long Barrier Section**

**Wire Rope Loops**

- 2" MIN.
- 2 1/2" MAX.

- **Wire Seizing**
  - Shall be Eight Wraps of 16 gauge wire with the ends twisted together, or equivalent fastening.

**Wire Rope Loop Detail**

**Side View**

- **Side 1**
- **Side 2**

**Barrier Connection Detail**

- **#5**
- **3 1/4" Diameter**

**Concrete Barrier Type 2**

**Standard Plan C-8**

**Sheet 2 of 2 Sheets**

***Pasco Bakotich III***

**02-10-09**

Washington State Department of Transportation

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**Effective:** August 5, 2013 to August 3, 2014

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**Approved for Publication**

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**State Design Engineer**

---

**State of Washington**

---

**Regulated Professional Engineer (RPE)**

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---
For details on wire rope loop, connecting pin and notches see Standard Plan "Concrete Barrier Type 2."

Concrete Barrier Type 2 or cast-in-place concrete barrier, high standard section.

2" Cleoronce
Lifting notches

Two #5 Bars (Bar A)

Bar B

Concrete Barrier Type 4

TRANSITION ELEVATION

CONCRETE BARRIER TYPE 4 AND TRANSITION SECTION

STANDARD PLAN C-8a
1. This plan shall be used for 40' and 50' Light Standards with 16' max. length double mast arms.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
4. See the Contract Plans for conduit placement.
5. Concrete shall be Class 4000.
**BAR LIST**

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**DETAIL "A"**

- **ANCHOR BOLT (TYP.)** - SEE DETAIL
- **2" CONDUIT - SEE NOTE 4**

**CONCRETE BARRIER LIGHT STANDARD SECTION**

**STANDARD PLAN C-8b**

**BENDING DIAGRAM**

(ALL DIMENSIONS ARE OUT TO OUT)

1. **ANCHOR PLATE**
2. **ANCHOR PLATE (TYP.)** - SEE DETAILS
3. **HEAVY HEX NUT AND WASHER (TYP.)**
4. **HEAVY HEX NUT AND WASHERS**
5. **TOP OF BARRIER**
6. **HEAD BOLT**
7. **ANCHOR BOLT DETAIL**
   - GALVANIZE EXPOSED ANCHOR ROD END 1'- 0" MIN.

**ANCHOR BOLT DETAIL**

- **POLE BASE PLATE** - SEE STD. PLAN J-28.60
- **HEAVY HEX NUTS AND WASHERS**
- **HEAVY HEX NUT AND WASHER**

**CONCRETE BARRIER LIGHT STANDARD SECTION**

**STATE DESIGN ENGINEER**

**Pasco Bakitch III**

**APPROVED FOR PUBLICATION**

**STATE OF WASHINGTON**
**DEPARTMENT OF TRANSPORTATION**

**Effective:** AUGUST 5, 2013 TO August 3, 2014
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.
CONCRETE BARRIER TYPE 2 (NJ-SHAPE) END VIEW

CONCRETE BARRIER TYPE 2 (NJ-SHAPE) SECTION 0 (SHOWN AT LIMIT OF TRANSITION)

TRANSITION SECTION - AS SHOWN IN PLAN

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

CONCRETE BARRIER TYPE 2

CONNECTING PIN — SEE STD. PLAN C-8

TRANSITION SECTION - MIRROR IMAGE OF PLAN

BRIDGE F-SHAPE TRAFFIC BARRIER END VIEW

F-SHAPE CONCRETE TRAFFIC BARRIER ON BRIDGE

REINFORCING STEEL BENDING DIAGRAM

9" - 11/4" FOR 10' - 0" LONG TRANSITION
11" - 10 3/4" FOR 12' - 6" LONG TRANSITION

ISOMETRIC VIEW

CONCRETE BARRIER TYPE 2

SECTION A
(SHOWN AT LIMIT OF TRANSITION)

BRIDGE F-SHAPE TRAFFIC BARRIER
SECTION B
(SHOWN AT LIMIT OF TRANSITION)

TRANSITION SECTION

06-30-04
Harold J. Peterfeso
STATE DESIGN ENGINEER
APPROVED FOR PUBLICATION
Washington State Department of Transportation

CONCRETE BARRIER TRANSITION TYPE 2 TO BRIDGE F-SHAPE STANDARD PLAN C-8f

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

NOTE
The vertical locations of the Wire Rope Loops at one end compose a set that shall not vary; however, which set is applied to an end is determined by the end to which it is being connected. A set with loops 1' - 5" apart connects to a set with loops 1' - 8" apart. See Standard Plan C-8, BARRIER CONNECTION DETAIL.
NOTES
1. Length of W8 x 35 and W6 x 9 shall be determined by measurement from top of ground to top of grout pad. This distance shall be verified by the Contractor.
2. Attach Guardrail Post to Box Culvert with 3/4" diameter high strength bolts with resin bonded anchors.
3. Drill 1 1/4" diameter hole in concrete slab for 7/8" diameter high strength bolt. Length of bolt is determined by top slab of Box Culvert thickness which shall be verified by the Contractor.
4. For details of post attachment to Double Box Culvert, see Standard Plan C-2i.

---

**Refer to Standard Plan C-10 for detailed information.**
NOTE
1. For W-Beam Type 31 shoulder application, see Standard Plan C-28.40.
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.
3. For W-Beam Type 31 shoulder application, see Standard Plan C-28.40.

PRECAST CONC. BARRIER TYPE 2

SINGLE SLOPE CONC. BARRIER
CAST-IN-PLACE

SINGLE SLOPE CONC. BARRIER
PRECAST

CABLE BARRIER

BEAM GUARDRAIL TYPE 1
(SEENOTE3)

BEAM GUARDRAIL TYPE 1 ON STEEP SLOPES
(SEENOTE3)
NOTES

1. Refer to Standard Plan C-1 and C-1b for additional details not shown on this plan.

2. Extend shoulder pavement to provide a base for the extruded curb. See Contract Plans for exceptions to distances shown.

3. Use a single block or combination of blocks (no more than 2) to achieve the actual 12" offset. See Standard Specification 9-16.3(2). Wood blocks shall be secured to the steel posts with anti-rotation nails as detailed. If combination blocks are used, the adjacent blocks shall be toe nailed with two 16d galvanized nails to prevent block rotation.

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

---

PLAN VIEW

TYPICAL SECTION - WITHOUT CURB
(6'-0" LONG POSTS)

6 x 12 BLOCKOUT - SEE NOTE 4

W6 x 9 STEEL POST - SEE NOTE 1

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

W6 x 9 STEEL POST - SEE NOTE 1

WOOD BLOCK

3/4" x 2 1/2" SLOT (TYP.)

TYPICAL RAIL ELEMENT

1/4" DIA. HOLE FOR ANTI-ROTATION 16d NAIL (TYP.)

1/4" DIA. HOLE THROUGH BLOCK
FOR STEEL POST ATTACHMENT

TYPICAL ELEVATION

1/3" (TYP.)

3/4" DIA. HOLE FOR BUTTON HEAD BOLT (TYP.)

BEAM GUARDRAIL TYPE 31

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

SLOPE EMBANKMENT TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>2H : 1V OR FLATTER</td>
<td>2.0' MIN.</td>
</tr>
<tr>
<td>STEEPER THAN 2H : 1V BUT NOT</td>
<td>4.0' MIN.</td>
</tr>
<tr>
<td>STEEPER THAN 1H : 1V</td>
<td></td>
</tr>
</tbody>
</table>
NOTES

1. For component details, see Standard Plan C-23.60.

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

3. The slope from the edge of the shoulder into the face of the guardrail cannot exceed 10H:1V 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.

CASE 1-31

CASE 2-31

CASE 3-31
NOTES
1. For details, see Standard Plan C-22.40.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10H:1V when the guardrail is within 12'-0" from the edge of the shoulder.
3. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier. See Standard Plan C-24.10 for connection details.
NOTES

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

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


BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL - PAY LIMIT

SEE NOTE 3

FIXED FEATURE

EDGE OF SHOULDER

TWO-WAY TRAFFIC

CASE 10A-31 (TRAILING END)

SEE NOTE 3

VARIES - SEE CONTRACT

BEAM GUARDRAIL TYPE 31

PAY LIMIT

MIN

MIN

BEAM GUARDRAIL ANCHOR TYPE 10

PAY LIMIT (SEE NOTE 2)

VARIABLES - SEE CONTRACT

BEAM GUARDRAIL TYPE 31

PAY LIMIT

FIXED FEATURE

EDGE OF SHOULDER

ONE-WAY TRAFFIC

CASE 10B-31 (TRAILING END)

SEE NOTE 3

VARIES - SEE CONTRACT

BEAM GUARDRAIL TYPE 31

PAY LIMIT

MIN

MIN

BEAM GUARDRAIL EXTENSION

LENGTH VARIES - SEE CONTRACT

FIXED FEATURE

EDGE OF SHOULDER

ONE-WAY TRAFFIC

CASE 10C-31 (TRAILING END)

SEE NOTE 1

VARIES - SEE CONTRACT

BEAM GUARDRAIL TYPE 31

PAY LIMIT

MIN

MIN

BEAM GUARDRAIL ANCHOR TYPE 10

PAY LIMIT (SEE NOTE 2)

VARIABLES - SEE CONTRACT

BEAM GUARDRAIL TYPE 31

PAY LIMIT

FIXED FEATURE (TYP.)

EDGE OF SHOULDER

ONE-WAY TRAFFIC OR

TWO-WAY TRAFFIC

CASE 10A-31, 10B-31, OR 10C-31

(APPROACH END)
Notes:

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

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

3. Beam Guardrail Anchor Type 10 (W-Beam) or Type 10 (Thrie Beam) required. For details, see Standard Plan C-23.60.

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

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

---

**EFFECTIVENESS:** AUGUST 5, 2013 TO August 3, 2014

**STATE DESIGN ENGINEER:** Pasco Bakotich

**DATE:** 7/12

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
1. For additional details not shown on this plan, refer to Standard Plan C-20.10.
2. CRT post to be wood only.
NOTES

1. See Contract for transition and connection type.

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

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

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

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

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

1. Beam Guardrail post spacing shall be 6' - 3" on centers.

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

3. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.

4. For details not shown, see Standard Plan C-20.10.

5. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
NOT STEEPER THAN 10H : 1V

NO BOLT REQUIRED

SECTION A

LOCATION OF POST (WITHOUT BLOCK)
~ W6 x 9 STEEL POST

NOT STEEPER THAN 4H : 1V

1' - 6" MAX.

LOCATION OF POSTS & BLOCKS (TYP)
~ SEE STANDARD PLAN C-6a

BEAM GUARDRAIL ANCHOR TYPE 2 ~ SEE STANDARD PLAN C-6a

11' - 8" Long Button Head Bolt with 7/32" Oval Grip, Cut Washer, and Hex Nut

NOT STEEPER THAN 4H : 1V

NOT FLATTER THAN 3H : 1V

SECTION C

SEE NOTE 3

NOTES

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

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

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

Refer to SECTION "C":

\[ \text{Elevation } G = (\text{Elevation } s - D (0.1)) + 27 \]

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>RATE</th>
<th>POSTED SPEED (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 : 1</td>
<td>70</td>
</tr>
<tr>
<td>14 : 1</td>
<td>60</td>
</tr>
<tr>
<td>12 : 1</td>
<td>55</td>
</tr>
<tr>
<td>11 : 1</td>
<td>50</td>
</tr>
<tr>
<td>10 : 1</td>
<td>45</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 OR LESS</td>
</tr>
</tbody>
</table>
1. Posts installed on shoulder slopes steeper than 10H : 1V shall be 8' long.

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

3. Determine the height of the W-Beam at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (S) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (S) on the edge of shoulder used to obtain the offset distance (at the same station). Add Beam Guardrail design height (31") to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION "C":
Elevation \( G = (\text{Elevation} \, S - D(0.1)) + 31 \)

### FLARE RATE TABLE

<table>
<thead>
<tr>
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<td>10 : 1</td>
<td>45</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 OR LESS</td>
</tr>
</tbody>
</table>

### BEAM GUARDRAIL TYPE 31
BURIED TERMINAL TYPE 2 - PAY LIMIT (TERMINAL LENGTH VARIES)

### STANDARD PLAN C-22.16-03

**STATE DESIGN ENGINEER**
Pasco Bakotich III
04/18/12

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES
1. These terminals are FHWA accepted at Test Level Three (TL-3) and may be used for all posted speeds.
2. An ET-31 (Steel) as manufactured by Trinity Industries, Inc. or an SKT-SP-MGS as manufactured by Road Systems Inc. shall be installed according to manufacturer's recommendations.
3. A reflectorized object marker shall be installed according to manufacturer's recommendations.
4. When snow load post washers and snow load rail washers are required by the contract, the snow load rail washers shall not be installed within the terminal limits.
5. Terminal shall be installed at a widening, ensuring that the end piece is entirely off the shoulder. While these terminals do not require an offset at the end, a flare is recommended. A maximum flare of 25 : 1, or flatter over the length of the terminal is allowed for either the ET-31 (Steel) or the SKT-SP-MGS, with a maximum offset of 24" (in.) over 50' (ft.).
6. For Terminal details, see WSDOT approved manufacturer's drawings.
NOTES
1. These Terminals are FHWA accepted at Test Level Two (TL-2) and may be used in applications with speeds of 40 MPH or less.
2. An ET-31 (TL-2) as manufactured by Trinity Industries, Inc. or an SKT-SP-MGS (TL-2) as manufactured by Road Systems Inc. shall be installed according to manufacturers' recommendations.
3. A reflectorized object marker shall be installed according to manufacturers' recommendations.
4. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the Terminal limits.
5. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While these Terminals do not require an offset at the end, a flare is recommended. A maximum flare of 25 : 1 or flatter over the length of the Terminal is allowed for either the ET-31 (TL-2) or the SKT-SP-MGS (TL-2), with a maximum offset of 24" (in.) over 50' (ft.).
6. For Terminal details, see WSDOT-approved manufacturers' drawings.
NOTES
1. For use on the end of guardrail runs when a crashworthy terminal is not required.
2. For additional details not shown, see Standard Plan C-6c.
3. For end section details, see Standard Plans C-7 and C-7a.
4. Use details for Wood Breakaway post shown on this plan and components shown on Standard Plan C-1b.
5. Fasten the Anchor Cable using two 1" nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
NOTES
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts in accordance with Standard Spec. 9-06.5(4), with thin slab ferrule inserts or resin bonded anchors. See Contract Plans.
2. If the last guardrail post is 3" or less from the end of the bridge barrier, this attachment and blackout is not necessary.
3. This case is also applicable for F-shape and vertical faces with no curbs.
4. When B connection is used with Type 1A Transition, the maximum spacing between bolts is 6'-3".
5. See Bridge Plans for additional connection details.
6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3 (2).
1. For additional details not shown in this plan, refer to Standard Plan C-20.10.
2. This guardrail transition is for connection to a vertical concrete shape or single slope barrier and cannot be connected directly to a concrete safety shape.
3. Do not bolt nested W-Beam or rubrail W-Beam to posts and blocks on posts 1, 2, 3, and 5. Bolt tapered blocks directly to posts.
4. The rubrail W-Beam can be shop bent to facilitate installation.
5. Posts 1, 2, 3, and 6 require an additional hole to attach tapered blocks and/or rubrail.
6. Posts 1 and 2 are W6x15 steel posts - 7'-6" long. Posts 3 through 9 are W6x9 steel posts - 6'-0" long.
7. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
NOTES
1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety shape barrier. The toe of the single slope and the safety shaped barrier shall be tapered or the barrier blocked out so that the toe of the barrier does not project past the face of the approach guardrail.
2. See Standard Plan C-24.10 for details regarding connection to Bridge rail or traffic barrier.
3. For details of typical components, see Standard Plans C-1b and C-20.10.
NOTES
1. See Standard Plans C-1b, C-1d, C-20.10 and C-25.20 for rail elements and thrie beam block details.
2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.
NOTES
1. See Standard Plan C-1b, C-20.10 and C-25.20 for rail elements and thrie beam block details.
2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.
3. For additional alternatives not shown, see Contract Plans.

SECTION A
ALTERNATIVE 1

SECTION A
ALTERNATIVE 2

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

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

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

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

4. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

PLAN VIEW
CASE 9A

LEGEND

Design Layout Line

PLACEMENT DETAIL

MAX. DEFLECTION - AS SHOWN IN CONTRACT PLANS

LENGTH OF NEED

CABLE BARRIER TERMINAL

DIRECTION OF TRAFFIC

EDGE OF SHOULDER

HIGH TENSION CABLE BARRIER

MEDIAN

28°

THREE BEAM BULL NOSE

EDGE OF SHOULDER

EDGE OF TRAVELED WAY

LEGEND

Design Layout Line

BARRIER PLACEMENT CABLE TO THREE BEAM BULL NOSE CONNECTION
STANDARD PLAN C-40.14-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 07/2/12
STATE DESIGN ENGINEER
Washington State Department of Transportation

- DRAWN BY
- FERN LODGE

- APPROVED FOR PUBLICATION
- Pasco Bakotich III 07/2/12
- STATE DESIGN ENGINEER
- Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
LEGEND

--- Design Layout Line

PLAN VIEW

CABLE BARRIER TERMINAL
LENTH OF NEED

EDGE OF TRAVELED WAY
MAX. DEFLECTION – AS SHOWN IN CONTRACT PLANS

HIGH TENSION CABLE BARRIER

DIRECTION OF TRAFFIC

EXISTING REDIRECTIONAL LANDFORM
MAX. DEFLECTION – AS SHOWN IN CONTRACT PLANS

EXISTING BRIDGE PIER

SECTION A

HIGH TENSION CABLE BARRIER

EDGE OF TRAVELED WAY

LENGTH OF NEED

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Pasco Bakotich III 07/2/12
STATE DESIGN ENGINEER
Washington State Department of Transportation

APPROVED FOR PUBLICATION

BARRIER PLACEMENT ~ CABLE BARRIER SHIELDING FOR REDIRECTIONAL LANDFORM
STANDARD PLAN C-40.18-02

SHEET 1 OF 1 SHEET
1. **PERMANENT INSTALLATION** requirements: 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 Blackout between barrier segments.

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

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

---

**NOTES**

1. PERMANENT INSTALLATION requirements: 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 end design.

4. For Barrier with a 2' - 10" reveal, see sheet 2.
   For High-Performance Barrier with a 3' - 6" reveal, see sheet 3.
**SECTION A**
3'-6" BARRIER SHOWN LEVEL

**SECTION B**
3'-0" BARRIER FOR USE WITH A 0" TO 9" MAX. GRADE SEPARATION

**SECTION C**
3'-6" BARRIER FOR USE WITH A GREATER THAN 9" TO 10" MAX. GRADE SEPARATION

**SECTION D**
4'-0" BARRIER FOR USE WITH A GREATER THAN 9" TO 10" MAX. GRADE SEPARATION

**STANDARD MOUNTING HEIGHT**

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
HIGH-PERFORMANCE BARRIER

SECTION A

4'-0" BARRIER SHOWN LEVEL

SECTION B

4'-0" BARRIER FOR USE WITH A 0" TO 3" MAX. GRADE SEPARATION

SECTION B

4'-6" BARRIER FOR USE WITH A GREATER THAN 3" TO 6" MAX. GRADE SEPARATION

SINGLE-SLOPE CONCRETE BARRIER (PRECAST)
STANDARD PLAN C-70.10-00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Pasco Bakotich III 04/18/12
STATE DESIGN ENGINEER
Washington State Department of Transportation
**NOTES**

1. **PERMANENT INSTALLATION** requirements: Embed barrier 3" minimum, install 1/4" Pre-molded Joint Filler between segments, fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.

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

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

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

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

---

**WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE**

<table>
<thead>
<tr>
<th>MARK</th>
<th>REINFORCING SIZE</th>
<th>WELDED WIRE REINFORCING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>#4</td>
<td>D - 20</td>
</tr>
<tr>
<td>2</td>
<td>#4</td>
<td>D - 20</td>
</tr>
<tr>
<td>3</td>
<td>#5</td>
<td>D - 31</td>
</tr>
</tbody>
</table>

---

**WELDED WIRE REINFORCEMENT SHALL CONFORM TO STANDARD SPECIFICATION SECTIONS 6-10 and 9-97**

---

**REINFORCING STEEL BENDING DIAGRAM**

**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>
<th>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD. 3' - 6&quot;</td>
<td>8&quot;</td>
<td>1' - 6&quot;</td>
<td>3</td>
<td>3' - 0&quot;</td>
<td>2' - 8 1/2&quot;</td>
<td>2' - 8&quot;</td>
<td>2' - 9 1/2&quot;</td>
<td>1' - 2&quot;</td>
<td>8</td>
</tr>
<tr>
<td>H/P 4' - 0&quot;</td>
<td>9 1/2&quot;</td>
<td>1' - 7 1/8&quot;</td>
<td>4</td>
<td>3' - 6&quot;</td>
<td>2' - 2 1/2&quot;</td>
<td>3' - 2&quot;</td>
<td>3' - 3 1/2&quot;</td>
<td>1' - 3&quot;</td>
<td>10</td>
</tr>
</tbody>
</table>

---

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
NOTES

1. PERMANENT INSTALLATION requirements: 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. See Standard Plan C-70.10 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 row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3".

**WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE**

<table>
<thead>
<tr>
<th>MARK</th>
<th>REINFORCING</th>
<th>WELDED WIRE REINFORCING</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>#4</td>
<td>D - 20</td>
</tr>
<tr>
<td>②</td>
<td>#4</td>
<td>D - 20</td>
</tr>
<tr>
<td>③</td>
<td>#5</td>
<td>D - 31</td>
</tr>
</tbody>
</table>

**WELDED WIRE REINFORCEMENTS SHALL CONFORM TO STANDARD SPECIFICATION SECTIONS 6-10 and 9-07**

**REINFORCING STEEL BENDING DIAGRAM**

SEE STD. SPEC. 9-07,10 FOR BENDING DIAMETERS

**DIMENSION TABLE**

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
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<th>E</th>
<th>F</th>
<th>G</th>
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<tr>
<td>STD. 3'-6&quot;</td>
<td>8</td>
<td>2'-0&quot;</td>
<td>3</td>
<td>2'-6&quot;</td>
<td>2'-9&quot;</td>
<td>1'-7&quot;</td>
</tr>
<tr>
<td>H/P 4'-0&quot;</td>
<td>9 &quot;1/8&quot;</td>
<td>2'-1 1/4&quot;</td>
<td>4</td>
<td>3'-2&quot;</td>
<td>3'-3&quot;</td>
<td>1'-9&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

**ISOMETRIC VIEW**

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
NOTES

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

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

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

4. For Barrier with a 2' - 10" reveal, see Sheet 2. For High-Performance Barrier with a 3' - 6" reveal, see Sheet 3.

---

**EXPANSION JOINT DETAIL**

Ensure that no cement concrete enters the PVC conduit when pouring.

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**

---

**WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE**

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<td>D - 20</td>
</tr>
<tr>
<td>3</td>
<td>#5</td>
<td>D - 31</td>
</tr>
</tbody>
</table>

**WELDED WIRE REINFORCEMENTS SHALL CONFORM TO STANDARD SPECIFICATION SECTIONS 6-10 and 9-07**

**CONDUIT**

1 1/4" PVC CONDUIT (TYP.)

**PVC CAP**

3/4" PVC CAP (TYP.)

**PREMIUM JOINT FILLER**

**STANDARD PLAN C-80.10-00**

**STATE ENGINEER**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**DATE: 04/18/12**

---

**TYPICAL SECTION**

**DUMMY JOINT DETAIL**

**NOTE2**

**SECTION B**
3/4" CHAMFER (TYP.)

SECTION A

3'-0" BARRIER SHOWN LEVEL

SECTION A

3'-0" BARRIER FOR USE WITH A
0" TO 5" MAX. GRADE SEPARATION
(SEE NOTE 3)

SECTION A

4'-0" BARRIER FOR USE WITH A
GREATER THAN 7" TO 10" MAX. GRADE SEPARATION
(SEE NOTE 3)

STANDARD MOUNTING HEIGHT
HIGH-PERFORMANCE BARRIER

SECTION A

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

TOP OF ROADWAY
3'-6" MIN.
3" CLR.
2'-2 1/4"
3'-6" MIN.
3" CLR.
2'-2 1/4"
3'-6" MIN.
3" CLR.
2'-2 1/4"
3'-6" MIN.
3" CLR.
2'-2 1/4"
3'-6" MIN.
3" CLR.
2'-2 1/4"
3'-6" MIN.
3" CLR.
2'-2 1/4"
36'-0" MINIMUM TO 120'-0" MAXIMUM BETWEEN EXPANSION JOINTS

NOTES
1. The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
2. See Standard Plan C-80.10, 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 H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6", and a minimum embedment of 3'.

BARRIER HEIGHT

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD.</td>
<td>3'-6&quot;</td>
<td>8&quot;</td>
<td>2'-0&quot;</td>
<td>2'-6&quot;</td>
</tr>
<tr>
<td>H/P</td>
<td>4'-0&quot;</td>
<td>9 1/8&quot;</td>
<td>2'-2 1/4&quot;</td>
<td>4</td>
</tr>
</tbody>
</table>

* WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE

<table>
<thead>
<tr>
<th>MARK</th>
<th>REINFORCING SIZE</th>
<th>WELDED WIRE REINFORCING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>#4 D-20</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>#4 D-20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>#5 D-31</td>
<td></td>
</tr>
</tbody>
</table>

* WELDED WIRE REINFORCEMENTS SHALL CONFORM TO STANDARD SPECIFICATION SECTIONS 6-10 and 9-07

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 9-07,1(2) FOR BENDING DIAMETERS

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>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD.</td>
<td>3'-6&quot;</td>
<td>8&quot;</td>
<td>2'-0&quot;</td>
<td>2'-6&quot;</td>
<td>1'-8&quot;</td>
<td>8</td>
</tr>
<tr>
<td>H/P</td>
<td>4'-0&quot;</td>
<td>9 1/8&quot;</td>
<td>2'-2 1/4&quot;</td>
<td>4</td>
<td>3'-0&quot;</td>
<td>1'-10&quot;</td>
</tr>
</tbody>
</table>

SEE NOTE 3

SINGLE-SLOPE CONCRETE BARRIER (CAST-IN-PLACE)
TERMINAL

STANDARD PLAN C-80.20-00

APPROVED FOR PUBLICATION
04/18/12
**NOTES**

1. The Transition Section is used in the configurations shown in Standard Plans C-85.10 and C-85.11.
2. See Standard Plan C-80.10, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details. Modify rebar on wider end as shown in EXPANSION JOINT MODIFICATION.
3. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slip-form construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 1/2" and adjust steel dimensions as required.
4. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3'.

---

**WELDED WIRE REINFORCING**

**STANDARD SPECIFICATION**

**SINGLE-SLOPE CONCRETE BARRIER (CAST-IN-PLACE)**

**TRANSITION SECTION**

**STANDARD PLAN C-80.30-00**

**ISOMETRIC VIEW**

**ELEVATION**

**PLAN**

**SECTION**

**EXPANSION JOINT MODIFICATION**

**SEENOTE4**

**SEENOTE2**
**NOTES**

1. The Vertical Back barrier is used only in the configurations shown in Standard Plans C-85.10 and C-85.11, and when placed against a retaining wall.

2. See Standard Plan C-80.10, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details. Modify rebar as shown in EXPANSION JOINT MODIFICATION.

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

4. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of $3'\ 6''$ and a minimum embedment of $3''$.

---

**WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE**

<table>
<thead>
<tr>
<th>MARK</th>
<th>REINFORCING SIZE</th>
<th>WELDED WIRE REINFORCING</th>
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</thead>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
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<td>D - 20</td>
</tr>
<tr>
<td>3</td>
<td>#5</td>
<td>D - 31</td>
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**WELDED WIRE REINFORCEMENTS SHALL CONFORM TO STANDARD SPECIFICATION SECTIONS 6-10 and 9-07**

---

**REINFORCING STEEL BENDING DIAGRAM**

SEE STD. SPEC. 9-07.1(2) FOR BENDING DIAMETERS

<table>
<thead>
<tr>
<th>DIMENSION TABLE</th>
<th>SEE NOTE 4</th>
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</table>

**EXPANSION JOINT MODIFICATION**

SEE NOTE 2

---

**SINGLE-SLOPE CONCRETE BARRIER (CAST-IN-PLACE) VERTICAL BACK**

**STANDARD PLAN C-80.40-00**

**EFFECTIVE:** AUGUST 5, 2013 TO August 3, 2014

---

**SHEET 1 OF 1 SHEET**

APPROVED FOR PUBLICATION

Pasco Bakotich III  04/18/12
STATE DESIGN ENGINEER
Washington State Department of Transportation
This plan is for transitions to Precast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.

**CONCRETE BARRIER TRANSITION**

**TYPE 2 TO SINGLE-SLOPE**

**STANDARD PLAN C-80.50-00**

**SECTION A**

**REINFORCING STEEL BENDING DIAGRAM**

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

**NOTE**

Provide wire loops, notches, and other details to match the barrier connections shown in Std. Plan C-4.

**ELEVATION**

**ISOMETRIC VIEW**

**PLAN**

**SINGLE-SLOPE CONCRETE BARRIER (BID ITEM)**

**SECTION B**

**SECTION C**

**CONCRETE BARRIER TYPE 2**
DUAL-FACED TRANSITION SECTION LENGTH VARIES PER BARRIER TYPE

STEEL WELDED WIRE FABRIC - COMPLY WITH STANDARD SPEC 9-07.7
- 6 x W2.1 x W0.1 (6 GAGE)
- 6 x W2.9 x W0.9 (6 GAGE)
- 6 x W4.0 x W4.0 (4 GAGE)
- 4 x 4 W1.4 x W1.4 (10 GAGE)
- 4 x 4 W2.1 x W2.1 (8 GAGE)
- 4 x 4 W2.9 x W2.9 (6 GAGE)

1 1/2" CLEARANCE ON ALL SURFACES

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

NOTE 2: For Single-Slope Concrete Barrier details, see Standard Plan series C-70's (precast) or C-80's (cast-in-place).
NOTES

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

2. For Single-Slope Concrete Barrier details, see Standard Plan series C-70’s (precast) or C-80’s (cast-in-place).
ALL DIMENSIONS ARE OUT TO OUT
ALL BENDS ARE 2" RADIUS

BAR LIST

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<tr>
<td>2</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>#5</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>FND &amp; BARRIER - VERTICAL</td>
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<td>16</td>
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<tr>
<td>4</td>
<td>BARRIER - HORIZONTAL</td>
<td>#7</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>FOUNDATION</td>
<td>#8</td>
<td>32</td>
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<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Q</th>
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<tbody>
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<td>0 TO 5&quot;</td>
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<td>8&quot;</td>
<td>2'-0&quot;</td>
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<td>1&quot;</td>
<td>2&quot;</td>
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<tr>
<td>UP TO 7&quot;</td>
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<td>2'-2 1/4&quot;</td>
<td>3'-6 1/4&quot;</td>
<td>7&quot;</td>
<td>5&quot;</td>
<td>10&quot;</td>
<td>12</td>
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<tr>
<td>UP TO 10&quot;</td>
<td>4'-6&quot;</td>
<td>10 1/4&quot;</td>
<td>2'-4 1/2&quot;</td>
<td>3'-8 1/2&quot;</td>
<td>10&quot;</td>
<td>6&quot;</td>
<td>7&quot;</td>
<td>14</td>
</tr>
</tbody>
</table>

NOTES
1. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-13.
2. See the Contract Plans for conduit placement.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
4. Install Conduit Coupling flush with top of foundation. Do not glue PVC stubout.
5. This plan shall be used for 40' and 50' Light Standards with 16' max. length double mast arms.
6. Concrete shall be Class 4000.

SINGLE-SLOPE CONCRETE BARRIER LIGHT STANDARD FOUNDATION

STANDARD PLAN C-85.14-00

DRAWN BY: LISA CYUHD
DRAFTING DATE: 06-16-11

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-16-11

02 DESIGNER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
SINGLE-SLOPE CONCRETE BARRIER SIGN BRIDGE

24' - 0"
1' - 6"

END POST SPACING

W

24' - 0"
1' - 6"

TAPER

1 END POST SPACING

'W'

1' - 6"

PLAN

NOTES

1. When connecting between Cast-In-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-13.

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

3. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.

4. Concrete shall be Class 4000, unless otherwise noted.

DIMENSIONS "W" AND "Z"

SIGN BRIDGE SPAN LENGTH W Z

61' OR LESS 4'- 0" 11'- 6"

61' TO 91' 5'- 0" 13'- 8"

91' TO 129' 6'- 0" 15'- 0"

129' TO 159' 7'- 0" 16'- 0"

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

ELEVATION

SEE NOTE 1

ISOMETRIC VIEW

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SINGLE-SLOPE CONCRETE BARRIER SIGN BRIDGE FOUNDATION STANDARD PLAN C-85.16-00 SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-16-11 STATE DESIGN INCHIE
SINGLE SLOPE CONCRETE BARRIER

NOTES

1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-13

2. All concrete shall be class 4000.

MARL LIST

<table>
<thead>
<tr>
<th>MARK NO.</th>
<th>LOCATION</th>
<th>SIZE</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>BARRIER - TOP VERTICAL</td>
<td># 4</td>
<td>24</td>
</tr>
<tr>
<td>#2</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td># 4</td>
<td>24</td>
</tr>
<tr>
<td>#3</td>
<td>BARRIER - HORIZONTAL</td>
<td># 5</td>
<td></td>
</tr>
</tbody>
</table>

SEE DIMENSION TABLE - NOT COUNTING SPLICES

ALL DIMENSIONS ARE OUT TO OUT

ALL BENDS ARE 2" RADIUS

VARIES 5 3/4" TO 3 - 2"

VARIES (B - 4 1/2") TO (C - 5 3/4")

TRAILING END TRANSITION (FROM MONOTUBE SIGN STRUCTURE FOUNDATION TO SINGLE-SLOPE DUAL-FACED BARRIER)

SECTION A

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 (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 5&quot;</td>
<td>3'-6&quot;</td>
<td>9&quot;</td>
<td>8&quot;</td>
<td>2'-0&quot;</td>
<td>4'-10&quot;</td>
<td>3&quot; MIN.</td>
<td>4</td>
</tr>
<tr>
<td>UP TO 7&quot;</td>
<td>4'-0&quot;</td>
<td>9 1/8&quot;</td>
<td>2'-2 1/4&quot;</td>
<td>5'-0 1/4&quot;</td>
<td>7&quot; MIN.</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>UP TO 10&quot;</td>
<td>4'-6&quot;</td>
<td>10 1/4&quot;</td>
<td>2'-4 1/2&quot;</td>
<td>5'-2 1/2&quot;</td>
<td>10&quot; MIN.</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

SEE NOTE 1

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

STATE DESIGN ENGINEER

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-16-11

SINGLE-SLOPE CONCRETE BARRIER TRANSITION FOR MONOTUBE SIGN SUPPORT

STANDARD PLAN C-85.18-00

SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
SINGLE-SLOPE CONCRETE BARRIER

1. See Standard Specification 8-21.3(9) for construction requirements.
2. Use a template to locate and secure the bolts during foundation installation.
4. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide a 3'-0" slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
5. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>SHAFT CONCRETE</th>
<th>CLASS 4000P</th>
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</thead>
<tbody>
<tr>
<td>ALL OTHER CONCRETE</td>
<td>CLASS 4000</td>
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STEEL

<table>
<thead>
<tr>
<th>REINF BAR</th>
<th>AASHTO M 31</th>
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<tbody>
<tr>
<td>ANCHOR RODS</td>
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<td>ANCHOR NUTS</td>
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<td>ANCHOR WASHERS</td>
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<tr>
<td>STEEL PLATE</td>
<td>ASTM A 36</td>
</tr>
</tbody>
</table>

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

1. Approved Inertial Barrier Systems (sand barrel arrays) are listed in the Qualified Products List and shall be installed in accordance with the manufacturer's recommendations. When products not listed on the Qualified Products List are considered, a Request of Approval of Materials (RAM) form is required.

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

INSTALLATION DETAILS

ATTENUATOR CONFIGURATIONS

(NUMBERS INSIDE BARRELS INDICATE LBS.)

ROADSIDE INSTALLATION DETAIL

DIRECTION OF TRAFFIC

VARIIES FROM 1' TO 2'

HAZARD

10" (DESIRABLE)

CONCRETE BARRIER TERMINAL SECTION (TYP.)

TYPE 1

POSTED SPEED
40 MPH OR LESS

TYPE 2

POSTED SPEED
45 MPH

TYPE 3

POSTED SPEED
50 MPH

PLAN VIEW

TYPE 4

POSTED SPEED
55 MPH

TYPE 5

POSTED SPEED
60 MPH

TYPE 6

POSTED SPEED
70 MPH

PLAN VIEW

EXAMPLE CONFIGURATION

IMPACT ATTENUATOR INERTIAL BARRIER CONFIGURATIONS

STANDARD PLAN C-90.10-00

SHEET 1 OF 1 SHEET
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

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

APPROVED FOR PUBLICATION
Harold J. Peterfeso 11-10-05
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

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

Sheets 2 of 2 Sheets

APPROVED FOR PUBLICATION
Pasco Bakotich III 01-06-09
State Design Engineer
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
**NOTES**

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

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

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

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

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

---

### WALL HT H

<table>
<thead>
<tr>
<th>Type 4A</th>
<th>Type 4B</th>
<th>Type 4C</th>
<th>Type 4D</th>
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<td>WALL HT</td>
<td>WALL HT</td>
</tr>
<tr>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>6' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>5' - 0&quot;</td>
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**CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION**

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**

---

**NOISE BARRIER WALL TYPE 4 STANDARD PLAN D-2.08-00**

**APPROVED FOR PUBLICATION**

*Harold J. Petersen*

11-05

*Washington State Department of Transportation*

EXPRESS AUGUST 23, 2006
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

1. Wall to be designated Noise Barrier Wall Type 6A, 6B, 6C or 6D. The Contract specifies actual wall designations.

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

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

4. Construction joints in the foundation shall be spaced at 120 feet maximum.
1. Wall to be designated Noise Barrier Wall Type 6SSA, 6SSB, 6SSC or 6SSD. The Contract specifies actual wall designations.

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

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

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

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

NOISE BARRIER WALL TYPE 7
STANDARD PLAN D-2.18-00

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<thead>
<tr>
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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 foundation requirements D1 or D2.
**NOTES**

1. Wall to be designated Noise Barrier Wall Type 9A, 9B, 9C or 9D. The Contract specifies actual wall designation.

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

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

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

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

---

**PRECAST CONCRETE WALL ON SPREAD FOOTING**

**NOISE BARRIER WALL TYPE 9**

**STANDARD PLAN D-2.32-00**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

Harold J. Peterfeso  
10-10-05

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EXPRESS AUGUST 23, 2006**

---

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**

---

**WALL HT H**

**TYPE 9A**

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<tr>
<th>W</th>
<th>BARS A@&quot;F&quot;</th>
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**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**

---

**WIND EXPOSURE & VELOCITY**

**NOISE BARRIER TYPE**

<table>
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<th>VELOCITY (MPH)</th>
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<tr>
<td>A</td>
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<td>B</td>
<td>60</td>
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<tr>
<td>C</td>
<td>40</td>
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<tr>
<td>D</td>
<td>30</td>
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---

**BENDING DIAGRAM**

**W2 MINUS 1 1/2" BAR "H"**

---

**REFERENCES**

1. Wall to be designated Noise Barrier Wall Type 9A, 9B, 9C or 9D. The Contract specifies actual wall designation.

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

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

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

5. All joints shall be in full contact and sealed.
GRAVEL
DUCT
WALL
ANGLE
POINT
BAR "D"
BAR "G"
SPIRAL
FILL VOID WITH GROUT
2'-0"
CORNER PANEL
REINFORCED PER LISTED WALL HEIGHT REINFORCEMENT TABLE
GRAVITY PAD
FOOTING
WALL
BAR "D"
BAR "D" SPIRAL
FILL VOID WITH GROUT
BAR "H"
JOINT HOLE - 2" I.D. WITH ROUGHENED SURFACE, OR RIGID POST-TENSIONED DUCT, OR CORRUGATED STEEL PIPE
GRAVITY DUCT
FOOTING
FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC

JOINT AND CORNER DETAIL

PRECAST CONCRETE WALL ON SPREAD FOOTING

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

NOISE BARRIER WALL
TYPE 9
STANDARD PLAN D-2.32-00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
JOINT AND CORNER DETAIL

FILL VOID WITH GROUT

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

BAR "D"

GROUT DUCTS

WALL

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

RETURN TO FOOTING

FOOTING PADS

GROUT PADS

(TRANSVERSE BARS NOT SHOWN)

1" CLR. (TYP.)

5'-0" MIN. (TYP.)

BAR "W" (TYP.)

BAR "A" (TYP.)

PRECAST CONCRETE WALL
ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
TYPE 10
STANDARD PLAN D-2.34-01

APPROVED FOR PUBLICATION
Pasco Bakotich III  01-06-09
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES:
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. Panels 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.

**PRECAST CONCRETE WALL ON SHAFT FOUNDATION**

**NOISE BARRIER WALL TYPE 11**

**STANDARD PLAN D-2.36-02**

**SHEET 1 OF 3 SHEETS**

**APPROVED FOR PUBLICATION**

Pasco Bakotich 01-09-09

State Design Engineer
NOTE
THE BOTTOM 9" OF BAR "B" SHALL BE PAINTED WITH ONE COAT OF FORMULA A-6-86 ZINC DUST OXIDE PRIMER OR, ONE COAT OF FORMULA A-11-99 PRIMER.

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<th>S</th>
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<td>#9</td>
<td>2&quot;</td>
<td>1 3/8&quot;</td>
<td>1 3/4&quot;</td>
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<tr>
<td>#11</td>
<td>2 15/32&quot;</td>
<td>1 2/10&quot;</td>
<td>2 1/4&quot;</td>
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DEFORMED REINF. BAR

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

THREADED REINF. BAR

NO TAPER IS REQUIRED ON THE BASE PLATE WHEN USING THE THREADED BAR OPTION, USE DIAM. F HOLES

SLOT FOR ANCHOR BOLT (TYP.) - LC 1/4" X 2 1/2"

BASE PLATE - T x 10" x 1": 9" ASHHTO M 183, GALVANIZED, 3/4" CHAMFER ALL CORNERS (EMBEDDED WITH GROUT)

ANCHOR BOLT (TYP.) - ASTM F 1554-04 GRADE 55 MATERIAL (SEE TABLE FOR DIAMETER)

ANCHOR BOLTS, NUTS, WASHERS, BASE PLATE, AND BAR "B" SHALL HAVE A PROTECTIVE COATING OF ONE OF THE FOLLOWING: HOT DIPPED GALVANIZING AASHTO M 232 FOR HARDWARE; AASHTO M 111 FOR WASHERS AND PLATES; MECHANICAL GALVANIZING AASHTO M 298 CL 55, OR ZINC RICH PAINT, PAINT THREADS AND NUTS AFTER INSTALLATION.

BASE PLATE - T X 10" X 1' - 5", AASHTO M 183, GALVANIZED, 3/4" CHAMFER ALL CORNERS (EMBEDDED WITH GROUT) ~ LOCATIONS WHEN (SIX) 6 HOLES ARE REQUIRED (SEE TABLE)

PRECAST CONCRETE WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL TYPE 11

STANDARD PLAN D-2.36-02

SHEET 2 OF 3 SHEETS

NOTE
ANCHOR BOLTS, NUTS, WASHERS, BASE PLATE, AND BAR "B" SHALL HAVE A PROTECTIVE COATING OF ONE OF THE FOLLOWING: HOT DIPPED GALVANIZING AASHTO M 232 FOR HARDWARE; AASHTO M 111 FOR WASHERS AND PLATES; MECHANICAL GALVANIZING AASHTO M 298 CL 55, OR ZINC RICH PAINT, PAINT THREADS AND NUTS AFTER INSTALLATION.

ANCHOR BOLT (TYP.) - ASTM F 1554-04 GRADE 55 MATERIAL (SEE TABLE FOR DIAMETER)
ANGLE POINT ~ CANTILEVERED

ANGLE POINT ~ ON SHAFT
ANGLES 20° OR LESS

ANGLE POINT ~ ON SHAFT
ANGLES 20° TO 90°

PRECAST CONCRETE WALL
ON SHAFT FOUNDATION

NOISE BARRIER WALL
TYPE 11
STANDARD PLAN D-2.36-02

ANGLE "A" DIMENSION
30°  4 1/2"
45°  5 1/2"
60°  6 1/2"
75°  7 1/4"
90°  8"
105°  8 3/4"

PANEL LENGTH ~ 12'-0" MAX. (TYP.)

END-PANEL OPTIONS

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
**Notes and Details**

1. Walls to be designated Noise Barrier Wall Type 13SA, 13SB, 13SC or 13SD. 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.

**Design Details**

- **WALL HT**
  - 6' - 0" 1" 4@ 12" 8@ 15" 8@ 15" 8@ 15" 8@ 15" 6' - 0"
  - 8' - 0" 1" 4@ 12" 8@ 15" 8@ 15" 8@ 15" 8@ 15" 8' - 0"
  - 10' - 0" 1" 4@ 12" 8@ 15" 8@ 15" 8@ 15" 8@ 15" 10' - 0"
  - 12' - 0" 1" 4@ 12" 8@ 15" 8@ 15" 8@ 15" 8@ 15" 12' - 0"
  - 14' - 0" 1" 4@ 12" 8@ 15" 8@ 15" 8@ 15" 8@ 15" 14' - 0"
  - 16' - 0" 1" 4@ 12" 8@ 15" 8@ 15" 8@ 15" 8@ 15" 16' - 0"
  - 18' - 0" 1" 4@ 12" 8@ 15" 8@ 15" 8@ 15" 8@ 15" 18' - 0"

- **TYPE 13SA**
- **TYPE 13SB**
- **TYPE 13SC**
- **TYPE 13SD**

**Wind Exposure & Velocity**

- **Noise Barrier Type**
  - 13SA
  - 13SB
  - 13SC
  - 13SD

**WIND EXPOSURE**

- **WIND VELOCITY (MPH)**
  - 80
  - 80
  - 80
  - 80

**Bending Diagram**

- Precast concrete wall with single slope traffic barrier on spread footing.

**Elevation**

- Noise sealer 1/2" (Typ.)
- Panel width 15'-0" Max.
- Panel height 5'-0" Max.
- Top of roadway

**Final Ground Line**

- Precast panel to be placed vertically.
- Final ground line
- Max. 1'

**Reinforcement Section**

- Grout pad leveling course
- GROUT PAD LEVELING COURSE
- Set panel immediately after placing grout.

**Precast Panel to Be Placed Vertically**

- 3'-0" Min.
- 2'-0" Max.

**Typical Section**

- "G" - Spiral Chamfer
- Bar "E" & "C" space as shown on tables.
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. Panels shall have at least 3 feet level ground on each side.

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

5. Anchor Bolts, Nuts, Washers, Base Plate, and Bar "B" shall have a Protective Coating of one of the following: Hot Dipped Galvanizing AASHTO M 222 for Hardware; AASHTO M 111 for Washers and Plates. Mechanical Galvanizing AASHTO M 298 Cl 55, 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-6-86 Zinc Dust Oxide Primer OR, one coat of Formula A-11-99 Primer.

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

ANGLE POINT PLAN
ADJUST REINFORCEMENT AS NECESSARY TO ACCOMODATE ANGLE POINT

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)

20" MAX
20" MAX

TRAFFIC SIDE

NOISE WALL

END OF PANEL

NOISE SEALER
1/2" (TYP.)

1/2" (TYP.)

SEE DETAIL

TRAFFIC SIDE

DEFORMED REINFORCEMENT BAR

BAR "B"

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.

BASE PLATE DETAIL

NOISE SEALER
1/2" (TYP.)

BASE PLATE

SHAFT

1/4" ANCHOR BOLT

TAPERED HOLE FOR #8 BAR (TYP.) - SEE BAR "B"

PLATE 1 3/4" x 1 1/2" x 1 - 1/8"

ASTM A 36 GALVANIZED EMBEDDED IN GROUT. 3/4" CHAMFER ALL CORNERS.

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

SEE SHEAR-KEY DETAIL

BASE PLATE DETAIL

SHARD-LY DETAIL

PRECAST CONCRETE WALL
W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL
TYPE 14

STANDARD PLAN D-2.46-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Harold J. Petefeso

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DETAILED DESIGN ENGINEER

DATE

11/10/05

NOISE SEALER
1/2" (TYP.)

NOISE WALL

END OF PANEL

1/4" ANCHOR BOLT

TAPERED HOLE FOR #8 BAR (TYP.) - SEE BAR "B"

PLATE 1 3/4" x 1 1/2" x 1 - 1/8"

ASTM A 36 GALVANIZED EMBEDDED IN GROUT. 3/4" CHAMFER ALL CORNERS.

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

SEE SHEAR-KEY DETAIL

BASE PLATE DETAIL

SHARD-LY DETAIL

PRECAST CONCRETE WALL
W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL
TYPE 14

STANDARD PLAN D-2.46-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Harold J. Petefeso

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DETAILED DESIGN ENGINEER

DATE

11/10/05
NOTES

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

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

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

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

5. Anchor Bolts, Nuts, Washers, Base Plate, and Bar B shall have a Protective Coating of one of the following: Hot Dipped Galvanizing AASHTO M 232 for Hardware; AASHTO M 111 for Washers and Plates. Mechanical Galvanizing AASHTO M 298 CL 55, 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-6-86 Zinc Dust Oxide Primer OR, one coat of Formula A-11-99 Primer.

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

NOISE BARRIER WALL

TYPE 14SS

STANDARD PLAN D-2.48-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Harold J. Peterfeso

11-10-05

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTES

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

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

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

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

5. Anchor Bolts, Nuts, Washers, Base Plate, and Bar B shall have a Protective Coating of one of the following: Hot Dipped Galvanizing AASHTO M 232 for Hardware; AASHTO M 111 for Washers and Plates. Mechanical Galvanizing AASHTO M 298 CL 55, 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-6-86 Zinc Dust Oxide Primer OR, one coat of Formula A-11-99 Primer.

7. The Contract specifies actual foundation requirements D1 or D2.
**Typical Intermediate and End Panel**

- **Angle Point Plan**: Adjust reinforcement as necessary to accommodate angle point.
- **Limits of Transverse Barrier Reinforcement (Typ.)**: 1 1/2" (Typ.)
- **Traffic Side**: See detail C
- **Noise Wall**: 1/2" (Typ.)
- **Noise Sealer**: 1/2" (Typ.)
- **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.

**Typical Intermediate and End Panel**

- **Bar "B"**: 3/4" x 9" x 1' - 9"
- **Chamfer** (Typ.)
- **Noise Sealer**: 1/2" (Typ.)
- **See Shear-Key Detail**: D

**Bar "B"**

- **End Plate**: 1 1/4" Anchor Bolt
- **Set Elevation of Leveling Nut Before Setting Panel**: 1 1/4" Anchor Bolt
- **Tapered Hole for #8 Bar (Typ.)**: See Bar "B"
- **Slot 1 3/8" x 1 3/4" for 1 1/4" Anchor Bolt (Typ.)**

**Noise Barrier Wall**

- **Type 14SS**
- **Standard Plan D-2.48-00**

---

**Effective**: August 5, 2013 to August 3, 2014

---

**Harold J. Peterfeso**

*State Design Engineer*

Washington State Department of Transportation

*PRECAST CONCRETE WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SHAFT FOUNDATION*
**Noise Barrier Wall Type 16**

**Standard Plan D-2.60-00**

**Sheet 2 of 2 Sheets**

Approved for Publication: Harold J. Peterfeso 11-10-05

Washington State Department of Transportation

Effective: August 5, 2013 to August 3, 2014
Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

Expansion joint at width step.

Bond beam units.

Bond beam grouting limit.

Typical expansion joint.

Plan view.

Traffic side.

#5 (typ.)

8" or 10" CMU

8" CMU

10" CMU

See Detail A

Typical both sides of wall.

Footing width transition detail.

Footage:

3" CLR. (typ.)

1" - 0" MIN. (typ.)

Bar "A" (typ.)

Traffic side.

Traffic side.

3/16" joint.

Polyurethane sealant.

Detail A.

Backer rod.

### Notes

1. Walls to be designated Noise Barrier Wall Type 18A, 18B, 18C or 18D. 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 footing shall be spaced at 120 feet maximum.

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

### Typical Section

#### CMU = Concrete Masonry Unit

<table>
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<th>CMU Size</th>
<th>Splice Length</th>
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<tr>
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<td>3 - 8</td>
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<tr>
<td>#8</td>
<td>4 - 10</td>
</tr>
</tbody>
</table>

#### Typical Section

- **Wind Exposure & Velocity**
  - **Noise Barrier Type**
  - **Wind Exposure**
  - **Wind Velocity (MPH)**

- **EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**

#### Right-of-Way

- **CLR. CMU (TYP.) - SEE NOTE 5**
- **Masonry**
  - All cells of masonry shall have at least 120 feet maximum.
  - Masonry is to be specially inspected.
  - Masonry walls shall have at least 3 feet of level ground on each side.
  - Construction joints in the footing shall be spaced at 120 feet maximum.
  - See "Masonry Wall Finishes and Details" sheets for masonry block finishes, special shapes, sizes and layout.

#### Offset Spread Footing

- **Offset Spread Footing**
  - WHEN W IS: + 2' - 4' CENTER WALL ON FOOTING
  - 2' - 4' + W X 4' - 6' DIM. 4' - 0' LEVEL 4 - 0' MAX.
  - 4' - 0' MIN. BOND BEAM AND REINFORCED EXTENSION AT STEP
  - TWO BLOCKS MIN. THREE BLOCKS MAX.
  - FINAL GROUND LINE

#### Expansion Joints

- **Expansion Joints @ 24' - 0'**
  - MAX. CENTERS SEE CONTRACT FOR LOCATIONS
  - COMPLETE FOOTING CONTINUOUS FOOTING REINFORCING STEEL BAR "A" @ EQUAL SPACING WITH 2' - 0' MIN. SPICE (TYP.)

#### Elevation

- **Level (TYP.)**
  - **#5 (TYP.)**

#### Design

- **Pasco Bakotic III 01-06-09**
- **Washington State Department of Transportation**
- **State Design Engineer**
- **Note: 1.01 to 0.99**

---

**Diagram and Table**

- **Typical Section**
- **Wind Exposition & Velocity**
- **Right-of-Way**
- **Offset Spread Footing**
- **Expansion Joints**
- **Elevation**

---

**Table**

<table>
<thead>
<tr>
<th>WALL H</th>
<th>CMU WIDTH</th>
<th>X</th>
<th>W</th>
<th>BAR &quot;A&quot;</th>
<th>BAR &quot;C&quot;</th>
<th>BAR &quot;D&quot;</th>
<th>BAR &quot;E&quot;</th>
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<td>2' - 0&quot;</td>
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**Diagram**

- **CMU (TYP.) - SEE NOTE 5**
- **REINFORCING STEEL BAR "D" (CENTERED)**
- **CMU (TYP.) - SEE NOTE 5**
- **OFFSET SPREAD FOOTING**
- **FLAT LINING**
- **LONG-WALL SPICE**
- **SHORT-WALL SPICE**

---

**Sheet 1 of 2 Sheets**

**APPROVED FOR PUBLICATION**

**Pasco Bakotic III 01-06-09**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**STATE DESIGN ENGINEER**

**Note: 1.01 to 0.99**

---

**Diagram**

- **RIGHT-OF-WAY**
- **SEE CONTRACT**
- **SOLID GROUT CAP**
- **BOND BEAM AT TOP**
- **2" (TYP.) WALL**
- **W**
- **H**

---

**Diagram**

- **PAINT HANDLING**
- **NOTES**
- **NOISE BARRIER WALL TYPE 18**
- **STANDARD PLAN D-2.64-01**

---

**Diagram**

- **WALL**
- **H**
- **WALL H**
- **CMU WIDTH**

---

**Diagram**

- **WALL H**
- **CMU WIDTH**
- **X**
- **W**
- **BAR "A"**
- **BAR "C"**
- **BAR "D"**
- **BAR "E"**

---

**Diagram**

- **WALL H**
- **CMU WIDTH**
- **X**
- **W**
- **BAR "A"**
- **BAR "C"**
- **BAR "D"**
- **BAR "E"**

---

**Diagram**

- **WALL H**
- **CMU WIDTH**
- **X**
- **W**
- **BAR "A"**
- **BAR "C"**
- **BAR "D"**
- **BAR "E"**

---

**Diagram**

- **WALL H**
- **CMU WIDTH**
- **X**
- **W**
- **BAR "A"**
- **BAR "C"**
- **BAR "D"**
- **BAR "E"**
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT.

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

TYPICAL EXPANSION JOINT

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

EXPANSION JOINT AT WIDTH STEP

8" CMU

10" CMU

TRAFFIC SIDE

#5 (TYP.)

SEE DETAIL A

8" CMU

10" CMU

TRAFFIC SIDE

#5 (TYP.)

SEE DETAIL A

BOND BEAM DETAIL

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

12" JOINT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

#5 (TYP.)

8" OR 10" CMU

#5 (TYP.)

EXPANSION JOINT AT WIDTH STEP

3" CLR (TYP.)

1" - 0" MIN. (TYP.)

BAR "A" (TYP.)

FOOTING WIDTH TRANSITION DETAIL

(For Locations Without Footing Step)

NOTE: TRANSVERSE BARS NOT SHOWN

NOISE BARRIER WALL

TYPE 18

STANDARD PLAN D-2.64-01

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 01-06-09

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
BOND BEAM DETAIL

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

#5 (TYP.)

8" OR 10" CMU

TRAFFIC SIDE

PLAN VIEW

TYPICAL EXPANSION JOINT

NOTE:
SPIRAL REINFORCEMENT SHALL BE LAPPED AS SHOWN TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT (TOP AND BOTTOM).

135° HOOK (TYP.)

1" - 5" MIN. LAP

2" CLR

SECTION A

DETAIL A

STEP DETAIL

CONCRETE SHAFT

W 3.5 SPIRAL @ 6" PITCH

EVEN MULTIPLES OF 6"

#4 @ 1' - 0"

2' - 0"

9" CMU

TRAFFIC SIDE

#5 (TYP.)

#5 (TYP.)

10" CMU

TRAFFIC SIDE

TRAFFIC SIDE

EXPANSION JOINT AT WIDTH STEP

SEE DETAIL B

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

#5 (TYP.)

BOND BEAM DETAIL

BOND BEAM UNITS

#5 @ 4' - 0"

MAX. (TYP.)

BOND BEAM GROUTING LIMIT

BACKER ROD

POLYURETHANE SEALANT

1/2" JOINT

DETAIL B

TYPICAL BOTH SIDES OF WALL

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

#5 (TYP.)

BOND BEAM GROUTING LIMIT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

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

1. See "Masonry Wall Finishes and Details" sheet for masonry finishes, special shapes, sizes and layouts.
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7. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
8. The Contract specifies actual foundation requirements D1 or D2.
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
BENDING DIAGRAM

BAR "A"

#4 BAR

4 1/2"

VARIES

BAR "F"

VARIES

BAR "D"

2 - 0" 12"

4 - 0"

#4 BAR

BAR "E"

CONCRETE SLAB

GROUND LINE

WALL

CONCRETE SLAB DETAIL

DOOR DETAIL

(SEE NOTE 2)

CONCRETE SLAB NOT SHOWN

EXPANSION JOINT

2' - 6"

4' - 6"

48" DOOR OPENING

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

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

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

#6 x 10' - 0" (TYP.)

3" (TYP.)

4 1/2" (TYP.)

BAR "A" (7 BARS PER SIDE)

BAR "E"

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL ACCESS DOOR TYPE 4

STANDARD PLAN D-2.86-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterseso 11-10-05

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

1. All rebar shall have a minimum 1 1/2" cover.
3. 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.
16-GAGE STEEL DOOR FRAME

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

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

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

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

1/2" DOORSTOP

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

ANCHOR BOLT HOLES = 1/2" DAM.

1/2" TIE BAR

GROUND LINE

1/2" DOORSTOP

WELD FRAME TOGETHER INSIDE OF CHANNEL.
GRIND SMOOTH EXTERIOR SURFACES BEFORE PAINTING IF NEEDED.

GROUND LINE

ACCESS DOOR AND FRAME FOR PRECAST WALLS ONLY

1/2" TIE BAR

1/2" DOORSTOP

NOISE BARRIER WALL
ACCESS DOOR & FRAME

STANDARD PLAN D-2.92-00

PRECAST WALLS ONLY

ISOMETRIC VIEW

COUNTERSINK DETAIL

SEE COUNTERSINK DETAIL

ALTERNATE ACCESS DOOR AND FRAME FOR PRECAST WALLS ONLY

1/2" TIE BAR

1/2" DOORSTOP

1/2" TIE BAR

1/2" DOORSTOP

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Harold J. Peterfeso
11-10-05
STATE DESIGN ENGINEER

DRAWN BY: JUAN C. CUPIDO

Sheet 2 of 2 sheets

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EXPRES: AUGUST 23, 2006
NOTES

1. For the values of "L," see sheet 3, and for the values of "Sv" see sheet 2.
2. For Geosynthetic Wall Construction Sequence, see sheet 4.
3. "Ags" is the peak seismic ground acceleration as defined and applied in the AASHTO LRFD Bridge Design Specifications, Articles 3.10, 4.1 and 11.6.5.
4. The long-term geosynthetic design strength "Tal" shall be determined in accordance with WSDOT Standard Practice 1925. See Qualified Products List (QPL), Appendix "D," for products in which "Tal" has been determined. "H" and "Z" are graphically defined. "Z" is the distance from the top of the wall to a geosynthetic layer, and is used to determine "Tal" for that layer.
5. "L," the geosynthetic reinforcement length behind the wall face, is graphically defined. The maximum factored bearing stress acts in the vertical direction at the base of the wall. The load factors used are as specified in the AASHTO LRFD Bridge Design Specifications for each specified limit state.
6. Fascia or facing type shall be selected from Standard Plans D-3.10 or D-3.11 and called out in the Contract Plans. Region is to coordinate with the Geotechnical Services and Bridge & Structures offices.
# Wall Geometry and Reinforcement Design

## Effective: August 5, 2013 to August 3, 2014

### Long-Term Geosynthetic Reinforcement Strength Required, $T_d$ (lbs/ft)*

<table>
<thead>
<tr>
<th>Layer Location</th>
<th>Geosynthetic Wall Type 1</th>
<th>Geosynthetic Wall Types 2 and 4</th>
<th>Geosynthetic Wall Type 5</th>
<th>Geosynthetic Wall Type 6</th>
<th>Geosynthetic Wall Types 6 and 8</th>
<th>Geosynthetic Wall Type 7</th>
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<tr>
<td><strong>TOTAL WALL HEIGHT, $H$ (ft)</strong></td>
<td><strong>DEPTH BELOW WALL TOP AT FACE, $Z$ (ft)</strong></td>
<td><strong>GEOSYNTHETIC WALL HEIGHT, $L$ (ft)</strong></td>
<td><strong>GEOSYNTHETIC WALL VERTICAL SPACING, $S_v$ (ft)</strong></td>
<td><strong>TOTAL WALL DEPTH BELOW GEOSYNTHETIC WALL</strong></td>
<td><strong>PERMANENT GEOSYNTHETIC WALL</strong></td>
<td><strong>GEOSYNTHETIC WALL</strong></td>
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<tr>
<td><strong>UP TO 10</strong></td>
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**NOTE:** See Note 4, sheet 1.
### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

#### (Includes seismic design for large earthquake: \( A_g \leq 0.30g \))

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<tr>
<th>WALL TYPE 1</th>
<th>SERVICE 1</th>
<th>STRENGTH 1</th>
<th>EXTREME EVENT I</th>
<th>EXTREME EVENT II</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
<th>SERVICE 1</th>
<th>STRENGTH 1</th>
<th>EXTREME EVENT I</th>
<th>EXTREME EVENT II</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
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### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

#### (Includes seismic design for large earthquake: \( A_g \leq 0.30g \))

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<th>SERVICE 1</th>
<th>STRENGTH 1</th>
<th>EXTREME EVENT I</th>
<th>EXTREME EVENT II</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
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</thead>
<tbody>
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### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

#### (Includes seismic design for large earthquake: \( A_g \leq 0.30g \))

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<th>WALL TYPE 7</th>
<th>SERVICE 1</th>
<th>STRENGTH 1</th>
<th>EXTREME EVENT I</th>
<th>EXTREME EVENT II</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
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### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

#### (Includes seismic design for large earthquake: \( A_g \leq 0.30g \))

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### PERMANENT GEOSYNTHETIC WALL STANDARD PLAN D-3-09-00

#### SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakốtich III 05/17/12

 Washitngton State Department of Transportation
1. Set form on completed lift.

2. 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.

3. Place the backfill until the backfill is up to half of the required vertical geosynthetic layer spacing.

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

5. Place the geosynthetic "tail" over the windrow and lock into place with backfill.

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

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

Notes:

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.
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

KEY NOTES

1. **W** ROWS OF **#4** Dowel Reinforcement Place between Geosynthetic Layers at 5'-0" O.C. HORIZONTAL SPACING. SEE TABLE. VERTICAL SPACING BETWEEN ROWS TO BE EQUAL, AS MULTIPLES OF **1/2" ALLOW. ROWS MAY BE STAGGERED. SEE STD. PLAN D-3.08 FOR **W**.

2. **increase the cover as required to accommodate architectural features and finish.**

3. **Construction Joint with roughened surface.**

4. **3" I.D. PVC pipe for weep hole in wall facing – Place between Geosynthetic Layers approx. 3" deep at 12" O.C. horizontal spacing. Length to extend to outer surface of specified wall. Weep holes shall be kept clear of concrete. See STANDARD PLAN D-3.09, for details not shown.**

5. **vertical construction joints in fascia at 24" O.C. WITH 1/2" PREMOLDED JOINT FILLER (SEE STANDARD PLAN D-10.45, "SPLIT ELEVATION").**

6. **vertical construction joints in footing at 120" O.C. MAX. (SEE STANDARD PLAN D-18.46, "ELEVATION"). If the footing is stepped, provide 2'-0" non-contact lap splices for the **#4** bars at each step.**

7. **Coordinate wall finish and configuration with State Bridge and Structures Architect PER WSDOT DESIGN MANUAL 730.04(5).**

8. **THE **#4** bars and interior **#2** bars shall be used only if the face is vertical.**

9. **WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT 4" x 4", NO 8 OR 6" x 6", V.A.D. - COMPLY WITH AASHTO M55**

10. **EXCESS SHOTCRETE - REQUIRED TO COMPENSATE FOR FACE BUILDING AND VARIATIONS WITHIN FACING TOLERANCE.**

NOTES

1. **All bars shown on this plan shall be ASTM A706 unless otherwise specified in the Contract.**

2. Safety cable or fence required when "H" ≥ 10'-0".

3. **All cast-in-place concrete shall be class 4000.**

CAST-IN-PLACE PERMANENT GEOSYNTHETIC RETAINING WALL FASCIA AND FACING

STANDARD PLAN D-3.10-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III
5/29/13

STATE DESIGN ENGINEER

Washington State Department of Transportation

TYPICAL SECTION
PERMANENT GEOSYNTHETIC RETAINING WALL WITH CAST-IN-PLACE CONCRETE FASCIA
NOTE

1. Ensure that no concrete enters the PVC conduit during concrete placement.
NOTES
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.

CONDITION A OR CONDITION B WITH GEOTEXTILE

CONDITION A

CONDITION B

ALTERNATE DETAIL, TYPICAL FOR CONSTRUCTION WITH SHORING.
NOTES

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

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

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

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

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

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

1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 2SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 2SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/LF.
5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.
NOTES

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

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

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

4. When Wall Type 3SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/LF.

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

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

VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 3SW

STANDARD PLAN D-10.200-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakotich III 07-08-08
STATE DESIGN ENGINEER
Washington State Department of Transportation

KEY DETAIL
REQUIRED ON WALLS WHERE H ≥ 13'
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

FOOTING REINFORCEMENT
DIMENSIONS

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4'- 9"
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17'- 9"
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18'- 6"
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19'- 6"
20'- 3"
21'- 6"
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VE: AUGUST 5,2013 TO August3,2014

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19'- 3 1/2"
18'- 0 1/2" 1'- 8" #10
9"
20'- 10"
19'- 5"
1'- 10" #11
8"
20' -7"
19'- 2 1/2" 1'- 10" #11
7"
20'- 0"
18'- 7 1/2" 1'- 10" #11
7"
21'- 4"
19'-111/2" 1'- 10" #11
6"
20'- 2 1/2"
18'- 10"
1'- 10" #11

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BAR

LENGTH

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1'- 0"
1'- 2"
1'- 0"
1'- 0"
1'- 0"
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9"
8"
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9"
8"
7"
7"
6"

7'- 5"
9'- 0"
9'- 3"
10'- 8"
10'- 11"
10'- 11"
11'- 2"
11'- 2"
11'- 5"
11'- 8"
13'- 5 1/2"
13'- 7"
13'- 9 1/2"
14'- 1"
14'- 3"

6'- 2"
7' - 6 1/2"
7' - 9 1/2"
9'- 0 1/2"
9'- 3 1/2"
9'- 3 1/2"
9'- 6 1/2"
9'- 6 1/2"
9'- 9 1/2"
10'- 0 1/2"
11'- 8"
11'- 10"
12'- 0"
12'- 4"
12'- 5 1/2"

1'- 3"
1'- 6"
1'- 6"
1'- 8"
1'- 8"
1'- 8"
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1'- 8"
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SIZE SPA.

1'- 6"
1'- 6"
1'- 6"
1'- 6"
1'- 6"
1'- 6"
1'- 6"
9"
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7"

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RADIUS
(SEE TABLE)

Q)

MATERIAL
QUANTITY

@#4

MAXIMUM SOIL PRESSURE (PSF)
SERVICE STRENGTH

EXTREME
EVENT 1

LENGTH

LENGTH

CONC.
CY/LF

STEEL
LBS/LF

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

0.31
0.35
0.41
0.47
0.55
0.64
0.76
0.89
1.05
1.22
1.34
1.54
1.79
1.94
2.18
2.47

20.6
21.7
24.2
26.8
29.5
36.2
44.3
59.3
67.8
73.2
86.6
104.3
122.9
139.7
158.7
181.2

707
827
920
1020
1129
1238
1419
1493
1594
1672
1777
1869
2007
2186
2336
2561

928
1084
1198
1328
1525
1678
1923
1970
2088
2199
2347
2554
2756
3007
3225
3537

1019
1296
1557
2018
2647
2868
3126
2650
3050
3539
3783
4266
4560
5040
5583
6137

1'- 0"
1'- 2"
1'- 0"
1'- 0"
1'- 0"
10"
10"
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9"
8"
7"
7"
6"

18'- 8"
19'- 5"
20'- 2"
21'- 2"
21'- 11"
22'- 11"
23'- 8"
24'- 8 1/2"
25'- 5 1/2"
26'- 2 1/2"
26' -111/2"
27' - 11 1/2"
28'- 10 1/2"
29'- 8 1/2"
30'- 8 1/2"

18'- 7"
19'- 4"
20'- 1"
21'- 1"
21'- 10"
22'- 10"
23' -7"
24' -7"
25'- 4"
26'- 1"
26'- 10"
27'- 10"
28'- 9"
29' -7"
30' -7"

2.69
2.97
3.29
3.52
3.84
4.06
4.49
4.75
5.16
5.55
5.99
6.22
6.57
7.09
7.49

192.8
246.3
261.3
322.1
324.2
378.8
406.8
433.8
442.5
459.3
533.5
661.9
746.0
849.0
968.6

2583
2733
2881
2984
3136
3241
3382
3485
3633
3785
3934
4044
4162
4285
4381

3556
3774
3986
4122
4344
4489
4679
4816
5026
5249
5462
5620
5783
5941
6058

5870
6394
6813
6926
7476
7715
7870
7995
8403
8947
9370
9757
10009
10005
9904

SIZE SPA.

VERTICAL FACE WALL DESIGN
WITH 2:1 BACKSLOPE

f.1
lJ

----

~b~

BAR@

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LENGTH

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#4
#4

@ 1' - 6" CENTERS

en

BAR@

BAR®

STEM REINFORCEMENT

BAR

RADIUS

#4

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

#5
#6
#7
#8
#9
#10
#11

BAR

MIN. SPLICE

#4

2'- 0"
2'- 0"
2'- 0"
2'- 6"
3'- 3"
4'- 2"
5'- 3"

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

REINFORCED CONCRETE
RETAINING WALL
TYPE 3 AND 3SW
STANDARD PLAN D-10.20-00
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION

Pasco Bakotich Ill

BARS@ AND@

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

.....

fll
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

STATE DESIGN ENGINEER

07-08-08
DATE

Washington State Department of Transportation

EFFECTI
VE: AUGUST 5,2013 TO August3,2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014


# Vertical Face Wall Design

**Retaining Wall Standard Plan D-10.25-00**

**Type 4 and 4SW**

**Effective:** August 5, 2013 to August 3, 2014

---

### Footing Reinforcement

<table>
<thead>
<tr>
<th>Bar</th>
<th>Size</th>
<th>Quantity</th>
<th>Service Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>#10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Stem Reinforcement

<table>
<thead>
<tr>
<th>Bar</th>
<th>Size</th>
<th>Quantity</th>
<th>Service Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#10</td>
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</tbody>
</table>

---

**NOTES:**
- The plans may not be used without permission of the Engineer.
- The engineer's approval is required for all changes or modifications.
- The plans are subject to revision by the Engineer.

---

**Design by:**
- D. B. Bakowski
- M. L. K. D. N. W. C.

---

**Checked by:**
- Washington State Department of Transportation

---

**Drawn by:**
- Bill B. B. N. W. C.
SPECIAL WALL TREATMENT
WHEN SPECIFIED
IN CONTRACT

SEE CEMENT CONC.
GUTTER DETAIL

@ #4 @ 1'-6"
CENTERS (MAX) BOTH FACES

CONSTRUCTION JOINT WITH
ROUGHENED SURFACE

OFFSET = SET TOP OF WALL BACK:
H > 20' OFFSET = 1/2"
H > 25' OFFSET (inches) = H / 8 - 2

NOTE: All concrete shall be Class 4000, except as noted.

For backfill requirements, see Standard Plan D-4.

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

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

KEY DETAIL
REQUIRED ON WALLS WHERE H > 26'

VERTICAL FACE WALL DESIGN
WITH 2:1 BACKSLOPE

REINFORCED CONCRETE
RETAINING WALL TYPE 5
STANDARD PLAN D-10.30-00
SHEET 1 OF 2 SHEETS
APPROVED FOR PUBLICATION
Pasco Bakotich III 07-08-08
State Design Engineer
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

FOOTING REINFORCEMENT
DIMENSIONS

WALL
HT
H

5'
6'
7'
8'
9'
10'
11'
12'
13'
14'
15'
16'
17'
18'
19'
20'

4'- 3"
4'- 3"
4'- 3"
4'- 3"
4'- 3"
4'- 9"
5'- 6"
6'- 3"
6'- 6"
7'- 3"
7'- 9"
8'- 3"
8'- 9"
9'- 6"
10'- 0"
10'- 6"

~
1'- 6"
1'- 6"
1'- 6"
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1'- 6"
1'- 6"
1'- 6"
1'- 9"
1'- 9"
2'- 0"
2'- 3"
2'- 3"
2'- 3"
2'- 6"
3'- 0"

21'
22'
23'
24'
25'
26'
27'
28'
29'
30'
31'
32'
33'
34'
35'

11'- 6"
12'- 3"
12'- 9"
13'- 6"
14'- 3"
14'- 6"
14'- 9"
15'- 3"
16'- 0"
17'- 0"
17'- 6"
18'- 3"
19"- 0"
20'- 0"
20'- 6"

3'3'3'4'4'4'4'5'5'6'6'6'7'7'7'-

EFFECTI
VE: AUGUST 5,2013 TO August3,2014

B

6"
9"
9"
0"
6"
6"
9"
0"
6"
0"
3"
6"
0"
3"
6"

BAR@#4

h

D

hk

A

1'- 0"
1'- 0"
1'- 0"
1'- 0"
1'- 0"
1'- 0"
1'- 0"
1'- 0"
1'- 0"
1'- 0"
1'- 3"
1'- 3"
1'- 6"
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1'- 9"
2'- 0"

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1' - 1 1/2"
1'- 3"
1'- 4"
1'- 5"
1'-61/2"
1' - 7 1/2"
1'- 9"
1'- 10"
1' - 11"
2'- 0 1/2"
2' - 1 1/2"
2'- 2 1/2"
2'- 3 1/2"
2'- 4 1/2"
2'- 5 1/2"
2'- 6 1/2"

3'- 3
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3'- 9
3'- 9
4'- 0
4'- 3

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3'- 9"

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

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2'- 7 1/2"
2'- 9"
2'- 10"
2'- 11"
3'- 0"
3'- 1"
3'- 2"
3'- 3"
3'- 4"
3'- 5"
3'- 6"
3' -7"
3'- 7 1/2"
3'- 9"
3'- 10"

4'- 3
4'- 3
4'- 6
4'- 6
4'- 9
5'- 0
5'- 0
5'- 3
5'- 6
5'- 6
5'- 9
6'- 0
6'- 3
6'- 3
6'- 6

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2'2'2'2'2'2'2'2'2'2'-

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LENGTH

BAR@

BAR®
SIZE SPA.

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LENGTH

SIZE SPA.

LENGTH

BAR@
SIZE SPA.

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8'- 6"
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9'- 9"
10'- 3"

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11'- 3"
12'- 0"
12'- 6"
13'- 3"
14'- 0"
14'- 3"
14'- 6"
15'- 0"
15'- 9"
16'- 9"
17' - 3"
18'- 0"
18'- 9"
19'- 9"
20'- 3"

#4
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14'- 6"
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18'- 9"
19'- 9"
20'- 3"

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1'- 4"
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STEM REINFORCEMENT

#4
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BAR@

LENGTH

h

b

5'- 2"
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9'- 2"
10'- 2"
11'- 2"
12'- 2"
13'- 2 1/2"
14' - 2 1/2"
15'- 3 1/2"
16'- 3 1/2"
17'- 3 1/2"
18'- 5"
19'- 5 1/2"
20'- 5 1/2"

4' -7"
5' -7"
6' -7"
7'- 7"
8'- 7 1/2"
9'- 7 1/2"
10'- 7 1/2"
11' -7 1/2"
12'- 7 1/2"
13'- 7 1/2"
14'- 8"
15'- 8"
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19'- 8"

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14'- 4"
15'- 7 1/2"
16'- 1"
15'- 3 1/2"
16'- 8"
18'- 0 1/2"
18'- 2 1/2"
18'- 1"
17'- 6 1/2"
16'- 9 1/2"
18'- 9"
17'- 7"
19'- 1"
18'- 11"
20'- 5"

13'- 5 1/2"
14'- 10"
15'- 3 1/2"
14'- 3"
15'- 7 1/2"
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17'- 2"
17'- 0 1/2"
16'- 6"
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RADIUS
(SEE TABLE)

BAR

LENGTH

h

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N/A
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5'- 2 1/2"
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5'- 5 1/2"
7'- 4 1/2"
7'- 7 1/2"
7' -10 1/2"
7' -10 1/2"
8'- 1 1/2"
8'- 4 1/2"
9'- 8"
11'- 4"
11'- 7"
11'- 10"
11'- 10"
12'- 1"

4'- 4 1/2"
4'- 4 1/2"
4'- 7 1/2"
6'- 3 1/2"
6'- 6 1/2"
6'- 9 1/2"
6'- 9 1/2"
7' - 0 1/2"
7' - 3 1/2"
8'- 5"
9' -10 1/2"
10'- 1 1/2"
10'- 4 1/2"
10'- 4 1/2"
10'- 7 1/2"

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

#6
#6
#6
#8
#8
#8
#8
#8
#8
#9
#10
#10
#10
#10
#10

SIZE SPA.

Q)

MATERIAL MAXIMUM SOIL PRESSURE (PSF)
QUANTITY

@#4

SERVICE STRENGTH

EXTREME
EVENT I

LENGTH

LENGTH

CONC.
CY/LF

STEEL
LBS/LF

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

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

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

0.30
0.34
0.39
0.44
0.50
0.58
0.67
0.76
0.84
0.94
1.09
1.19
1.36
1.49
1.68
1.88

19.3
21.7
22.8
25.3
27.7
32.0
37.6
43.9
49.6
61.9
69.5
79.2
89.0
108.6
122.5
128.5

706
825
930
1018
1211
1421
1623
1826
1963
2169
2306
2423
2677
2883
3021
3048

928
1084
1218
1362
1649
1946
2225
2508
2715
3001
3198
3369
3729
4015
4213
4256

831
982
1169
1401
1696
2000
2283
2570
2769
3060
3247
3405
3777
4068
4256
4268

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

18'- 11"
19'- 11"
20'- 8"
21'- 8"
22'- 5"
23'- 2"
24'- 2"
24'- 11 1/2"
25'- 8 1/2"
26'- 8 1/2"
27'- 5 1/2"
28'- 2 1/2"
28'- 11 1/2"
29'- 11 1/2"
30'- 8 1/2"

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

2.05
2.20
2.44
2.61
2.88
3.35
3.49
3.77
4.09
4.34
4.66
5.02
5.40
5.69
6.05

116.0
128.0
141.1
185.1
197.5
205.6
227.9
251.8
288.7
361.2
396.1
450.1
475.6
538.0
558.4

3015
3114
3355
3454
3481
3818
3955
4097
4117
4102
4245
4372
4411
4499
4640

4199
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4816
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5538
5739
5761
5729
5931
6103
6151
6267
6468

4180
4307
4655
4780
4792
5279
5474
5667
5667
5614
5808
5974
6006
6117
6310

SIZE SPA.

VERTICAL FACE WALL DESIGN
WITH 2:1 BACKSLOPE

f.1
lJ

----

~b~

BAR@
@ 1' - 6" CENTERS

BAR

RADIUS

#4

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

en

#5

0::

#6
#7
#8
#9
#10
#11

zw

w

CD

....1
....1

1ii

~

~

BAR
#4

#5

#6
#7
#8
#9
#10

MIN. SPLICE

2'2'2'2'3'4'5'-

0"
0"
0"
6"
3"
2"
3"

REINFORCED CONCRETE
RETAINING WALL
TYPES
STANDARD PLAN D-10.30-00
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION

Pasco Bakotich Ill

Cl

BARS@ AND@

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

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fll

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

STATE DESIGN ENGINEER

07-08-08
DATE

Washington State Department of Transportation

EFFECTI
VE: AUGUST 5,2013 TO August3,2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014


NOTES

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

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

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

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

EXPANSION JOINT - 48' CENTERS, W/1/2" PREMOLDED JOINT FILLER

SLOPING FACE WALL DESIGN
WITH 2:1 BACKSLOPE

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

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
VERTICAL FACE WALL DESIGN
WITH A 250 PSF SURCHARGE
OR TRAFFIC BARRIER

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

TYPICAL SECTION

OFFSET - SET TOP OF WALL BACK
H = 20' OFFSET = 1/2'
H = 20' OFFSET (inches) = H(20) = 2

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6" MIN. FROM THE TOP OF THE WALL

SPLIT ELEVATION VIEW
(SHOWING SEPARATE REBAR LAYERS)

REINFORCED CONCRETE
RETAINING WALL
TYPE 7
STANDARD PLAN D-10.40-01

APPROVED FOR PUBLICATION
Pasco Bakotich III 12-02-08

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
STATE DESIGN ENGINEER
WASHINGTON STATE HIGHWAY DESIGN DISTRICT
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
### Vertical Face Wall Design with a 250 PSF Surfacing on Traffic Barrier

#### Reinforcement Notes

1. If traffic barrier is used, add 0.100 CY of concrete class 4000 for barrier alternate 1.

2. Add 28 lbs/ft of reinforcing steel for barrier alternate 1 or 19 lbs/ft of reinforcing steel for barrier alternate 2. See standard plan D-16.10.

#### VERTICALLY FACING WALL DESIGN WITH A 250 PSF SURFACING OR TRAFFIC BARRIER

- **Date**: EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

#### Reinforcement Design

<table>
<thead>
<tr>
<th>BAR</th>
<th>D R A M M E T E R</th>
<th>I N C R E A S E</th>
<th>EXT. E</th>
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#### Reinforced Concrete Retaining Wall Type 7

**STANDARD PLAN D-10.40.01**

**Sheet 2 of 2 Sheets**

APPROVED FOR PUBLICATION

Pasco Bakotich III

City Design Engineer

Washington State Department of Transportation

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
All concrete shall be Class 4000, except as noted.

For backfill requirements, see Standard Plan D-4.

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

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

If Traffic Barriers are required, see Standard Plans D-15.10, D-15.20 and D-15.30.

1. 250 PSF EQUIVALENT LIVE LOAD SURCHARGE WHEN SPECIFIED IN CONTRACT

2. CEMENT CONCRETE GUTTER (CL 3000, 4" THICK)

3. CONSTRUCTION JOINTS IN FOOTING AT 120' CENTERS MAX.

4. EXPANSION JOINT - 48' CENTERS, W/ 1/2' PREMOLDED JOINT FILLER

5. DRAIN 3" DIAM. DRAINS AT ABOUT 12' CENTERS AND 6" ABOVE FINAL GROUND LINE AT FRONT FACE OF WALL

6. CONSTRUCTION JOINT WITH ROUGHENED SURFACE

7. CONSTRUCTION JOINTS IN FOOTING AT 120' CENTERS MAX.

8. SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

9. SPLIT VIEW LINE

10. 48' WALL SECTION (BETWEEN JOINTS)

11. 48' WALL SECTION (BETWEEN JOINTS)

12. 3' CLR. EACH SIDE OF JOINT

13. 1 1/2' CLR. MIN.

14. 1 1/2' CLR.

15. 3' CLR.

16. 1 1/2' CLR.

17. 1 1/2' CLR.

18. 24' MIN. VERTICAL CURVE AT ALL ANGLE OR (BREAK) POINTS IN TOP OF WALL PROFILE

19. OFFSET - SET TOP OF WALL BACK
   H ≥ 27' OFFSET = 10''
   H ≥ 27' OFFSET (inches) = H/2 - 2

20. WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6' MIN. FROM THE TOP OF THE WALL


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

23. 24' MIN. VERTICAL CURVE AT ALL ANGLES OR BREAK POINTS IN TOP OF WALL PROFILE
## REINFORCEMENT NOTES

1. If trafficking barrier is used, add 0.110 CF of concrete class 400 for barrier alternate 1. Add 0.152 CF of concrete class 400 for barrier alternate 2. See standard plan D-10-45-01 for barrier alternate 2. See standard plan D-10-45-01 for barrier alternate 1.

## MATERIAL QUANTITY

<table>
<thead>
<tr>
<th>Bar Size</th>
<th>Iso</th>
<th>Grade</th>
<th>Minimum</th>
<th>Design</th>
<th>Minimum</th>
<th>Design</th>
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**SLOPING FACE WALL DESIGN**

**ERECTION FRAME**

**CONCRETE STEEL**

- Effective: August 5, 2013 to August 3, 2014

---

**STYLE AND FINISH**

- Type 8

---

**REINFORCED CONCRETE**

- Standard plan D-10-45-01

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**NOTE:**

- This is not an official engineering document. It is for information purposes only. The original, official version of the document is kept at the Washington State Department of Transportation. A copy may be obtained upon request.
DUMMY JOINT – SEE DETAIL; DUMMY JOINT TO BE OMITTED ON BACK FACE OF BARRIER

TOP OF ROADWAY

PLAN

SECTION A

ELEVATION

CONSTRUCTION JOINT – LEVEL TRANSVERSE WITH ROUGHENED SURFACE

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

BEAM GUARDRAIL TRANSITION TYPE 20 CONNECTION

BEAM GUARDRAIL TRANSITION TYPE 21 CONNECTION

F-SHAPE TRAFFIC BARRIER ON RETAINING WALL

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS

STANDARD PLAN D-15.10-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 12-02-08

STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
REINFORCING STEEL BENDING DIAGRAM

NOTE
SEE ELEVATION FOR LAP SPICE REQUIREMENTS

CONSTRUCTION JOINT = LEVEL TRANSVERSE WITH ROUGHENED SURFACE

1 1/2" x 1/4"
R = 1/4"
1/4" TO 1/2" DEEP IRREGULAR FRACTURE

PLAN VIEW
FRACTURED FIN FINISH DETAIL

DUMMY JOINT DETAIL

ALL DIMENSIONS ARE OUT TO OUT
SEE STD. SPEC. FOR BENDING DIAMETERS
CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

NOTE
SEE ELEVATION FOR LAP SPlice REQUIREMENTS

USED WITH A SLOPED FRONT FACE OF A RETAINING WALL

USED WITH A VERTICAL FRONT FACE OF A RETAINING WALL

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

1 1/2" ± 1/4" R = 1/4"
1" ± 1/4" 1/4" TO 1/2" DEEP IRREGULAR FRACTURE

PLAN VIEW
FRACTURED FIN FINISH DETAIL

DUMMY JOINT DETAIL

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

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.20-02
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION
Pasco Bakotich III 06-02-11
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTE
FOR GUARDRAIL DETAILS NOT SHOWN - SEE BEAM GUARDRAIL TRANSITION TYPE 21 CONNECTION, STANDARD PLAN C-25.22

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

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

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

REINFORCING STEEL BENDING DIAGRAM

CONSTRUCTION JOINT = LEVEL TRANSVERSE WITH ROUGHENED SURFACE

ALL DIMENSIONS ARE OUT TO OUT
SEE STD. SPEC. FOR BENDING DIAMETERS
NOTES
1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.
2. Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is 3/4".
3. Traffic Barrier Connections between the bridge and the approaching roadway vary and may consist of concrete barrier extensions. Install the Date Numerals on the traffic barrier of the bridge itself.

Date Numerals Placement on Bridge Traffic Barrier
Standard Plan E-1

Ken L. Smith
02-21-07
State Design Engineer
Washington State Department of Transportation

Effective: August 5, 2013 to August 3, 2014
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 pilings shall be untreated Douglas Fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, ungalvanized.
6. Each deck plate shall be nailed to each stringer with two 1" spikes, number 1 or larger.
7. In 17' spans, stringers shall be 5x15 51E. In 15' spans, stringers shall be 4x15 51E.
8. Overlay thickness must be sufficient to cover bolts.
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 cut-off 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 E4.

8. Piles stored on the ground should be bunched on level dunnage at no more than 20' on center, with a maximum overhang of 10'.
FACE OF CURB
MATCH ROADWAY SLOPE
ROADWAY

VARIATES 12" TO 24"

1/2" R.

11 1/2"

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

MATCH ROADWAY SLOPE
ROADWAY

VARIATES 10" TO 22"
(SEE CONTRACT)

1/2" R.

11 1/2"

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

MATCH ROADWAY SLOPE
ROADWAY

VARIATES FROM 6" TO 0°,
MAINTAIN 1:6 SLOPE ON SIDE OF CURB

1/2" R.

11 1/2"

DEPRESSED CURB SECTION AT CURB RAMPS AND DRIVEWAY ENTRANCES

1/2"

3/8" PREMOLDED JOINT FILLER

CEMENT CONCRETE PEDESTRIAN CURB

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

FACE OF CURB

VARIATES 12" TO 24"

1/2" R.

11 1/2"

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

FACE OF CURB

VARIATES 10" TO 22"

1/2" R.

11 1/2"

CEMENT CONCRETE TRAFFIC CURB

FACE OF CURB

VARIATES 12" TO 24"

1/2" R.

11 1/2"

MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

NOTE


CEMENT CONCRETE CURBS

STANDARD PLAN F-10.12-02

PASCO BAKOTICH III 06-16-11

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
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.
SIDEWALK BUFFER STRIP CURB OUTSIDE CURB LANE CURB LANE SPLITTER ISLAND CURB LANE CURB BUFFER STRIP CURB 0 OUTSIDE CURB 0 LANE 5'-0" MIN. 03'-0" MIN. 2 TRUCK APRON 1 SIDEWALK BUFFER STRIP CURB CIRCULATING ROADWAY CURB Truck APRON CURB PLACEMENT SECTION A CURB PLACEMENT SECTION B (ROUNDABOUT CONFIGURATION WILL VARY DEPENDING ON CONTRACT PLANS) NOTE:

LEGEND

\[ \text{WIDTH VARIES} - \text{SEE CONTRACT PLANS} \]

ROUNDABOUT CEMENT CONCRETE CURBS STANDARD PLAN F-10.18-00 SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION Pasco Bakotic 06-27-11 STATE DESIGN ENGINEER Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

CURB 1
ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER

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

CURB 3
ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB

CURB RAMP (TYP.) SIDEWALK (TYP.) CURB 2 - OUTSIDE OR RIGHT SIDE

CURB 3 - CENTRAL ISLAND SPLITTER ISLAND CURB 3 - OUTSIDE TRUCK APRON CURB 3 - SPLITTER ISLAND

MATCH ROADWAY SLOPE R 1/2'' R (TYP.)

SPLITTER ISLAND CURB RAMP (TYP.) TOP OF TRUCK APRON SPLITTER ISLAND CURB 3 - OUTSIDE TRUCK APRON CURB 3 - SPLITTER ISLAND

OPTIONAL CONSTRUCTION JOINT
**NOTES**

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

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

3. See Contract for exception to distances shown.

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

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

6. For extruded curb placement at Beam Guardrail Type 3, see Standard Plan C-20.10.

7. For extruded curb details, see Standard Plan F-10.42.

---

**EXTRUDED CURB WITH SLOPE Rounding**

**EXTRUDED CURB WITHOUT SLOPE Rounding**

**EXTRUDED CURB AT CUT SLOPE**

**EXTRUDED CURB AT BEAM GUARDRAIL TYPE 1**
NOTE
Joints may be formed during installation using a rigid divider or sawcut after concrete cures to minimum strength.

EXTRUDED CURB
STANDARD PLAN F-10.42-00

SPACING OF ANCHOR BARS
(For Types 4, 5, and 6)
#3 REBAR – REQUIRED ONLY IN TANGENT BLOCK, WHEN LENGTH EXCEEDS 30" (1 1/2" CLR. BOTH ENDS)

TOP VIEW
INSIDE CORNER BLOCK

TOP VIEW
OUTSIDE CORNER BLOCK

TYPICAL OF ALL
END VIEW

30" RADIUS BLOCK

18" RADIUS BLOCK

INSIDE CORNER BLOCK

OUTSIDE CORNER BLOCK

30" RADIUS BLOCK

ISOMETRIC VIEWS

PRECAST CONCRETE
SLOPED MOUNTABLE CURB
STANDARD PLAN F-10.62-01

APPROVED FOR PUBLICATION
Pasco Bakotich III 09-05-07
Washington State Department of Transportation

STATE DESIGN ENGINEER
DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Sheet 1 of 2 Sheets

EXPRESS JUNE 18, 2008

PRECAST CONCRETE
SLOPED MOUNTABLE CURB
STANDARD PLAN F-10.62-01

APPROVED FOR PUBLICATION
Pasco Bakotich III 09-05-07
Washington State Department of Transportation

STATE DESIGN ENGINEER
DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Sheet 1 of 2 Sheets

EXPRESS JUNE 18, 2008
## CURB RADIUS TABLE

<table>
<thead>
<tr>
<th>CURB RADIUS</th>
<th>DIMENSION A</th>
<th>DIMENSION B</th>
<th>DIMENSION C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'</td>
<td>12'</td>
<td>2&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>4' TO 5'</td>
<td>12&quot;</td>
<td>1 1/2&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>12&quot;</td>
<td>1&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>12&quot;</td>
<td>7/8&quot;</td>
<td>10 1/4&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>16&quot;</td>
<td>1 1/8&quot;</td>
<td>15 3/4&quot;</td>
</tr>
<tr>
<td>9&quot;</td>
<td>16&quot;</td>
<td>1&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>16&quot;</td>
<td>7/8&quot;</td>
<td>16 1/4&quot;</td>
</tr>
<tr>
<td>11' TO 13'</td>
<td>16&quot;</td>
<td>3/4&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>14' TO 16'</td>
<td>16&quot;</td>
<td>5/8&quot;</td>
<td>16 3/4&quot;</td>
</tr>
<tr>
<td>16' TO 17'</td>
<td>24&quot;</td>
<td>3/4&quot;</td>
<td>22 1/2&quot;</td>
</tr>
<tr>
<td>18' TO 22'</td>
<td>24&quot;</td>
<td>5/8&quot;</td>
<td>22 3/4&quot;</td>
</tr>
<tr>
<td>23' TO 29'</td>
<td>24&quot;</td>
<td>1/2&quot;</td>
<td>23&quot;</td>
</tr>
<tr>
<td>30' TO 34'</td>
<td>30&quot;</td>
<td>1/2&quot;</td>
<td>29&quot;</td>
</tr>
<tr>
<td>35' TO 46'</td>
<td>30&quot;</td>
<td>3/8&quot;</td>
<td>29 1/4&quot;</td>
</tr>
<tr>
<td>46' TO 69'</td>
<td>30&quot;</td>
<td>1/4&quot;</td>
<td>29 1/2&quot;</td>
</tr>
<tr>
<td>OVER 60'</td>
<td>USE TANGENT BLOCK, SEE SHEET 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table lists the calculated dimensions for casting blocks suitable for constructing various curb radii. Curved blocks, or blocks with different dimensions, may be acceptable with prior approval of the engineer.
The dual faced curb may be constructed by using two precast concrete sloped mountable curbs (longitudinal halves) so long as the installation is consistent with the dimensions shown in the plan.
SEE RAISED EDGE DETAIL – THIS SHEET

BRIDGE OR PEDESTRIAN RAILING
BARRIER – SEE CONTRACT PLANS

VERTICAL WALL – SEE DETAIL

FOR SIDE TREATMENT
SEE OTHER SIDEWALK SECTIONS

SIDEWALK – 6’ – 0" MIN

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

FINISHED GRADE 1" BELOW TOP OF CONCRETE SURFACE FOR PLANTING – FLUSH IF PAVED

WITH RAISED EDGE

ADJACENT TO CURB
(STEEP FILL SLOPES)

SIDEWALK – 6’ – 0" MIN

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

3/8" PREMOLDED JOINT FILLER

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

NOTE

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

SIDEWALK ADJACENT TO CURB

SIDEWALK – 6’ – 0" MIN

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

3/8" PREMOLDED JOINT FILLER

ADJACENT TO CURB AND RAILING OR WALL

SIDEWALK – 6’ – 0" MIN

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

3/8" PREMOLDED JOINT FILLER

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

NOTE

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

CURB FACE DETAIL

EXTEND SIDEWALK TRANSVERSE EXPANSION JOINTS TO INCLUDE CURB (FULL DEPTH)

FINISHED GRADE 1" BELOW TOP OF CONCRETE SURFACE

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

PREMOLDED JOINT FILLER

SIDEWALK ADJACENT TO WALL DETAIL

SIDEWALK – 6’ – 0" MIN

CURB NOT INCLUDED IN BID ITEM – SEE STANDARD PLAN F-10.12

3/8" PREMOLDED JOINT FILLER

RAISED EDGE DETAIL

EXTEND SIDEWALK TRANSVERSE EXPANSION JOINTS TO INCLUDE RAISED EDGE

CURB (FULL DEPTH)
1. Provide a separate Curb Ramp for each marked or unmarked crosswalk. Curb Ramp location shall be placed within the width of the associated crosswalk, or as shown in the Contract Plans.

2. Where “GRADE BREAK” is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.

3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances in front of the Curb Ramp or on any part of the Curb Ramp or Landing.


6. The Bid Item “Cement Concrete Curb Ramp Type _” does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.

7. The Curb Ramp maximum running slope shall not require the ramp length to exceed 15 feet to avoid chasing the slope indefinitely when connecting to steep grades. When applying the 15-foot max. length, the running slope of the curb ramp shall be as flat as feasible.


9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will be no material to retain.

**Cement Concrete Pedestrian Curb - See Note 6**

**Detectable Warning Surface - See Standard Plan F-40.10**

**Cement Concrete Pedestrian Curb Ramp Type Parallel A’ Pay Limit - See Note 6**

**DEPRESSED CURB & GUTTER**

**DETECTABLE WARNING SURFACE**

**GRADE BREAK**

**COUNTER SLOPE**

**TOP OF ROADWAY**

**LANDING**

**SIDEWALK**

**PEDESTRIAN CURB - SEE NOTE 9**

**CROSSWALK**

**PLAN VIEW**

**TYPE PARALLEL A**

**SECTION A**

**PLAN VIEW**

**TYPE PARALLEL B**

**SECTION B**

**PLAN VIEW**

**TYPE PARALLEL C**

**SECTION C**

**LEGEND**

SLOPE IN EITHER DIRECTION
NOTES

1. Provide a separate Curb Ramp for each marked or unmarked crosswalk. Curb Ramp location shall be placed within the width of the associated crosswalk or as shown in the Contract Plans.

2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.

3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances in front of the Curb Ramp or on any part of the Curb Ramp or Landings.


6. The Bid Item "Cement Concrete Curb Ramp Type _ _ " does not include the adjacent Curb, Curb and Gutter, Depressed Curb, and Gutter, Pedestrian Curb, or Sidewalks.

7. The Curb Ramp maximum running slope shall not require the ramp length to exceed 15 feet to avoid chancing the slope indefinitely when connecting to steep grades. When applying the 15-foot max. length, the running slope of the Curb Ramp shall be as flat as feasible.

8. Curb Ramp, Landing and Flares shall receive broom finish. See Standard Specifications 8-14-

9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

LEGEND

- SLOPE IN EITHER DIRECTION

ISOMETRIC VIEW

TYPE COMBINATION

PAY LIMIT = SEE NOTE 6

Cement Concrete Curb and Gutter ~ See Notes 4 & 6

Cement Concrete Pedestrian Curb ~ See Note 9

Cement Concrete Pedestrian Curb and Gutter ~ See Note 9

Detectable Pedestrian Curb ~ See Note 9

Detectable Warning Surface ~ See Standard Plan F-46.10

Grade Break

Counter Slope 5.0% Max.

Top of Roadway

18' - 0" Max.

4' - 0" Min.

15' - 0" Min.

3' - 0" Min.

Buffer Strip (Typ.) ~ See Contract Plans

Buffer Strip (Typ.) ~ See Contract Plans

3/8" Expansion Joint (Typ.) ~ See Standard Plan F-30.10

3/8" Expansion Joint (Typ.) ~ See Standard Plan F-30.10

Curb Ramp

Landing

Cement Concrete Curb and Gutter ~ See Standard Plan F-10.12 and Note 6

Cement Concrete Curb and Gutter ~ See Notes 4 & 6

DETAIL D

CURB RADIUS DETAIL

PLAN VIEW

TYPE COMBINATION

WITH BUFFER

SECTION A

SECTION B

SECTION C

COMBINATION CURB RAMP

STANDARD PLAN F-40.14-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III

6/20/13

Washington State Department of Transportation

E F F E C T I V E :  AUGU S T 5 ,  2 0 1 3  T O  A ugu st 3 ,  2 0 1 4

DRAWN BY: USA OFFORD

E F F E C T I V E :  AUGU S T 5 ,  2 0 1 3  T O  A ugu st 3 ,  2 0 1 4
NOTES

1. Provide a separate Curb Ramp for each marked or unmarked crosswalk. Curb Ramp location shall be placed within the width of the associated crosswalk as shown in the Contract Plans.

2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.

3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances in front of the Curb Ramp or on any part of the Curb Ramp or Landing.


6. The Bid Item "Cement Concrete Curb Ramp Type ___" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalk.

7. The Curb Ramp maximum running slope shall not require the ramp length to exceed 15-feet to avoid chasing the slope indefinitely when connecting to steep grades. When applying the 15-foot maximum length, the running slope of the Curb Ramp shall be as flat as feasible.


LEGEND

SLOPE IN EITHER DIRECTION

PERPENDICULAR CURB RAMP

STANDARD PLAN F-40.15-02

PLAN VIEW

TYPE PERPENDICULAR A

PLAN VIEW

TYPE PERPENDICULAR B (SHOWN WITH BUFFER)

SECTION A

ISOMETRIC VIEW

TYPE PERPENDICULAR A PAY LIMIT

ISOMETRIC VIEW

TYPE PERPENDICULAR B PAY LIMIT
NOTE 1.
This plan is to be used where pedestrian crossing in one direction is not permitted.

NOTE 2.
Curb ramp location shall be placed within the width of the associated crosswalk, or as shown in the Contract Plans.

NOTE 3.
Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.

NOTE 4.
Do not place gratings, junction boxes, access covers or other appurtenances in front of the curb ramp or on any part of the curb ramp or landing.

NOTE 5.
See the Contract Documents for the curb design specified.

NOTE 6.
See Standard Plan F-30.10 for Cement Concrete Sidewalk Details.

NOTE 7.
The Curb Ramp Type shall be as shown.

NOTE 8.
The curb ramp maximum running slope shall not exceed 15 feet to avoid chasing the pedestrian between the two adjacent surface planes.

NOTE 9.
The bid item "Cement Concrete Curb Ramp Type "..." does not include the adjacent Curb or (Curb and Gutter), Depressed Curb or Pedestrian Curb or Sidewalk, or the pedestrian crosswalk closure sign.

NOTE 10.
The curb ramp and landing shall receive broom finish.

NOTE 11.
Pedestrian curbs may be omitted if the ground surface at the back of the curb ramp and/or landing will be at the same elevation as the curb ramp or landing and there will be no material to retain.

LEGEND
SLOPE IN EITHER DIRECTION
NOTES:

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


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

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

5. Where "GRADE BREAK" is called out, the entire length of the line between the two adjacent surface planes shall be flush.

6. The curb ramp maximum running slope shall not require the ramp length to exceed 15 feet to avoid chaging the slope indefinitely when connecting to steep grades. When applying the 15 foot max. length, the running slope of the curb ramp shall be as flat as feasible.

7. Pay item does not include driveway. See Contract Plans.
12.0’ MIN. – 30.0’ MAX.

SHOULDER NOT LESS THAN 6.0’

TYPICAL INSTALLATION
FOR SINGLE-FACED SIGNS

12.0’ MIN. – 18.0’ MAX.

SHOULDER NOT LESS THAN 6.0’

TYPICAL INSTALLATION
FOR DOUBLE-FACED SIGNS

NOTES

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

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

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

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

MILEPOST
STANDARD PLAN G-10.10-00

SUPPLEMENTAL PLAQUE – MOUNTING DETAIL
SEE NOTE 2
NOTES

1. Refer to the Sign Specification Sheet of the Contract for the 'V' and 'W' distances.

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

1. Notch is only required with multiple post installations.

2. 6x10, 8x10, and 8x12 Timber Sign Posts cannot be made breakaway and do not have holes or notches. These posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

3. Signs with a width less than 12 feet and supported on three 6x6 or 6x8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

4. Signs with a width less than 17 feet and supported on four 6x6 or 6x8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

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

6. For 6x6 posts and larger, 7 feet minimum spacing is required between posts.

### POST INSTALLATION TABLE

<table>
<thead>
<tr>
<th>POST SIZE (NOM.)</th>
<th>DEPTH</th>
<th>HOLE DIAMETER</th>
<th>NOTCH DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x6</td>
<td>3'-0&quot;</td>
<td>NOT REQ'D</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>6x6</td>
<td>4'-0&quot;</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>6x8</td>
<td>5'-0&quot;</td>
<td>SEE NOTE 3 &amp; 4</td>
<td>3&quot;</td>
</tr>
<tr>
<td>6x10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
<tr>
<td>8x10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
<tr>
<td>6x12</td>
<td>7'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
</tbody>
</table>

TIMBER SIGN SUPPORT

STANDARD PLAN G-22.10-01

APPROVED FOR PUBLICATION

Pasco Bakotich III  07-03-08

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
**Timber Sign Support**

**Standard Plan G-22.10-01**

*Sheet 2 of 3 sheets*

**Approved for Publication**

Pasco Bakotch III 07-03-08

Washington State Department of Transportation

**Effective:** August 5, 2013 TO August 3, 2014
MAJOR AND SECONDARY SIGN INSTALLATION

TOP OF POST

WINDBEAM (TYP.)

MAJOR SIGN

VARIES 0' TO 3'

SECONDARY SIGN

NOTCH LOCATION (TYP.)

SIGN POST (TYP.)

EDGE OF TRAVELED WAY

WINDBEAM (TYP.)

TOP OF MAJOR SIGN

DRILL TWO 1/2" DIAM. HOLES THROUGH TUBE AND INSTALL TWO 3/8" X 3" GALVANIZED LAG SCREWS

DEPTH — SEE POST INSTALLATION TABLE

TIMBER SIGN POST — SEE STD. SPEC. 9-28

TO BE USED WHEN PLACING TIMBER POST IN A PAVED AREA

TOP OF PAVEMENT

CONCRETE CLASS 3000

1/2" NOTCH IN EACH POST, WHEN REQUIRED — SEE POST INSTALLATION TABLE

ALUMINUM WINDBEAM AND TWO POST CLIPS (TYP.) — SEE SIGN PANEL ATTACHMENT DETAIL

3/16" ALUM. RIVETS @ 6" STAGGERED SPACING (TYP.)

VARIES 0' TO 3'

3/8" X 3" HEX LAG BOLT, STEEL, GALVANIZED = 2' 0" MAX. O.C. ~ STAGGER OPPOSING BOLTS 1 1/2" MIN.

TOP OF POST

4" MIN.

3/16" TUBULAR STEEL — 4" X 4", 4" X 6", 6" X 6", OR 6" X 8" — ASTM A 500 GRADE B (GALV.) PER AASHTO M 111 OR ASTM A 501 (GALV.) PER AASHTO M 111.

CONCRETE FOUNDATION SLEEVE DETAIL

TO BE USED WHEN PLACING TIMBER POST IN A PAVED AREA

ISOMETRIC VIEW

STANDARD PLAN G-22.10-01

TIMBER SIGN SUPPORT

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 07-03-08

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

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EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
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.
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.
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

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

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

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

5. Do not tighten any slip plate bolt to the recommended torque before pretightening 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.
**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
**Steel Sign Support Types SB-1, SB-2 & SB-3 Installation Details**

**Standard Plan G-24.40-03**

sheet 1 of 4 sheets

**Effective: August 5, 2013 to August 3, 2014**

**Notes**

1. For "W", horizontal distance from edge of traveled way to center of nearest post, and "V", vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20.10.

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

3. Top of concrete foundations shall be smooth, dense and uniform to finished groundline.

**Steel Sign Support Type SB-1, SB-2 & SB-3 ~ 8"**

<table>
<thead>
<tr>
<th>Post Type</th>
<th>Maximum XYZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1/2&quot; PST</td>
<td>172, 344, 515</td>
</tr>
<tr>
<td>3&quot; Solid Post</td>
<td>471, 942, 1413</td>
</tr>
</tbody>
</table>

**Wind Load for Square Tube Posts at 90 MPH**

- Top of Sign Height
- Bottom of Sign Height

**Elevation**

**Dual Post Installation**

**Drawn by:** Fern Ledge

**State Design Engineer:** Pasco Bakotich

**State:** Washington

**For Publication:**

6/20/13

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

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pre-tightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.

EXPLODED VIEW
STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3
INSTALLATION DETAILS
STANDARD PLAN G-24.40-03

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

STATE DESIGN ENGINEER
Pasco Bakotich
6/20/13
Washington State Department of Transportation

APPROVED FOR PUBLICATION
Sheet 2 of 4 Sheets
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STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3
INSTALLATION DETAILS
STANDARD PLAN G-24.40-03

Sheets 1-4 of 4

Approved for Publication:
Pasco Bakotich III
6/20/13
State Design Engineer
Washington State Department of Transportation

Effective: August 5, 2013 to August 3, 2014

Type SB-1
Slip Base Assembly

Type SB-3
Slip Base Assembly

3" - 7gage steel sign post

Sign post bracket

Upper slip plate

Shoulder collared bolt (Typ.)

Lower slip plate

Lower slip plate stub (lower sign post support not shown)

Slip plate bolts - see assembly note 2 for torque requirements

Explored View

Isometric View

Slip plate detail for type SB-1

Slip plate detail for type SB-3

Traffic Flow

ISOMETRIC VIEW

EXPLODED VIEW

10" Nominal

Traffic Flow

ISOMETRIC VIEW

EXPLODED VIEW
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

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


4. Maximum of 34 lbs./ft. in a seven foot path.

5. On fill slopes, the maximum sign height is nine feet for posts closest to the edge of the traveled way.
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").

3. The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3 feet; signs larger than 36 square feet require a special design mast arm and signal pole.
NOTES

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

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

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

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type III, IV, VIII or IX sheathing.
**SIGN BRACE DIMENSIONS**

<table>
<thead>
<tr>
<th>SIGN TYPE</th>
<th>YIELD</th>
<th>DIAMOND-SHAPED</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/3 SIGN WIDTH - 1 3/4&quot;</td>
<td>1/2 SIGN WIDTH - 2 1/4&quot;</td>
<td>1/2 SIGN WIDTH - 1&quot;</td>
</tr>
</tbody>
</table>

**SIGN POST TYPE**

<table>
<thead>
<tr>
<th>6&quot; OR 9&quot; TIMBER POST</th>
<th>6&quot; OR 9&quot; TIMBER POST</th>
<th>3&quot; DIAM. STEEL PIPE</th>
<th>2 1/2&quot; SQUARE TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>5 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>4 3/4&quot;</td>
</tr>
</tbody>
</table>

**NOTE**

1. For sign installations on round steel posts, see Standard Plan G-30.10, sheet 2 of 2.

---

**SIGN BRACE DETAIL**

- **YIELD SIGN**
  - SIGN WIDTH
  - SIGN HEIGHT
  - BRACE

- **SMALL RECTANGULAR SIGN**
  - SIGN WIDTH
  - SIGN HEIGHT
  - BRACE

- **LARGE RECTANGULAR SIGN**
  - SIGN WIDTH
  - SIGN HEIGHT
  - BRACE

- **DIAMOND-SHAPED SIGN**
  - SIGN WIDTH
  - SIGN HEIGHT
  - BRACE

- **RAILROAD WARNING SIGN**
  - SIGN WIDTH
  - SIGN HEIGHT
  - BRACE

- **NO PASSING ZONE SIGN**
  - SIGN WIDTH
  - SIGN HEIGHT
  - BRACE

- **SCHOOL ZONE SIGN**
  - SIGN WIDTH
  - SIGN HEIGHT
  - BRACE

---

**SIGN BRACING**

STANDARD PLAN G-50.10-01

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

APPROVED FOR PUBLICATION

Pasco Bakotich III
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE: 6/20/13
0 MIN. TO 1" - 6" MAX.

VERTICAL STRUTS AT SPAN END ONLY

VERTICAL "FAR" TRUSS DIAGONAL (TYP.)

PANEL LENGTH (4" - 3" MAX.) TO BE CONSTANT THROUGHOUT SPAN

VERTICAL "NEAR" TRUSS DIAGONAL (TYP.)

CAMBER EACH TRUSS 0.022 FIT FT FOR DOUBLE CANTILEVER (TYP.)

BOTTOM OF LUMINARIE BRACKET, WHEN SIGN LIGHTING IS SHOWN IN THE CONTRACT

X/2 L = 21" - 0" MAX.

SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE.

ELEVATION

DOUBLE CANTILEVER SIGN STRUCTURE

1 1/4" CAPPED NIPPLE

HAND HOLE ON SIDE AWAY FROM TRAFFIC

BOTTOM OF BASE PLATE

BASE ELEVATION

SCREEN – SEE DETAIL, SHEET 4
HEMISPHERICAL POST FINIAL, 1/8" MIN. THICKNESS, INSTALL AFTER GALVANIZING
3/8" ALLEN HOLLOW SET SCREW WITH DOG POINT (TYP.) (CORROSION RESISTANT METAL OR COATING) AT 90" INTERVALS

CUT HOLE IN POST FOR WIDE FLANGE, 1/16" MAX. CLEARANCE ALL AROUND

1/8" PLATE MIN.
5/16" x 1/2" SLOT FOR 3/8" ALLEN SET SCREW

HEAVY DUTY NUT AND 2 WASHERS (TYP.)

STANDARD GALVANIZED STEEL SCREW CAP, OR AN APPROVED ALTERNATE. INSTALL AFTER GALVANIZING TRUSS

SPAN END - SIDE
3/4" ALLEN HOLLOW SET SCREW AT 180" INTERVALS

SPAN END - END
OPPOSITE HAND SHOWN FOR CLARITY

CANTILEVER
SIGN STRUCTURE
(TRUSS-TYPE)

STANDARD PLAN G-60.10-02

STATE DESIGN ENGINEER
Pasco Bakotich III

APPROVED FOR PUBLICATION  6/10/13

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
1. **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>200 SF OR LESS</td>
<td>200 SF - 400 SF</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>Z</td>
<td>1500 AND UP</td>
</tr>
<tr>
<td>13'-0&quot;</td>
<td>18'-0&quot;</td>
<td>1000 - 1499</td>
</tr>
<tr>
<td>16'-0&quot;</td>
<td>22'-0&quot;</td>
<td></td>
</tr>
</tbody>
</table>

2. **PROVIDE SCREEN AROUND BASE - SEE SCREEN DETAIL, STANDARD PLAN G-60.10, SHEET 4**

3. **FINISH GROUND LINE**

4. **1" STEEL CONDUIT OR AS PER CONTRACT - WHEN REQUIRED, CAP EACH END**

5. **CONDUIT COUPLING**

6. **INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)**

7. **ANCHOR ROD**

8. **1 3/4" Diam, x 4'-4" Long, Thru-Ground Plate**

9. **Threaded 3'-0" Min. Each End, W/ 2 Washers & 4 Heavy Hex Nuts**

10. **GALVANIZE EXPOSED ANCHOR ROD END FOR 1'-0" Min.**

11. **ANCHOR PLATE (TYP.) - SEE DETAIL, SHEET 2**

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

13. **CONSTRUCTION JOINT WI ROUGHENED SURFACE**

14. **12 @ #9 (TYP.)**

15. **#5 (TYP.)**

16. **#6 (TYP.)**

17. **#7 (TYP.)**

18. **CONCRETE CLASS 4000P**

19. **CONCRETE CLASS 6000P**

20. **CONCRETE (OR CASING, IF REQUIRED) SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH**

21. **CONSTRUCTION JOINT**

22. **FINISH GROUND LINE**

23. **3/4" CHAMFER**

24. **3'-0" SLACK (ROUTE TO GROUNDING STUD)**

25. **ANCHOR ROD END FOR 1'-0" Min.**

26. **3/4" DIAM. X 4'-4" LONG**

27. **THREADED 8" MIN. EACH END; W/2 WASHERS & 4 HEAVY HEX NUTS**

28. **GALVANIZE EXPOSED ANCHOR ROD END FOR 1'-0" MIN.**

29. **GROUNDING CONDUCTOR SHALL BE NON-INSULATED & AWG STANDED COPPER - PROVIDE 3'-0" BLACK (ROUTE TO GROUNDING STUD)**

30. **CONSTRUCTION JOINT WI ROUGHENED SURFACE**

31. **FINISH GROUND LINE**

32. **TOP**

33. **CONCRETE CLASS 4000P**

34. **CONCRETE CLASS 6000P**

35. **CONCRETE (OR CASING, IF REQUIRED) SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH**

36. **CONSTRUCTION JOINT WI ROUGHENED SURFACE**

37. **FINISH GROUND LINE**

38. **TOP**

39. **ANCHOR PLATE**

40. **NOTES**

1. **See Standard Specification 8-21.3(9) for construction requirements.**

2. **Use a template to locate and secure bolts in place during foundation installation.**
**Anchor Plate Detail**

- 2" - 6" bolt circle
- 1/2" plate (ASTM A36)
- 2" diam. hole for anchor bolt (TYP.)
- May be field bent (TYP.)

**Column and Shaft Spiral Options**

<table>
<thead>
<tr>
<th>Deformed Bar</th>
<th>Plain Steel Bar</th>
<th>Cold Drawn Wire</th>
<th>Deformed Wire</th>
<th>Weld Dimensions (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO M 31 Grade 60</td>
<td>AASHTO M 31 Grade 60</td>
<td>AASHTO M 32</td>
<td>ASTM A 225</td>
<td>S</td>
</tr>
<tr>
<td>#4</td>
<td>1/2&quot; diam.</td>
<td>W20</td>
<td>D20</td>
<td>1/4</td>
</tr>
<tr>
<td>#5</td>
<td>5/8&quot; diam.</td>
<td>W31</td>
<td>D31</td>
<td>5/16</td>
</tr>
<tr>
<td>#6</td>
<td>3/4&quot; diam.</td>
<td>W44</td>
<td>D44</td>
<td>3/8</td>
</tr>
</tbody>
</table>

**Bending Diagram**

All dimensions are out to out.

**Material Specifications**

- **Shaft Concrete**: Class 4000P
- **All Other Concrete**: Class 4000
- **Steel Rein. Bar**: AASHTO M 31 Grade 60
- **Anchor Rods**: ASTM F 1554 Grade 105
- **Anchor Nuts**: AASHTO M 291
- **Anchor Washers**: AASHTO M 293
- **Anchorage Galvanizing**: AASHTO M 232
- **Anchor Plate**: ASTM A 36

**Bar List**

<table>
<thead>
<tr>
<th>Mark</th>
<th>Location</th>
<th>QTY.</th>
<th>Length</th>
<th>Size</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap Vertical</td>
<td>4</td>
<td>3'-10&quot;</td>
<td>#4</td>
<td>STR.</td>
</tr>
<tr>
<td>2</td>
<td>Cap Hoops</td>
<td>5</td>
<td>15'-9&quot;</td>
<td>#5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shaft Vertical</td>
<td>12</td>
<td>2&quot; minus clearances</td>
<td>#6</td>
<td>STR.</td>
</tr>
<tr>
<td>4</td>
<td>Shaft Spiral</td>
<td>1</td>
<td>AS Required</td>
<td>#4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cap Top</td>
<td>4</td>
<td>10'-10&quot;</td>
<td>#5</td>
<td></td>
</tr>
</tbody>
</table>

**Spiral Welded Lap Splice Detail**

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

**Spiral Lap Splice Detail**

See Table for Weld Dimensions.
**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 2</td>
<td>200 SF OR LESS</td>
<td>19' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>200 SF - 400 SF</td>
<td>11' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td>2500 OR GREATER</td>
</tr>
<tr>
<td>TYPE 3</td>
<td>200 SF OR LESS</td>
<td>11' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>200 SF - 400 SF</td>
<td>13' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td>NOT LESS THAN 1500</td>
</tr>
</tbody>
</table>

**MATERIAL SPECIFICATIONS**

- **Concrete**
  - Class 4000P
- **Steel Rein. Bar**
  - AASHTO M 31 Grade 60
- **Anchor Rods**
  - ASTM F 1554 Grade 105
- **Anchor Nuts**
  - AASHTO M 291
- **Anchor Washers**
  - AASHTO M 293
- **Anchorage Galvanizing**
  - AASHTO M 232
- **Anchor Plate**
  - ASTM A 36

**CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)**

*Foundation Types 2 & 3*  
*Standard Plan G-60.30-01*

**Effective:** August 5, 2013 to August 3, 2014
HEMISPHERICAL POST FINIAL, 1/8" MIN. THICKNESS. INSTALL AFTER GALVANIZING

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

FINIAL DETAIL

TOP

ELEVATION

HAND HOLE DETAIL

ELEVATION

SECTION THROUGH FINIAL AND POST

FINIAL BRACKET

DRILL AND TAP WALL FOR 3/8" ALLEN SET SCREW

5/16" x 1/2" SLOT FOR 3/8" ALLEN SET SCREW

PLAN - 1/8" MIN.

END POST FINIAL DETAIL

TOP

ELEVATION

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, OMITTING THE 3/4" PLATE STIFFENER ON THE TEE MEMBER.

CHORD TO END POST CONNECTION TYPE R

USED WHERE DIAGONALS CONNECT

SIGN BRIDGE (TRUSS-TYPE)

STANDARD PLAN G-70.10-02

APPROVED FOR PUBLICATION

Pasco Bakotich III

DATE: 6/10/13

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
DRILLED HOLE IN CHORD AT EACH DIAGONAL AND STRUT SHALL BE 1" DIAMETER FOR SPANS OVER 60' - FOR SPANS 60' OR LESS, DIAMETER SHALL BE 3/4".

ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORD OR POST. FILLET WELD SIZE TO BE DIAGONAL TUBE OR PIPE THICKNESS PLUS 1/16".

1/4" BACKING PLATE TYPICAL JOINT DETAIL CHORD SHOWN - END POST SIMILAR

45° FOR CHORDS OVER 1/4" THICK (SQUARE FOR 1/4" OR LESS)

DIMENSION SHALL EQUAL CHORD THICKNESS OR 1/4", WHICHEREVER IS LESS.

END POST OR CHORD SHOP SPLICE NO POST SPLICES PERMITTED IN LOWER THIRD OF HEIGHT OR 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.

ELEVATION SECTION

INTERIOR DIAGONAL - WHERE REQUIRED

SECTION A

4/3" MAX.

CALL OUT DETAILS

INTERIOR DIAGONAL SHALL BE SLOTTED FOR GUSSET

SECTION D

ALTERNATE JOINT DATA

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>d</th>
<th>e</th>
<th>BOLT Q DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>2 1/2&quot;</td>
<td>1 1/4&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>61' TO 90'</td>
<td>3&quot;</td>
<td>1 1/2&quot;</td>
<td>7/8&quot;</td>
</tr>
<tr>
<td>91' TO 120'</td>
<td>3 1/2&quot;</td>
<td>1 3/4&quot;</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

TOP

INTERIOR DIAGONAL SHALL BE SLOTTED FOR GUSSET

HORIZONTAL DIAGONAL WHEN ALTERNATE JOINT DETAIL IS USED

INTERIOR DIAGONAL WHEN REQUIRED (SEE TRUSS ELEVATION)

3 1/16" GUSSET PLATE

DIAMETER OF HOLE IN FLANGE 1/16" LARGER THAN CHORD OUTSIDE DIAMETER

TOP

3 1/16" GUSSET PLATE

CHORD FIELD SPLICE DATA

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>F</th>
<th>T</th>
<th>BOLT K DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>6&quot;</td>
<td>3/4&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>61' TO 90'</td>
<td>7&quot;</td>
<td>3/4&quot;</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>91' TO 120'</td>
<td>8 1/2&quot;</td>
<td>1&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>121' TO 150'</td>
<td>9 1/2&quot;</td>
<td>1 1/4&quot;</td>
<td>7/8&quot;</td>
</tr>
</tbody>
</table>

CHORD FIELD SPLICE

(NO CHORD FIELD SPLICE PERMITTED IN MIDDLE THIRD OF SPAN LENGTH)

3 1/16" SHIMS ARE REQUIRED AT THE REMAINING TWO CHORD JOINTS WHEN INTERIOR DIAGONAL IS INSTALLED.

3 1/16" SHIMS

FOR SPAN LENGTHS NOT LISTED, INTERPOLATE VALUES OF .

FABRICATE TRUSS WITH CHORDS CURVED TO PROVIDE CAMBER.

DO NOT CAMBER BY USING SHIMS BETWEEN CHORDS AT SPLICES.

DEAD LOAD CAMBER

SIGN BRIDGE (TRUSS-TYPE)

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

STATE DESIGN ENGINEER

Pasco Bakotich III 6/10/13

STATE ENGINEERING DIVISION  WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

SHEET 3 OF 4 SHEETS

STANDARD PLAN G-70.10-02

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
DRILL AND TAP FOR 1/4" DIAMETER CAP SCREW – SPACING APPROX. 8" O.C.
ASTM F 593, W/ S.S. WASHER, LIBERALLY COAT THE THREADS WITH ANTI-SEIZE COMPOUND (TYP.)

WELDED GALV. CLOTH 11/16" x 7/16" SQ. WRAP AROUND BASE PLATE WITH 3" MIN. LAP

BASE PLATE HOLE = 6" DIAM.
1'-6" BOLT CIRCLE
1 1/2" DIAM. HOLE FOR ANCHOR BOLT (TYP.)

1/4" BACK-UP BAR
SEAL WELD
**MATERIAL SPECIFICATIONS**

- **SHAFT CONCRETE:** CLASS 4000P
- **ALL OTHER CONCRETE:** CLASS 4000
- **STEEL REINF. BAR:** AASHTO M 31 Grade 60
- **ANCHOR RODS:** ASTM F 1554 Grade 105
- **ANCHOR NUTS:** AASHTO M 261
- **ANCHOR WASHERS:** AASHTO M 263
- **ANCHORAGE GALVANIZING:** ASTM A 36
- **CASE THE EXCAVATION AND PLACE USING TREMIE METHOD WHEN WATER IS PRESENT**

**CONCRETE**
- **ALL OTHER CLASS 4000 CONCRETE**

**STEEL AASHTO**
- **M 31 REINF. BAR GRADE 60**

**ANCHOR RODS ASTM F 1554 GRADE 105**
- **ANCHOR NUTS AASHTO M 291**
- **ANCHOR AASHTO M 293**
- **ANCHOR PLATE GALVANIZING ANCHOR A36 PLATE**
- **ANCHOR PLATE DETAIL**

---

**TABLE**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
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</thead>
<tbody>
<tr>
<td>SPAN LENGTH</td>
<td></td>
</tr>
<tr>
<td>60' OR LESS</td>
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<td>61' TO 90'</td>
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<td>91' TO 120'</td>
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<td>121' TO 150'</td>
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<td>5' - 0&quot;</td>
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</tr>
<tr>
<td>6' - 0&quot;</td>
<td></td>
</tr>
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<td>7' - 0&quot;</td>
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<td>BAR SPACES = N</td>
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</tr>
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<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>SHAFT DEPTH = Z</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>13' - 6&quot;</td>
<td></td>
</tr>
<tr>
<td>15' - 0&quot;</td>
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</tr>
<tr>
<td>16' - 0&quot;</td>
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</tr>
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<td>2500 OR BETTER</td>
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</tr>
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</table>

**BENDING DIAGRAM**

- **ALL DIMENSIONS ARE OUT TO OUT**
- **2" RADIUS, UNLESS OTHERWISE NOTED**
- **DETERMINE LENGTH FROM PLANS**

---

**BACKGROUND**

- **1 1/4" RIGID GALV. STEEL CONDUIT TO BE INSTALLED WHERE DIRECTED BY THE ENGINEER**

**GROUNDING CONDUCTOR SHALL BE NON-INSULATED #4 AWG STRANDED COPPER - PROVIDE 3' - 0" SLACK (ROUTE TO GROUNDING STUD)**

- **ANCHOR ROD - 1" x 7' - 6" THREADED 8" MIN. EACH END; W/ 2 WASHERS AND 6 HEAVY HEX NUTS**

**ANCHOR PLATE (TYP.) - SEE DETAIL**

- **CONCRETE SHALL BE PLACED IN 1' - 0" MIN. GALVANIZING**

**BOARD W/ 1/2" X 1 3/4" X 2' - 0" SHEAR KEY**

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**SIGN BRIDGE (TRUSS-TYPE) FOUNDATION TYPE 1 STANDARD PLAN G-70.20-02 SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**Pasco Bakotich III 6/10/13**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**STATE DESIGN ENGINEER**

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
NOTES
1. Install Sign Lighting Luminaires (and Brackets) 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-90.20 (Monotube), or G-90.30 (Truss) 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.
3. Galvanize all non-stainless steel parts.
4. For VMS mounting, the contractor may substitute W6 x 12 Steel or W8 x 13 Steel sections for the Vertical Brace W4 x 13 Steel.
5. 3'-0" MAX. Vertical Brace spacing for Walk-In Cabinet Type VMS installation.
6. An acceptable alternative to a Locknut with Nylon insert shall be as follows:
   - Nylock Blue Nylon Torque-Patch
   - Nylock Precote 30
   - ND Patch 360 Ring Patch
   - All products shall be applied the full length of the bolt threads with 360 degrees coverage.
3/16” RIVETS - 4” SPACING

3/8” DIAM. x 1 1/2” BOLT, WASHER, LOCKWASHER, AND LOCKNUT (TYP.)

3/8” DIAM. LOCKNUT

3/16” RIVET (TYP.) - 4” STAGGERED SPACING

3/8” DIAM. x 1 1/2” BOLT, WASHER, LOCKWASHER, AND LOCKNUT (TYP.)

3/8” LOCKWASHER

1. Sign Lighting Luminaire shall include a 3/4” threaded side entry, a gasketed front entry, a door prop, and mounting holes. Refer to Standard Spec. 8-20.3(13) for additional requirements.

2. See Standard Plan J-75.40 and J-75.45 for Sign Light Luminaire Electrical Details.
**PLAN**

**STEEL GRATING DETAIL**

(RAILING NOT SHOWN FOR CLARITY)

- **SPAN (DIRECTION OF BEARING BARS)**
- **PANEL SPAN (TYP.)**
- **4" MAX. (TYP.)**
- **1" MAX. CLEAR (TYP.)**
- **1/4" TOE PLATE**
- **CROSS BAR, 18" MIN. THICKNESS (TYP.)**
- **BEARING BAR, 3/16" MIN. THICKNESS (TYP.)**
- **3/16" CLEARANCE BETWEEN ENDS OF CROSS BARS**
- **3/8" MAX.**
- **3/16" MIN.**
- **1 1/4" TOE PLATE**
- **BEARING BARS**
- **W4x13 (TYP.)**
- **W4x13**

**SECTION F**

- **EVERY FOURTH BEARING BAR AND NEAR ALL TOE PLATE CORNERS**

**SECTION G**

- **GRAting FASTENER SEE DETAIL**
- **CROSS BAR**
- **GRAting FASTENER SEE DETAIL**
Provide a 3/4" drain hole for galvanizing, top & bottom (typ).

Structural lugs (size to fit rope spelter socket) (typ.) See detail "A".

ELEVATION VIEW

Fall restraint bracket installation on new monotube sign bridge.

Field locate 1 1/8" diam. holes @ front and back of monotube (typ.).

Existing monotube beam and bracket plate.

ELEVATION VIEW

1 1/8" diam. hole (typ.).

Structural lug (intermediate support) see detail "B" (see note 3).

Provide a 3/4" drain hole for galvanizing, top & bottom (typ.).

Provide the 1/4" cover plate top & bottom (typ.)

1/4" cover plate top & bottom (typ.)

3/4" H.S. bolt w/nut & 2 washers, galv. (typ.)

Fabricated from L4 x 4 x 3/8

Fabricated from L4 x 4 x 3/8

TS64 x 5/16

TS64 x 5/16

TS64 x 5/16

TS64 x 5/16

1/4" hole for galvanizing, top & bottom (typ.).

1/8" (typ.)

4" (typ.)

3/8" (typ.)

1/4" (typ.)

1" (typ.)

1/8" (typ.)

1/8" (typ.)

1/4" (typ.)

1/8" (typ.)

3" (typ.)

1/4" (typ.)

ELEVATION VIEW

SECTION A

SECTION B

SECTION C

1/4" bolt w/nut & 2 washers, galv. (typ.)

1/4" bolt w/nut & 2 washers, galv. (typ.)

1" diam. rod w/2 lock-nuts & washers, galv. (ASTM A-449) (typ.) - 4 sets required per bracket.

ELEVATION VIEW

Fall restraint bracket installation on existing monotube sign bridge.

Existing monotube

1 1/8" diam. hole (typ.).

1/4" bolt w/nut & 2 washers, galv. (typ.)

1/4" bolt w/nut & 2 washers, galv. (typ.)

4" (typ.)

2" (typ.)

2" (typ.)

2" (typ.)
MAINTENANCE WALKWAY
PARTIAL PLAN

ATTACHMENT BRACKET DETAIL

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE SIGN BRIDGE
STANDARD PLAN G-95.20-02

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-02-11

MONOTUBE

STEEL GRATING (TYP.)

W4x13 MOUNTING BEAM (TYP.)

4'-0' MAX. (TYP.)

W4x13 MOUNTING BEAM (TYP.)

WALKWAY ENTRANCE (INSIDE OPENING SWING GATE)

TOE PLATE (ALL-AROUND)

TOP OF GRATING

MAX. CLR. (TYP.)

MAX. (TYP.)

WALKWAY ENTRANCE

FACE OF VMS

ATTACHMENT BRACKET

SEE DETAIL

VMS HOUSING

MOUNTING BEAM

C5x9 (TYP.)

SECTION D

BEAM (TYP.)

1' (TYP.)

DRILL 5/16" HOLE (TYP.)

3/8" x 3 1/2" x 6" PLATE (TYP.)

3/8" x 4" x 3" PLATE (TYP.)

LOCKING HEX NUT W/ NYLON INSERT (TYP.)

WASHER (TYP.)

1/2" MIN. D.L.E.

3/8" X 4" X 3" PLATE (TYP.)

3/4" DIAM. ROD

1/4" HEX NUT

1 1/4" (TYP.)

1/2" MIN. D.L.E.

VIEW G

SECTION F

MONOTUBE

C5#9 (TYP.)

1 1/4"

C5#9 (TYP.)

1/4"

MONOTUBE

MOUNTING BEAM

SECTION E

BEAM (TYP.)

1' (TYP.)

MAINTENANCE WALKWAY MOUNTING BEAM

C5x9 (TYP.)

7/8" X 1" SLOTTED HOLE IN CHANNEL (TYP.)

3/4" DIAM SIGN BRACKET ROD W/ 4 WASHERS & 4 HEX NUTS

MAINTENANCE WALKWAY MOUNTING BEAM W4 x 13 SPK @ 4'-0' MAX.

ATTACHMENT BRACKET DETAIL

MONOTUBE SIGN BRIDGE

W4x13 MOUNTING BEAM

W4x13 AND POST

W4x13 AND POST

MONOTUBE

MONOTUBE

MONOTUBE
**Maintenance Walkway**

**Partial Plan**

- **VMS Housing**
- **Steel Grating (Typ.)**
- **W4 x 13 Mounting Beam (Typ.)**
- **Walkway Entrance (Inside Opening Swing Gate)**

**Detail "A"**

- **5/8" Plate**
- **1 1/2" R**
  - 5" When an Intermediate Support is Used

**Detail "B"**

- **3/4" x 3" Slotted Hole**
- **3/4" x 4" x 8" Plate 8"**
- **2" R**

**Note:** See Note 5, Located on Sheet 1

**Section B**

- **Face of VMS**
- **1" Min. (Typ.)**
- **Entry Panel**
- **Top of Toe Plate**
- **Top of Grating**
- **5' - 0"**
- **W4 x 13 Mounting Beam**

**Section C**

- **1.18"**
- **3/8" Dia. U-Bolts W/ Hex Lock Nuts & Flat Washers**
- **TRUSS CHORD**
- **W4 x 13 Mounting Beam**

**Maintenance Walkway Mounting for Truss-Type Sign Bridge**

**Standard Plan G-95.30-02**

**Sheet 2 of 2 Sheets**

**Approved for Publication**

Pasco Bakotich III 06-02-11

Washington State Department of Transportation

Effective: August 5, 2013 To August 3, 2014
**SHRUB, TREE AND GROUND COVER PLANTING DETAIL**

- **Uppermost root shall be no more than 1" below soil surface.**
- Mound soil to form watering well at outer edge of planting hole.
- Install plant vertically.
- Mulch & compost to specified depth - feather to base of plant.

**MULCH & COMPOST TO SPECIFIED DEPTH**

**FEATHER TO BASE OF PLANT**

**SECTION**

**BULB PLANTING DETAIL**

- Equally space bulbs - depth varies by species.

**SLOPE PLANTING DETAIL**

(includes all plants on slopes)

- Plant rhizome with crown / growth points at finished grade.

**TUBER OR RHIZOME PLANTING DETAIL**

- Uppermost root shall be no more than 1" below soil surface.
- Mound soil to form watering well at dripline of each plant.

**STREET TREE PLANTING AND STAKING DETAIL**

- Applies to container, ball and burlapped, (B&B) deciduous and conifers.
- Using 30" x 2" x 2" stakes, stake through edge of rootball into edge of undisturbed soil. Stakes shall be flush with ground surface or just below.

**EMERGENT PLANTING DETAIL**

- Planting hole 3 times the root spread.
- Break up rootball of container plants, including plugs prune circling roots.

**EMERGENT PLANTING DETAIL**

**STANDARD PLAN H-10.10-00**

**STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT**

**SALLY A. ANDERSON**

**CERTIFICATE NO. 000372**

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

**EFFECTIVE:** August 5, 2013 TO August 3, 2014
NOTES
1. See Plant Material List for size and type of live stake.
2. Do not use axe or sledge for driving stakes.
3. In hard ground use an iron bar or star drill to prepare the holes for the stake.
4. Avoid stripping bark or bruising stakes during installation.
5. Fill void around cutting with soil.
NOTES

1. All Angle Irons and Steel Straps shall be galvanized in accordance with AASHTO M 232.

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

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

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

5. Water level may vary, depending on season.

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

CREST GAGE

STANDARD PLAN H-30.10-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakitch III 10-12-07

STATE OF
WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

CERTIFICATE NO. 000860

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.
POST BASE ASSEMBLY
FINISHED GRADE 1/8" CONCRETE FOOTING - COMMERCIAL CONCRETE GRANULAR, FREE DRAINING MATERIAL 1/8" PLATE

SECTION A

1/8" CHAIN - GRADE 3, 6" LONG

COVER PLATE 1/8" X 1 1/2" STEEL PLATE WITH ROUNDED CORNERS AND 3/4" CENTERED HOLE

POST NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

BASE ASSEMBLY

STEEL PIPE - ASTM A 53, NPS 3 (3" NOM.), SCHEDULE 80 1/2" REFLECTIVE TAPE (TYP.) 1/4" X 1 1/2" X 2" STEEL PLATE WITH ROUNDED CORNERS AND 3/4" CENTERED HOLE

STANDARD PLAN H-60.10-01 SHEET 1 OF 1 SHEET APPROVED FOR PUBLICATION

Pasco Bakotich III 07-03-08 STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EXPRESS JUNE 8, 200
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
NOTES

1. A socket and wedge anchoring system that meets the NCHRP 350 crash test criteria may be substituted in lieu of the anti-twist plate designs shown. Anti-twist plates are not required for wood post installations.

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

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

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

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

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

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

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

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

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

STANDARD PLAN H-70.20-01

MAILBOX SUPPORT TYPE 1
(WOOD POST SHOWN)
FOR DETAILS,
SEE STANDARD PLAN I-70.10

MAILBOX SUPPORT TYPE 2

ANCHORING SYSTEM - SOCKET AND WEDGE SHOWN
(SEE NOTE 1)

5" MIN. BETWEEN MAILBOXES

NEWSPAPER BOX - SEE NOTE 5

SINCE GUARD - WHEN REQUIRED,
PLACE ON LEADING END OF
SUPPORT (SEE DETAIL)

MAILBOX SUPPORTS TYPE 2

SPACING DETAIL

MAILBOX SUPPORT TYPE 1
(WOOD POST SHOWN)
FOR DETAILS,
SEE STANDARD PLAN I-70.10

ANCHORING SYSTEM - SOCKET AND WEDGE SHOWN
(SEE NOTE 1)

SINCE GUARD - WHEN REQUIRED,
PLACE ON LEADING END OF
SUPPORT (SEE DETAIL)
NOTES

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

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

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

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

5. The Platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.10, Sheet 2. The design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required.

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

7. Attach a newspaper box to the pipe with two 1 3/4" muffler clamps spaced 4" apart. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

MAILBOX SUPPORT TYPE 3

STANDARD PLAN H-70.30-02

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakitch III 02-07-12

Washington State Department of Transportation
NOTE

1. Post shall have sufficient strength and durability to support the fence through the life of the project.
ATTACH IN A MANNER THAT ASSURES FABRIC IS FIRMLY HELD BY THE BACKUP SUPPORT IN A WAY THAT REDUCES THE POTENTIAL FOR FABRIC TEARING.

POST - SEE STD. SPEC. 8-01.3(9)A

FASTEN GEOTEXTILE TO POST EVERY 6" (IN.) O.C.

NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

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

3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.

4. Install silt fencing parallel to mapped contour lines.

SEE NOTE 1

SPLICE DETAIL
(STEEL POSTS SHOWN)

SPliced fence sections shall be close enough together to prevent silt laden water from escaping through the fence at the overlap.

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NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(15).
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.
ATTACH IN A MANNER THAT ASSURES FABRIC IS FIRMLY HELD BY THE BACKUP SUPPORT IN A WAY THAT REDUCES THE POTENTIAL FOR FABRIC TEARING.

INSTALL BACKUP SUPPORT FOR THE GEOTEXTILE - SEE STANDARD SPECIFICATION SECTION 5.0.1.3(9)A

TYPICAL INSTALLATION DETAIL (STEEL POSTS SHOWN)

TYPICAL HIGH VISIBILITY SILT FENCE WITH BACKUP SUPPORT ISOMETRIC (STEEL POSTS SHOWN)

SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

SPlice DETAIL (STEEL POSTS SHOWN)

NOTES
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 5.0.1.3(9)A and 5.0.1.3(15).
3. Splices shall never be placed in low spots or sump areas. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

NOTE
DURING EXCAVATION: MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

INSTALL BACKUP SUPPORT FOR THE GEOTEXTILE - SEE STANDARD SPECIFICATION SECTION 5.0.1.3(9)A

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

CERTIFICATE NO. 000860

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1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(15).
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

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FASTEN GEOTEXTILE TO POST EVERY 6" (IN.) O.C.

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)
Place sand bags as required around culvert to provide support for silt fence.

Culvert, box culvert, or pipe arch - end treatment varies.

Silt fence = see std. plan I-30.10

Compost berm = see std. plan I-80.10

Geotextile for temporary silt fence - see std. spec. 9-33.2(1), Table 6

Embed posts into sand bags as required

Post = see std. spec. 8-01.3(9A)

NOTE
Perform maintenance in accordance with Standard Specification 8-01.3(9)A and 8-01.3(15).
**ALLOWABLE ALTERNATIVE TIE-DOWN METHOD**

**ANGLE TERMINAL END UPHILL 24° TO 48° TO PREVENT FLOW AROUND WATTLE (TYP.)**

**PLAN VIEW**

**Contour Line (Typ.)**

**Stagger Overlaps (Typ.)**

**Trench - See Note 1**

**8" Diameter Wattle Spacing Table**

<table>
<thead>
<tr>
<th>Slope</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H : 1V</td>
<td>10' - 0'</td>
</tr>
<tr>
<td>2H : 1V</td>
<td>20' - 0'</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>30' - 0'</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>40' - 0'</td>
</tr>
</tbody>
</table>

**Wattle Detail**

**Trench - See Note 1**

**Area Available for Sediment Trapping (Typ.)**

**Spacing Varies - See Wattle Spacing Table (Typ.)**

**Wattle (Typ.) - See Detail**

**Section A**

**Wattle Installation on SLOPES**

**STATE OF WASHINGTON**

**REGISTERED LANDSCAPE ARCHITECT**

**Sandra L. Salisbury**

**LICENSE NO. 860**

**June 10, 2013**

**WATTLE INSTALLATION ON SLOPE**

**STANDARD PLAN I-30.30-01**

**APPROVED FOR PUBLICATION**

**Pasco Bakotich III**

**6/10/13**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**NOTES**

1. Wattles shall be in accordance with Standard Specification 9-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification 8-01.3(10).

2. Securely knot each end of Wattle. Overlap adjacent Wattle ends 12" behind one another and securely tie together.

3. Compact excavated soil and trenches to prevent undercutting. Additional staking may be necessary to prevent undercutting.

4. Install Wattle perpendicular to flow along contours.

5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.

6. Perform maintenance in accordance with Standard Specification 8-01.3(16).

7. Refer to Standard Specification 8-01.3(16) for removal.
ALLOWABLE ALTERNATIVE TIE-DOWN METHOD

ANGLE TERMINAL END UPHILL 24" to 48" TO PREVENT FLOW AROUND SOCK (TYP.)

CONTOUR LINE (TYP.)

SPACING VARIES (TYP.)

DISTURBED AREA

SPACING Varies (TYP.) SEE COMPOST SOCK SPACING TABLE

BIODEGRADABLE EROSION CONTROL BLANKET – SEE NOTE 4

COMPOST SOCK (TYP.) – SEE DETAIL

PROTECTED AREA

DRAINAGE GRATE (CIRCULAR GRATE SHOWN)

COMPOST SOCK (TYP.) – SEE DETAIL

WIRE TIED (TYP.)

12" MIN. OVERLAP

PLAN VIEW

EXCESS SOCK MATERIAL, DRAWN IN AND TIED OFF SECURELY (TYP.)

STAGGER OVERLAPS (TYP.)

SECTION A

COMPOST SOCK DETAIL

8" DIAMETER COMPOST SOCK SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H : 1V</td>
<td>10' - 0'</td>
</tr>
<tr>
<td>2H : 1V</td>
<td>20' - 0'</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>30' - 0'</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>40' - 0'</td>
</tr>
</tbody>
</table>

COMPOST SOCK STANDARD PLAN I-30.40-01

ISOMETRIC VIEW

CATCH BASIN INSTALLATION

STATE DESIGN ENGINEER

Pasco Bakotich 11
6/10/13

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

Sandra L. Salisbury
LICENSE NO. 860

DATE: June 6, 2013

NOTE: THIS PLAN IS SET TO SCALE, DRAWN IN BLACK INK ON WHITE COATED PAPER. IT MAY NOT BE REPRODUCED OR ALTERED IN ANY WAY WITHOUT THE WRITTEN CONSENT OF THE STATE DESIGN ENGINEER. A COPY MAY BE OBTAINED UPON REQUEST.

NOTES

2. Securely knot each end of Compost Sock. Overlap adjacent Compost Sock ends 12" behind one another and securely tie together.
3. Compost to be dispersed on site as determined by the Engineer, when vegetation covers the surface.
4. If Erosion Control Blanket is specified, place Compost Sock on top of blanket. See Standard Plan I-60.10.
5. Install Compost Sock perpendicular to flow along contours.
6. Remove sediment from the up slope side of the Compost Sock when accumulation has reached 1/2 of the effective height of the Compost Sock.
7. Perform maintenance in accordance with Standard Specification 8-01.3(15).
8. Refer to Standard Specification 8-01.3(16) for removal.

EXCESS SOCK MATERIAL, DRAWN IN AND TIED OFF SECURELY (TYP.)

8" DIAMETER COMPOST SOCK SPACING TABLE

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<td>30' - 0'</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>40' - 0'</td>
</tr>
</tbody>
</table>
1. Coir logs shall be installed starting at the bottom of the slope and working uphill.
2. Excavated material shall be spread evenly along the uphill slope and compacted by hand tamping or other methods approved by the Engineer.
3. Overlap Coir log ends by 12" to prevent water from moving between logs.
4. Always install Coir log perpendicular to slope along contour lines. Ends shall angle uphill to prevent flow around the Coir log.
5. Use an adequate number of stakes to ensure logs are secure.
7. Perform maintenance in accordance with Standard Specification 8-01.3(15).

**NOTES**

**PLAN VIEW**

- **TOP OF STAKES FLUSH WITH TOP OF LOG**
- **EXCAVATED MATERIAL COMPACTED AND SPREAD EVENLY ON UPHILL SLOPE - COMPACT AGAINST THE UPHILL SIDE OF LOG TO FORM WATERTIGHT SEAL**
- **SPACING DEPENDENT UPON SLOPE - TOP OF LOWER COIR LOG IN LINE WITH BOTTOM OF COIR LOG ABOVE (TYP.)**
- **RECESS APPROX. 1/3 OF LOG INTO SLOPE**
- **COIR LOG**
- **SHORELINE - IF APPLICABLE (SEE CONTRACT PLANS)**
- **ORDINARY HIGH WATER MARK**

**ELEVATION VIEW**

- **COIR LOG PLACEMENT**

**ISOMETRIC VIEW**

- **LAND / UPHILL**
- **WATER / DOWNHILL**
- **COIR LOG**
- **2" x 2" x 36" MIN. UNTREATED WOODEN STAKE (TYPICAL)**
- **1/4" DIAMETER NATURAL FIBER ROPE**
- **12" DIAMETER MINIMUM**

**STATE OF WASHINGTON**

**REGISTERED LANDSCAPE ARCHITECT**

**SANDRA L. SALISBURY**

**LICENSE NO. 860**

**DATE: June 6, 2013**

**Pascoc Bakotich III**

**STATE DESIGN ENGINEER**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
GEOTEXTILE FOR TEMPORARY SILT FENCE
- SEE STD. SPEC 9-33.2(1), TABLE 6

COMPACTED NATIVE SOIL

BURY GEOTEXTILE IN TRENCH

INLET

GEOTEXTILE

PLAN VIEW
(CROSS BRACES NOT SHOWN)

GEOTEXTILE FOR TEMPORARY SILT FENCE
- SEE STD. SPEC B-01.3(9)A.

POST (SEE STD. SPEC 8-01.3(9)A).

FLOW

FLOW

ISOMETRIC VIEW
(ENTIRE FENCE NOT SHOWN
FOR ILLUSTRATIVE PURPOSES)

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 seam-
less joint.
3. Ensure that ponding height of water does not cause flooding on adjacent roadways or private property.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
NOTES

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

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

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

4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
**CHECK DAMS ON CHANNELS**

**STANDARD PLAN 1-50.20-01**

Sheet 1 of 1 Sheet

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 8/10/13

**STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT**

Sandra L. Salisbury

**LICENSE NO. 880**

**DATE:** June 6, 2013

---

**BIODEGRADABLE CHECK DAM**

1. Biodegradable Check Dams may need additional or modified staking to prevent undercutting or scouring.

**NON-BIODEGRADABLE CHECK DAM**

1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer’s recommendations and shall perform in accordance with Standard Specification 8-01.3(6).

2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.

3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.

---

**GENERAL NOTES**

1. Check Dams shall meet the requirements of Standard Specifications 8-01.3(6) and 9-14.5(4).

2. In channels, install the sloped ends of the Check Dam a minimum of 8" higher than the spillway to ensure water flows over the dam and not around it.

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

4. Remove Check Dams in accordance with Standard Specification 9-01.3(16).

---

**NOTES**

1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer’s recommendations and shall perform in accordance with Standard Specification 8-01.3(6).

2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.

3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.
STAPLES - 4" APART, STAGGERED, 6" O. C.

STAGGERED, 6" O. C.

END OVERLAP

ISOMETRIC VIEW

INSTALLATION STEPS:

1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket down the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

NOTES

1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and slope steepness.
2. See Standard Specification 8-01.3(3) and 9-14.5(2).
3. Use manufacturer's requirements. When manufacturer's requirements are not provided, use installation requirements shown on Standard Plans.
4. Additional staples may be required on slopes greater than 3H : 1V.

WASHINGTON STATE
REGISTERED
LANDSCAPE ARCHITECT
SANDRA L. SALISBURY
LICENSE NO. 860
DATE: 6/6/13

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
SANDRA L. SALISBURY
LICENSE NO. 860
DATE: 6/6/13
Tamped native soil from pile

Shingle splice at end of roll

Erosion control blanket

Initial anchor - section

Check slot - section

Longitudinal anchor - section

Channel installation - section

Isometric view

Notes:
1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.
2. Install check slots per manufacturer's recommendations.
3. See Standard Specification 8-01.3(3) and 9-14.8(2).
4. Use manufacturer's requirements. When manufacturer's requirements are not provided, use installation requirements shown on standard plan.
5. Additional staples may be required for high flow exposure.

Installation steps:
1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Set aside native soil removed from trench.
4. Secure blanket in anchor trench, staggering or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket parallel to the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

Passco Bakotich
State Design Engineer

Effective: August 5, 2013 to August 3, 2014

Washington State Department of Transportation

State of Washington
Registered Landscape Architect
Sandra L. Salisbury
License No. 860

Date: 6/6/13

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.
SECTION

NOTE
PLACE GEOTEXTILE UNDER THE SPILLWAY AND SIDE SLOPES. PROVIDE A CONTINUOUS LAYER BETWEEN THE GRAVEL ROCK AND THE NATIVE EARTHEN MATERIAL.

SECTION A

TEMPORARY SEDIMENT TRAP

EXISTING ROAD

25'-0" R MIN. (TYP.)

4'-0" QUARRY SPLAIS

PLACE CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION AND A MINIMUM OF 0.15' CRUSHED ROCK UNDER THE SPLAIS, FROM THE EDGE OF THE EXISTING ROADWAY TO THE RADIUS RETURNS, OR AS DIRECTED BY THE ENGINEER.

ISOMETRIC VIEW

STABILIZED CONSTRUCTION ENTRANCE

2'-0" SETTLING DEPTH

1'-0" SETTLING DEPTH

GROUNDLINE

OUTFLOW CHANNEL IS CONSTRUCTED BY EXCAVATION

SEDIMENT TRAP BOTTOM

1'-0" DEPTH OF 3/4" - 1 1/2" WASHED GRAVEL BACKFILL

1'-0" DEPTH OVERFLOW

COMPACTED NATIVE MATERIAL CONSTRUCTED BY EXCAVATION OR EMBANKMENT

1'-0" DEPTH OF 2" - 6" ROCK

PLACE GEOTEXTILE - SEE STD. SPEC. SECTION 9-33

X = 1'-0" FOR SLOPES FLATTER THAN 4H:1V
X = 1'-6" FOR SLOPES STEEPER THAN 4H:1V

TYPICAL SECTION

COMPOST BERM DETAIL

COARSE COMPOST

2X

STATE OF WASHINGTON LICENSED LANDSCAPE ARCHITECT

CERTIFICATE NO. 000598

MISCELLANEOUS
EROSION CONTROL DETAILS

STANDARD PLAN 1-80.10-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III
08-11-09
STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
**Photoelectric Control Details**

- **TYPE A SERVICE, 120 VOLT**
  - Bend conduit to pole and strap within 18" above meter
  - Conduit to luminaire, size as required

- **TYPE B SERVICE, 120/240 VOLT**
  - Bend conduit to pole and strap within 18" above meter
  - Conduit to luminaire, size as required

- **TYPE C SERVICE, 480 VOLT**
  - Bend conduit to pole and strap within 18" above meter
  - Conduit to luminaire, size as required

**Liquid Tight Flexible Conduit**
- Length: 2' MIN, 3' MAX - strap to pole
- Bend conduit to allow removal of weatherhead, strap below bend

**Weatherhead**
- Bend conduit to pole and strap within 18" above meter

**Hub and Gasket**
- Type: (TYP)

**Service Cabinet**
- Use metal standoffs to mount to pole

**Conduit Body**
- Two 1/4" x 1/2" brass bolts; drill bracket to fit meter base

**Timber Pole**
- Two 1/4" x 5" galvanized lag screws

**Photoelectric Control**
- Oriented to north sky

**Note 5**
- See Note 5

**Current and Potential Transformers**
- Furnished and installed by utility

**Service Cabinet**
- Use metal standoffs to mount to pole

**Lighting and C Service Details**
- Standard Plan J-3
- Approved for Publication

**Effective:** August 5, 2013 TO August 3, 2014
TYPE B SERVICE CABINET

TYPE C SERVICE CABINET

NOTES:
1. Metering arrangements may vary with different serving utilities. The contractor shall verify the requirements of the utility prior to installing the service equipment.
2. All service pole conduit shall be secured to the pole with conduit strap at 6' centers.
3. All risers and service equipment shall be installed on side of pole that is away from traffic.
4. Where required by the serving utility, service breakers shall be installed above the meter socket in a separate raintight enclosure.
5. Bend and attach to pole within 1' of enclosure. See Standard Plan "Typical Grounding Details."
6. For Type B service wiring diagram, use Standard Plan "Modified Type B Service". For Type C service wiring diagram, use Standard Plan, "Type E Service."
7. See breaker schedule in contract for breaker and contactor sizes.
CONSTRUCTION NOTES

1. Drive ground rods before placing concrete. Move rod(s) and drain tiles with cover(s) as required to achieve full ground penetration. Maintain a 6" min. minimum clearance from ground rods and 6" from foundation edge as detailed on Standard Plan J-60.05.

2. Gravel conduits penetrating all cabinets shall be terminated with grounding bushing and bonded to the cabinet. PVC conduits penetrating cabinets shall be terminated with end bell bushing.

3. Install conduit couplings on all conduits. Place couplings flush with top of the cabinet. If PVC conduits are specified, the conduit shall be installed with end bell bushing in foundation. Use #4 hoop for a 3 1/2" cabinet footing and (2) #4 hoops for a 9" cabinet footing.

4. 4" diameter x 1/2" deep sump. Slope foundation with cabinet footprint toward sump. Drainpipe shall be 3/8" diam. polyethylene or copper tubing.

5. The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2" or 9" cabinet footing.

6. Cabinet power supply conduit.

7. Conduits for service grounding electrodes.

8. Conduit placement location (or transformer high voltage conduit area).

9. Low voltage conduit placement location.

10. Utility generator transfer switch.

11. The cabinets shown in these details are shown for illustrative purposes only. The Contractor shall verify the plans and substitute those cabinets in place of the cabinets shown in these details. The Contractor shall install each cabinet type in the locations and orientations shown in these details.

12. The Contractor shall install the conduits in the locations shown. Conduits shall extend 2' min. above the conduit. Maintenance containing unfused utility conduits shall extend up to the utility chase.

13. The ground rods, drain tiles, associated conduits, and #4 rebar, 90° with 30" legs, may be omitted if no transformer or service cabinet is to be installed.

14. The cabinets shall be attached to the foundation with 4 each: 1/2" x 12" x 2" x 4" hot dip galvanized anchor bolts, washers, and nuts. Stainless steel epoxy anchors may be used as an alternative, and shall be 1/2" diam. x 9", or 5/8" diam. x 8". Bolts shall extend 1 1/2" min. to 2" max. above the concrete pad.

15. All reinforcing steel shall be embedded 2" below surface of concrete.

16. Place 1/2" bead of silicone between cabinets and foundation.

17. Two ground rods are required for foundations with a service cabinet or transformer cabinet. See Standard Plan J-60.05 for details.


19. Verify detail locations from manufacturer prior to placing conduit in foundation.

20. Foundations installed in, or adjacent to, sidewalks shall be constructed with the top flush with the sidewalk surface and grade, not including concrete risers for cabinets. Omit chomber when foundation abuts sidewalk.

21. If the slope is 3H:1V or steeper, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

12. For Type 333SD Controller Cabinet, the cabinet vendor shall allow the Utility Transfer Switch to be installed on either side of the cabinet. The Utility Transfer Switch unit shall be shipped inside the cabinet for field installation by Region Maintenance Personnel.

13. Height of cabinet footings shall be adjusted to serve environmental needs. Adjust length of conduits and rebar accordingly.

14. Use (1) #4 hoop for a 3 1/2" cabinet footing and (2) #4 hoops for a 9" cabinet footing.

15. The Police Panel location is set by Industry Standards on all Controller Cabinets.


17. Verify pad size and location with Project Engineer prior to placing.

18. Field bend #4 rebar around the Generator Anti-Theft Tie Down Unit when required.

19. See Standard Plan J-3c and J-3d for additional details for Type D and Type E Service Cabinets.
With Meter Base mounted on inside of Service Cabinet, allow 6" between Cabinets.

With Meter Base mounted on outside of Service Cabinet, allow 36" from face of meter to adjacent Cabinet. See Standard Plan J-3c.

24" X 24" X 18" (TYP.)

3/4" CHAMFER (TYP.)

CONCRETE OR HMA MATERIAL

SLOPE TO DRAIN (TYP.)

GROUND LINE

CONDUIT TO ADJACENT JUNCTION BOX - SEE CONTRACT PLANS

Spare Conduit to Adjacent Junction Box - See Contract Plans

Conduit to Adjacent Junction Box - See Contract Plans for Number and Size of Conduits (TYP.)

SECTION A

SECTION B

Two Cabinet Foundation
(Type E Service and Type 332D Controller Cabinet Shown)

Three Cabinet Foundation
(Type E Service, 7.5 kVA Transformer and Type 332 Controller Cabinet Shown)

APPROVED FOR PUBLICATION
Pasco Bakotich III
05-11-11

STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

SHEET 2 OF 5 SHEETS

CABINET ORIENTATION CONDUIT LAYOUT AND FOUNDATION DETAIL
STANDARD PLAN J-10.10-01

DRAWN BY: LISA ODORO
APPROVED BY: PASCO BAKOTICH
Without transfer switch, allow 6' between cabinets.

With transfer switch, allow 36” between cabinets.

#4 REBAR – 90° WITH 30" LEGS (2 PLACES)

PLAN VIEW

18" X 18" X 18" DRAINAGE WELL

ELEVATION VIEW

SINGLE CABINET FOUNDATION
(15 KVA TRANSFORMER SHOWN)

CONDUIT TO ADJACENT JUNCTION BOX – SEE CONTRACT PLANS FOR NUMBER AND SIZE OF CONDUITS (TYP.)

1/4" PREMOLDED JOINT FILLER

#4 HOOP – SEE NOTE 14

SECTION E

7 1/2" DIA. BOLT CIRCLE
FOR AT LEAST 4 BOLT HOLES @ 3/4" DIA. EACH

GENERATOR ANTI-THEFT TIE DOWN UNIT

CONCRETE OR HMA MATERIAL

#4 REBAR – EACH CORNER (SEE NOTE 18)

#4 REBAR – 30" WITH 30" LEGS (2 PLACES)

PEDESTAL BASE DETAIL

PLAN VIEW

1/4" PREMOLDED JOINT FILLER

#4 HOOP – SEE NOTE 14

CONDUIT TO ADJACENT JUNCTION BOX – SEE CONTRACT PLANS FOR NUMBER AND SIZE OF CONDUITS (TYP.)

1/4" STEEL PLATE (TYP.)

#6 REBAR

#3 REBAR (TYP.)

3/8" DIAM. BOLT CIRCLE FOR AT LEAST 4 BOLT Holes @ 3/4" DIAM. EACH

PEDESTAL MOUNT

HOT DIP GALVANIZED
AFTER FABRICATION

GENERATOR ANTI-THEFT TIE DOWN UNIT

FABRICATE IF NOT AVAILABLE COMMERCIALLY

PEDESTAL MOUNT

GENERATOR ANTI-THEFT TIE DOWN UNIT

CONCRETE OR HMA MATERIAL

#4 REBAR – EACH CORNER (SEE NOTE 18)

3/8" POLYETHYLENE DRAIN TUBE

#6 REBAR

#3 REBAR (TYP.)

3/8" POLYETHYLENE DRAIN TUBE

GRAVEL BACKFILL

1/4" STEEL PLATE (TYP.)

#3 REBAR (TYP.)

CONDUIT TO ADJACENT JUNCTION BOX – SEE CONTRACT PLANS FOR NUMBER AND SIZE OF CONDUIT (TYP.)

4" STEEL PIPE – HOT DIP GALVANIZED

4" SLIPFITTER

3" X 5" HANDHOLE WITH COVER

5/8" X 2" - 0" - 4" STEELANCHOR BOLT (TYP.)

#4 BARS AT APPROXIMATELY 1" - 0" CENTERS

2" - 0" ROUND OR SQUARE

#4 VERTICAL REBAR – 8 TOTAL

1/4" PREMOLDED JOINT FILLER

1" - 0" MIN. ON ALL CABINET SIDES WITH DOORS

1/4" PREMOLDED JOINT FILLER

1/4" STEEL PLATE (TYP.)

#4 REBAR – 90° WITH 30" LEGS (2 PLACES)

PLAN VIEW

18" X 18" X 18" DRAINAGE WELL

ELEVATION VIEW

TYPICAL FOUNDATION CROSS SECTION
(SEE NOTE 12)

SECTION E

7 1/2" DIA. BOLT CIRCLE
FOR AT LEAST 4 BOLT HOLES @ 3/4" DIA. EACH

GENERATOR ANTI-THEFT TIE DOWN UNIT

CONCRETE OR HMA MATERIAL

#4 REBAR – EACH CORNER (SEE NOTE 18)

#4 REBAR – 30" WITH 30" LEGS (2 PLACES)

PEDESTAL MOUNT

HOT DIP GALVANIZED
AFTER FABRICATION

GENERATOR ANTI-THEFT TIE DOWN UNIT

CONCRETE OR HMA MATERIAL

#4 REBAR – EACH CORNER (SEE NOTE 18)

#4 REBAR – 30" WITH 30" LEGS (2 PLACES)

PEDESTAL MOUNT

HOT DIP GALVANIZED
AFTER FABRICATION

GENERATOR ANTI-THEFT TIE DOWN UNIT

CONCRETE OR HMA MATERIAL

#4 REBAR – EACH CORNER (SEE NOTE 18)

#4 REBAR – 30" WITH 30" LEGS (2 PLACES)
Provide a Type 4 Chain Link fence on 3 sides when retaining wall height exceeds 4'-0". See Standard Plan L-20.10

1. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Obtain Engineer's approval of maintenance pad orientation prior to proceeding with construction.

2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications 6th Edition, 2012.

3. Concrete for walls and bases shall be class 4000.

4. Height of wall varies to match slope of existing grade. Contractor shall field determine wall height and each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.

5. 3/4" chamfer for all exposed corners.

6. For grounding details, see Standard Plan J-60.05.

7. For cabinet and conduit details not shown, see Standard Plan J-10.10.

8. The Cabinets shall be attached to the foundation with 4 anchor bolts and located per the Cabinet supplier. Stainless steel epoxy anchor bolt may be used as an alternative and shall be 1/2" diameter by 9" long.

---

**CABINET ENCLOSURE ON SLOPE**

**STANDARD PLAN J-10.15-00**

**NOTE:**

1. Drive ground rods before placing concrete. Move rod(s) and drain tile(s) with cover(s) as required to achieve full ground penetration. Maintain a 6'-0" minimum clearance between ground rods as detailed on Standard Plan J-60.05.

2. Limits of pigmented sealer. Typical for all retaining walls.

---

**GENERAL:**

- CABINETS SHOWN FOR DISPLAY PURPOSES ONLY
- SEE CONTRACT PLANS FOR CABINET LAYOUT
- CABINET ENCLOSURE SHOWN

---

- **NOTE:**
  - **REINFORCING STEEL BENDING DIAGRAM**
    - See Std. Spec. 9-07.1(2) for bending diam.
    - All dimensions are out to out
    - **ANCHOR BOLT**
      - ASTM A307 with washer and nut – galvanized per AASHTO M 232

---

- **PLAN VIEW**
  - Cabinets shown for display purposes only
  - See contract plans for cabinet layout

---

- **SECTION A**
  - 2'-0" CONTINUOUS AT TOP
  - 2'-0" PER FT.
  - 8'-0" MAX.

- **SECTION B**
  - 3'-0" FILLET
  - CABINET PAD – SEE STANDARD PLAN J-10.15 AND CONTRACT PLANS FOR CABINET LAYOUT, CONDUITS AND DRAINAGE DETAILS

- **SECTION C**
  - 2'-0" CLR. (TYP.)
  - 2'-0" MIN. (TYP.)

- **SECTION D**
  - 3'-6" FROM THE FACE OF WALL TO THE FACE OF CABINET

---

- **FINISHED GROUND LINE**
  - 6" GRAVEL BASE
E F F E C T I V E:  AUGU S T  5,  2 0 1 3  T O  A ugus t 3 ,  2 0 1 4

1. Metering Arrangements vary with different serving utilities. The utility may require meter base mounting in the enclosure, on the side, or on the back of the enclosure. The utility may require the dimension between the door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting detail, see Standard Plan J-3b. The Contractor shall verify the serving utility's requirements prior to fabrication of and installing the service equipment.

2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor shall verify the serving utilities requirements prior to fabrication and installing the service equipment.


4. Hinges shall have stainless steel or brass pins.

5. Cabinets shall be rated NEMA 3R and shall include two rain tight vents. Metering equipment doors shall be pad lockable. Each door shall be gasketed. Install best construction core on bottom left and right doors. See door hinge detail, Standard Plan J-3b. Concealed heavy duty stainless steel lif off hinges are allowed as an alternative. Upper left door shall have 3 hinges, lower left door shall have 2 hinges, and right door shall have 3 hinges. All doors shall have a two position door stop assembly.

6. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key number 2, 3, 4, 6, 7, 9, 16, 21 and 24. Key number 4 name plate shall read: "Photocell Bypass Test On" and "Photocell Test Off-Automatic". See Service Cabinet detail.

7. The dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

8. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpering of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.

9. The photocell unit shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell without removal of the photocell unit or the photocell enclosure.

10. All internal wire runs shall be identified with "To-From" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or Polyolefin wire marking sleeves shall be used.

11. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.

12. All internal wire runs shall be identified with "To-From" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or Polyolefin wire marking sleeves shall be used.

13. A 1% tolerance is allowed for all dimensions.

14. See plans for breaker schedule.

15. Install conduit couplings on all conduits. Place couplings flush with top of concrete foundation.

16. Seal cabinet to foundation with a 1/2" bead of silicone. Apply silicone to dry surface only.

17. The meter base portion of this service was designed to meet metering portion of Euserc Drawing 309 requirements.

SERVICE METER BASE OR DISCONNECT SWITCH (TYP.) - PREFERENCE LOCATION WHEN UTILITY REQUIRES METER OR DISCONNECT SWITCH TO BE MOUNTED ON OUTSIDE OF CABINET

BRONZE GROUND CLAMP - WITH BRONZE U-BOLT, WASHERS AND SET SCREWS

CONDUIT

# 6 INSULATED STRANDED

END OR CORNER POST (TYP.) - SEE STANDARD PLAN J-20.10

END OR CORNER POST (TYP.) - SEE STANDARD PLAN J-20.10

CHAIN LINK GATE - SEE STANDARD PLAN J-30.10

SERVICE CABINET TYPE E
(0 - 200 AMP TYPE 240/480 SINGLE PHASE
STANDARD PLAN J-10.22-00)

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakitch III
5/29/13
Washington State Department of Transportation

NOTE:

1. Metering Arrangements vary with different serving utilities. The utility may require meter base mounting in the enclosure, on the side, or on the back of the enclosure. The utility may require the dimension between the door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting detail, see Standard Plan J-3b. The Contractor shall verify the serving utility's requirements prior to fabrication of and installing the service equipment.

2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor shall verify the serving utilities requirements prior to fabrication and installing the service equipment.


4. Hinges shall have stainless steel or brass pins.

5. Cabinets shall be rated NEMA 3R and shall include two rain tight vents. Metering equipment doors shall be pad lockable. Each door shall be gasketed. Install best construction core on bottom left and right doors. See door hinge detail, Standard Plan J-3b. Concealed heavy duty stainless steel lif off hinges are allowed as an alternative. Upper left door shall have 3 hinges, lower left door shall have 2 hinges, and right door shall have 3 hinges. All doors shall have a two position door stop assembly.

6. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key number 2, 3, 4, 6, 7, 9, 16, 21 and 24. Key number 4 name plate shall read: "Photocell Bypass Test On" and "Photocell Test Off-Automatic". See Service Cabinet detail.

7. The dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

8. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpering of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.

9. The photocell unit shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell without removal of the photocell unit or the photocell enclosure.

10. All internal wire runs shall be identified with "To-From" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or Polyolefin wire marking sleeves shall be used.

11. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.

12. All internal wire runs shall be identified with "To-From" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or Polyolefin wire marking sleeves shall be used.

13. A 1% tolerance is allowed for all dimensions.

14. See plans for breaker schedule.

15. Install conduit couplings on all conduits. Place couplings flush with top of concrete foundation.

16. Seal cabinet to foundation with a 1/2" bead of silicone. Apply silicone to dry surface only.

17. The meter base portion of this service was designed to meet metering portion of Euserc Drawing 309 requirements.
TIMBER LUMINAIRE SUPPORT

KEY
1. GALVANIZED STEEL OR ALUMINUM MAST ARM - CONFIGURATIONS VARY WITH MANUFACTURER
2. LUMINAIRE - SEE CONTRACT FOR TYPE AND NUMBER
3. MOUNTING HEIGHT - ROADWAY TO LUMINAIRE ELEVATION DIFFERENCE ± 2% - SEE CONTRACT
4. MAST ARM LENGTH - SEE CONTRACT
5. 5/8" GALVANIZED THIMBLE EYE BOLT (SINGLE OR DOUBLE) WITH WASHERS AND NUTS OR EYENUT
6. BONDING FOR POLE AND BRACKET CABLE
7. EQUIPMENT GROUNDING CONDUCTOR - SEE STANDARD PLAN J-60.05
8. FROM GROUND LINE TO 1/2 ABOVE GROUND, ENCLOSE EQUIPMENT GROUNDING CONDUCTOR IN GALVANIZED STEEL CONDUIT, CODE SIZED; ABOVE 1/2 FROM GROUND, STAPLE EQUIPMENT GROUNDING CONDUCTOR TO POLE. CONNECT TO SUPPLEMENTAL GROUND, PER STANDARD PLAN J-60.05
9. SERVICE WEDGE CLAMP
10. ACER TRIPLEX OR FOURPLEX CONDUCTORS - SEE CONTRACT
11. CU/L AL SPLIT BOLT CONNECTOR
12. MESSANGER CABLE
13. INSULATING TAPE FOR WATERPROOF CONNECTION
14. FUSED QUICK DISCONNECT, PER STANDARD SPECIFICATION 9-29.7 - USE 30 AMP FUSES FOR HIGH MAST SUPPORTS
15. WEATHERHEAD - SIZE AS REQUIRED
16. WEATHERHEAD - SIZE AS REQUIRED
17. STEEL CONDUIT
18. 6" X 6" X 4" NEMA 3R JUNCTION BOX WITH RAIN-TIGHT HUBS AND REMOVABLE COVER
19. GROUNDING LUG
20. 12 POLE TERMINAL BLOCK
21. DIRECT BURIAL CONDUCTORS OR GALVANIZED STEEL CONDUITS WITH CONDUCTORS - SEE CONTRACT
22. GROUNDING BUSHING
23. SUPPLEMENTAL GROUND - SEE STANDARD PLAN J-60.05
24. CLASS 5 TIMBER POLE - LENGTH SUFFICIENT FOR MOUNTING HEIGHT AND BURIAL DEPTH
25. CLASS 2 TIMBER POLE - LENGTH SUFFICIENT FOR MOUNTING HEIGHT AND BURIAL DEPTH
26. 1/4" X 10" PLATE COLLAR BENT TO FIT POLE DIAMETER (8" - 10")
27. 3/8" X 4" MACHINE BOLTS (FOUR REQUIRED) WITH WASHERS AND NUTS
28. 1/2" LAG BOLTS (SIX REQUIRED) - DRILL 8/16" HOLE IN PLATE
29. 2" PIPE
30. 3/4" BOLT HOLE 2" FROM GUSSET PLATE, SMOOTH HOLE EDGES
31. 1" NON-METALLIC CONDUIT WITH 1" STRAPS SPACED MAXIMUM 16" APART AND NEAR ALL CONDUIT ENDS
32. DISTANCE VARIES, 30" MIN TO 50" MAX DEPENDING ON LINE CLEARANCE REQUIREMENTS
33. CONDUIT GROUND CLAMP

NOTES
1. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.
2. When down guys are required, see Standard Plan J-15.15.
1. An eight-way expanding anchor may be used as an acceptable alternate to a power installed helical screw anchor.

2. If anchor hole diameter is greater than nominal diameter of folded anchors, a 6" diameter rock shall be tampéd in to replace the disturbed soil immediately above the anchor.

3. See Standard Plan J-7c for Type IV or Type V Strain Pole details not shown.

4. Strandvise or Guy Wrap may be used.

GUY WRAP (TYP.) - SEE NOTE 4

GALVANIZED STEEL BAR ~ 2" DIA. 12 GAUGE

SADDLE CASTING

STRAIN INSULATOR ~ SEE DETAIL

SEE GUY WRAP FOR DETAILS NOT SHOWN

GROUND CLAMP

STRAIN INSULATOR ~ SEE DETAIL

GUY WRAP

WIRE ROPE THIMBLE (TYP.)

FINISHED GRADE

GUY GUARD 8'

YELLOW REFLECTIVE PLASTIC GUY GUARD

GUY WRAP

WIRE ROPE THIMBLE (TYP.)

FINISHED GRADE

GUY GUARD

YELLOW REFLECTIVE PLASTIC GUY GUARD

5/8" STRAIGHT STRAND EYE BOLT WITH 2 1/2" SQUARE CURVED WASHER AND (2) HEX NUTS

5/8" ANGLE STRAND EYE BOLT WITH TWO-HOLE LIFT PLATE, 1/2" LAG BOLT, 2 1/2" SQUARE CURVED WASHER AND DOUBLE HEX NUTS (DOUBLE EYE BOLT FOR MULTIPLE GUYS) (TYP.)

GUY WRAP (TYP.) - SEE NOTE 4

STRAIN INSULATOR ~ SEE DETAIL

5/8" STRAIGHT STRAND EYE BOLT WITH 2 1/2" SQUARE CURVED WASHER AND (2) HEX NUTS

STRAIN INSULATOR ~ SEE DETAIL

40' CLASS STRAIN POLE DETAIL

FINISHED GRADE

COMPACTED PIT RUN ROCK ~ 6" TO 12" IN ACCORDANCE WITH STANDARD SPECIFICATION 2.09-3(1)

TOP OF ROADWAY

SIGNATURE BLOCK

SIGNAL DISPLAY VERTICAL CLEARANCE TO ROADWAY

HORIZONTAL DISTANCE FROM STOP LINE

<table>
<thead>
<tr>
<th>MIN.</th>
<th>MAX.</th>
<th>MIN.</th>
<th>MAX.</th>
<th>MIN.</th>
<th>MAX.</th>
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</table>

MEASURED FROM BOTTOM OF SIGNAL HEAD HOUSING TO ROADWAY

STANDARD PLAN J-15.15-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakitch III 06-16-10

STATE ROAD ENGINEER

Washington State Department of Transportation
NOTES
1. All poles shall be hot dip galvanized per AASHTO M111.
2. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete. Provide 3" x 0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with manufacturer's recommended crimper).
4. When additional crossing time is provided by an extended pushbutton press, a "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" plaque (R10-32P) shall be installed above the Accessible Pedestrian Signal assembly.
5. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.

FINISHED GRADE
3/4" CHAMFER
1/2" RADIUS (TYP.)
1 1/2" CLR. (TYP.)
1 1/2" CLR. 5/8" (TYP.)
1 1/2" CLR. (TYP.)
1/2" STEEL PLATE
5/8" DIAMETER HOLE (TYP.)
1 1/2" DIAMETER BOLT CIRCLE
3/8" PREMOLDED JOINT FILLER
#4 (TYP.)
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

1. See Standard Specification 9-06.16 for Breakaway Base Connection details. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The Breakaway Base Connection details are only shown on this plan to illustrate how parts are assembled.


4. When additional crossing time is needed, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal assembly. Add 14" to post to accommodate plaque and leave 2" space between signs.

5. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.

ACCESSIBLE BREAKAWAY PEDESTRIAN PUSHBUTTON (PPB) POST

STANDARD PLAN J-20.15-02

Sheet 1 of 1 sheet

APPROVED FOR PUBLICATION

Pasco Bakotich III 6/10/13

Engineer

Washington State Department of Transportation
**NOTES**

2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11 gage, 4 1/2" O.D. at slipfitter weld. Taper shall be 0.14 inches per foot.
3. All poles shall be hot dip galvanized per AASHTO M 111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
7. Hand holes shall include a removable, rain-tight cover and gasket, fastened with two stainless steel screws (ASTM 593).
8. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to vertical steel reinforcing bar with connector suitable for use embedded in concrete.

**BASE PLATE DETAIL**

- Install rosette if knockout is open
- Hand hole - see Note 7
- 1/4" weep hole
- Lock nipple
- Offset slipfitter - offset to front of pole

**MATCHLINE** - USE DETAILS FOR PEDESTRIAN SIGNAL HEAD WITH TYPE D MOUNT

**GROUNDING CONNECTION**

Configurations vary among different manufacturers (shown exploded for clarity)

**PEDESTRIAN SIGNAL STANDARD (TYPE PS)**

**DETAILS**

**STANDARD PLAN J-20.16-01**

- Effective: August 5, 2013 to August 3, 2014
- Approved for publication
- Prepared by: Pasco Bakotich
- Date: 7/12/12
- Washington State Department of Transportation

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**Drawn by:** L. KAUFER

**Effective:** August 5, 2013 to August 3, 2014
2. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Install heat shrink caps on all spare conductors not terminated on a terminal strip.
4. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete; provide 3" - 0" min. slack. Attach to pole ground stud with a full circle crimp-on connector (crimped with manufacturer's recommended crimper).
5. Equipment grounding conductor shall attach to grounding stud with a full circle crimp-on connector (crimped with a manufacturer's recommended crimper).

### 5C Pedestrian Head Terminations

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<td>Don't Walk Display</td>
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<td>Walk Display</td>
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<tr>
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### 7C Pedestrian Head Terminations

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<td>W</td>
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<td>7*6</td>
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<td>Don't Walk Display</td>
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<tr>
<td>7*2</td>
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<td>Walk Display</td>
</tr>
<tr>
<td>7*3</td>
<td>WB</td>
<td>Neutral Conductor</td>
</tr>
</tbody>
</table>

### Associated Phase Number

- 5C: 1
- 7C: 6

**Steel Reinforcing Bar**

- 3/8” Drain Tube
- 1/4” Diameter x 1” Long Stainless Steel Stud
- Full Circle Crimp-On Connector (Type YP)
- Supplemental Grounding Conductor - See Note 4

**Grounding Connection**

- Grounding Conductor - See Note 5
- Insulator Sleeve
- 2C (SH) Conductor - To Pushbutton (See Contract Plans For Quantities)
- Accessible Pedestrian Pushbutton Wiring Detail

**Pedestrian Signal Wiring Detail**

- Double Pedestrian Signal Wiring Detail (Type C Mounting Shown)
- Pedestrian Signal Wiring Detail (Type D Mounting Shown)
- Accessible Pedestrian Pushbutton Wiring Detail
- Pedestrian Signal Wiring Detail

**Equipment Grounding Conductor**

- Leveling Nut (Type YP)
- Steel Reinforcing Bar (Type YP)
- Conduit Coupling - InstallFlush With Top Of Foundation (Do Not Glue PVC Stubout)

2. Steel shaft shall be tapered either round or dodecagon (12 sided). 11 gage, 4 1/2" O.D. at slipfitter. Taper shall be 0.14 inches per foot.

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

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


6. Pedestrian signal displays mounted on the side of an octagonal (8 sided) traffic signal pole with a pole attachment angle other than 0°, 45°, 90°, 135°, 180°, 225°, 270°, or 315° shall utilize:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.

7. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.
FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.18

2C (SH) B&W CABLE - TO MOUNTING HARDWARE DETAILS

CLAMP CONDUCTORS TO PREVENT SLIPPING (TY)

2C (SH) B&W CABLE - TO FLASHING BEACON

INSTALL SIZED REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-20.20 FOR GROUND CONNECTION DETAILS

2C (SH) B&W CABLE - TO FLASHING BEACON

STEEL, REINFORCING BAR (TY)

2C (SH) B&W CABLE - FROM FOUNDATION WIRING

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3

CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

1" DIAMETER ELECTRICAL CONDUIT

CONDUIT COUPLING - INSTALL FLASH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

LEVELING NUT (TY)

POLE

8" FLASHING BEACON HOUSING

TERMINAL BLOCK (TY)

ORNAMENT CAP - WITH 2-WAY FLASHER

TERMINAL BLOCK (TY)

FLASHER 1

8" FLASHING BEACON

14" WEEP HOLE

FLASHING BEACON WIRING

FLASHER 2

8" FLASHING BEACON

14" WEEP HOLE

COLOR USE
B POWER
W NEUTRAL
R FLASHER 1
Bu FLASHER 2

NOTE
1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3" - 0" min. slack. Clamp to vertical steel reinforcing bar with listed connector suitable for use embedded in concrete.
5. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.

NOTES

FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.18

2C (SH) B&W CABLE - TO MOUNTING HARDWARE DETAILS

CLAMP CONDUCTORS TO PREVENT SLIPPING (TY)

2C (SH) B&W CABLE - TO FLASHING BEACON

INSTALL SIZED REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-20.20 FOR GROUND CONNECTION DETAILS

2C (SH) B&W CABLE - TO FLASHING BEACON

STEEL, REINFORCING BAR (TY)

2C (SH) B&W CABLE - FROM FOUNDATION WIRING

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3

CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

1" DIAMETER ELECTRICAL CONDUIT

CONDUIT COUPLING - INSTALL FLASH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

LEVELING NUT (TY)

POLE

8" FLASHING BEACON HOUSING

TERMINAL BLOCK (TY)

ORNAMENT CAP - WITH 2-WAY FLASHER

TERMINAL BLOCK (TY)

FLASHER 1

8" FLASHING BEACON

14" WEEP HOLE

FLASHING BEACON WIRING

FLASHER 2

8" FLASHING BEACON

14" WEEP HOLE

COLOR USE
B POWER
W NEUTRAL
R FLASHER 1
Bu FLASHER 2

NOTE
1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3" - 0" min. slack. Clamp to vertical steel reinforcing bar with listed connector suitable for use embedded in concrete.
5. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.

NOTES

FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.18

2C (SH) B&W CABLE - TO MOUNTING HARDWARE DETAILS

CLAMP CONDUCTORS TO PREVENT SLIPPING (TY)

2C (SH) B&W CABLE - TO FLASHING BEACON

INSTALL SIZED REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-20.20 FOR GROUND CONNECTION DETAILS

2C (SH) B&W CABLE - TO FLASHING BEACON

STEEL, REINFORCING BAR (TY)

2C (SH) B&W CABLE - FROM FOUNDATION WIRING

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3

CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

1" DIAMETER ELECTRICAL CONDUIT

CONDUIT COUPLING - INSTALL FLASH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

LEVELING NUT (TY)

POLE

8" FLASHING BEACON HOUSING

TERMINAL BLOCK (TY)

ORNAMENT CAP - WITH 2-WAY FLASHER

TERMINAL BLOCK (TY)

FLASHER 1

8" FLASHING BEACON

14" WEEP HOLE

FLASHING BEACON WIRING

FLASHER 2

8" FLASHING BEACON

14" WEEP HOLE

COLOR USE
B POWER
W NEUTRAL
R FLASHER 1
Bu FLASHER 2

NOTE
1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3" - 0" min. slack. Clamp to vertical steel reinforcing bar with listed connector suitable for use embedded in concrete.
5. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.

NOTES

FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.18

2C (SH) B&W CABLE - TO MOUNTING HARDWARE DETAILS

CLAMP CONDUCTORS TO PREVENT SLIPPING (TY)

2C (SH) B&W CABLE - TO FLASHING BEACON

INSTALL SIZED REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-20.20 FOR GROUND CONNECTION DETAILS

2C (SH) B&W CABLE - TO FLASHING BEACON

STEEL, REINFORCING BAR (TY)

2C (SH) B&W CABLE - FROM FOUNDATION WIRING

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3

CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

1" DIAMETER ELECTRICAL CONDUIT

CONDUIT COUPLING - INSTALL FLASH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

LEVELING NUT (TY)

POLE

8" FLASHING BEACON HOUSING

TERMINAL BLOCK (TY)

ORNAMENT CAP - WITH 2-WAY FLASHER

TERMINAL BLOCK (TY)

FLASHER 1

8" FLASHING BEACON

14" WEEP HOLE

FLASHING BEACON WIRING

FLASHER 2

8" FLASHING BEACON

14" WEEP HOLE

COLOR USE
B POWER
W NEUTRAL
R FLASHER 1
Bu FLASHER 2

NOTE
1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3" - 0" min. slack. Clamp to vertical steel reinforcing bar with listed connector suitable for use embedded in concrete.
5. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.
NOTES

1. See Standard Specification 9-29.3 for Cable Conductor requirements.


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

4. Heat shrink cap all spare conductors not terminated on a terminal strip.

5. When a Pedestrian Push Button is specified in contract plans, see Standard Plan J-20.20 for details.

6. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) ~ See Detail A, Standard Plan J-28.70.
NOTES


2. Steel shaft shall be tapered either round or dodecagon (12 sided), 11 gage, 4 1/2" O.D. at slipfitter. Taper shall be 0.14 inches per foot.

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

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


6. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
HOUSING FIXTURE
- THREE 12" DISPLAYS

TERMINAL BLOCK

INSTALL SIZE REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

1/4" WEEP HOLE

SUPPLIER OFFSET TOP MOUNT, PLACE OFFSET TO BACK OF POLE, DRILL TO SEAT SET SCREWS

TERMINAL BLOCK

IMSA 20-1 SC #14 CABLE - CONTINUING TO UPPER TRAFFIC SIGNAL HEAD

BRONZE 12 SECTION TERMINAL COMPARTMENT

FIELD DRILL HOLE AND INSERT AN INSULINER OR SIMILAR DEVICE TO PROTECT CONDUCTORS

DRILL AND TAP BOLT (TYP.)

NOTE
2. See Standard Specifications 9-29.17 for additional Mounting Bracket and Fitting information not shown.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. Top of Leveling Nut height shall be 1" maximum above foundation.
5. Heat shrink cap all spare conductors not terminated on a terminal strip.
6. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) ~ See Detail A, Standard Plan J-28.70.

COLOR CODE USE
R RED DISPLAY
O AMBER DISPLAY
G GREEN DISPLAY
W NEUTRAL CONDUCTOR
B SPARE CONDUCTOR

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-20.20 FOR GROUND CONNECTION DETAILS
SPARE WIRE (TYP.) - HEAT SHRINK CAPPED CABLE TO IMSA 20-1 SC #14 CABLE (SEE NOTE 5)
EQUIPMENT GROUNDING CONDUCTOR
LEVELING NUT (TYP.) - SEE NOTE 4

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3
CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

POLE
HAND HOLE
INSTALL 5 AMP QUICK DISCONNECT FOR R, O, & G CONDUCTORS.
INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR.
HEAT SHRINK CAP FOR B CONDUCTOR. SEE STANDARD SPEC. 9-29.7
PULL QUICK DISCONNECTS TIGHT TO CONDUIT.

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

ELECTRICAL CONDUIT TO JUNCTION BOX - SEE CONTRACT PLANS FOR DIAMETER

IMSA 20-1 SC #14 CABLE CONTINUED FROM FOUNDATION WIRING
IMSA 20-1 SC #14 CABLE CONTINUED FROM LOWER TRAFFIC SIGNAL HEAD WIRING

DETAİL A % UPPER TRAFFIC SIGNAL HEAD WIRING

DETAİL B % LOWER TRAFFIC SIGNAL HEAD WIRING (SHOWN LARGER FOR CLARITY)

DETAİL C % FOUNDATION WIRING

RAMP METER SIGNAL STANDARD ELECTRICAL DETAILS
STANDARD PLAN J-22.16-02

PERSPECTIVE VIEW RAMP METER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakotich III 6/10/13
STATE DESIGN ENGINEER

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
### Foundation Depth "D" Table

<table>
<thead>
<tr>
<th>Foundation Type</th>
<th>GROUND SLOPE ≤ 1:V</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 PSF</td>
<td>3'-0&quot; ROUND</td>
<td>1000 PSF</td>
</tr>
<tr>
<td>1500 PSF</td>
<td>3'-0&quot; SQUARE</td>
<td>1500 PSF</td>
</tr>
<tr>
<td>2500 PSF or GREATER</td>
<td>4'-0&quot; ROUND</td>
<td>2500 PSF or GREATER</td>
</tr>
</tbody>
</table>

### Foundation Reinforcement Detail

**Concrete Cast Directly Against Undisturbed Earth, Drilled Shaft**

- CONDUIT SIZE AND QUANTITY AS SHOWN IN THE CONTRACT;
- CAP BOTH ENDS;
- CONDUIT TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE IN CONCRETE;
- PAPER OR CARDBOARD FORM SHALL NOT BE IN PLACE.

**Concrete Cast Within a Corrugated Metal Pipe Stay-In-Place Form**

- CONDUIT SIZE AND QUANTITY AS SHOWN IN THE CONTRACT;
- CAP BOTH ENDS;
- CONDUIT TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE IN CONCRETE;
- PAPER OR CARDBOARD FORM SHALL NOT BE IN PLACE.

### Foundation Reinforcement and Backfill Detail

**Concrete Cast Within a Corrugated Metal Pipe Stay-In-Place Form**

- CONDUIT SIZE AND QUANTITY AS SHOWN IN THE CONTRACT;
- CAP BOTH ENDS;
- CONDUIT TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE IN CONCRETE;
- PAPER OR CARDBOARD FORM SHALL NOT BE IN PLACE.

**Concrete Cast Within a Corrugated Metal Pipe Stay-In-Place Form**

- CONDUIT SIZE AND QUANTITY AS SHOWN IN THE CONTRACT;
- CAP BOTH ENDS;
- CONDUIT TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE IN CONCRETE;
- PAPER OR CARDBOARD FORM SHALL NOT BE IN PLACE.

### Alternate #2 - Construction Method

**Metal (Subsurface) Form Required**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

- Place the concrete foundation.
- After concrete has cured, remove the entire paper or cardboard form portion.

---

**Notes**

1. This structure has been designed according to the Fifth Edition 2009 AASHO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Basic wind velocity is 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.

2. Foundations are designed for Type II, III, and SD Signal Standards with a maximum mast arm length of 60'.

3. Foundations are designed for Single Mast Arm Standards and Double Mast Arm Standards with 90' between arms. Special foundation design is required for Double Arm Standards where the angle between mast arms is either less than 90'. For Double Mast Arm Standards with 90' between arms, use larger XYZ value for foundation depth selection.

4. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office to design for Special Foundation Design.

5. Foundations constructed within Ecological Embankments shall be increased in depth by the depth of the Ecological Embankment.

6. The top 2 feet of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.

7. For design parameters between the values listed in Table, depth requirements may be interpolated between the values provided.


---

**Alternate #2 - Construction Method**

**Metal (Subsurface) Form Required**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

- Place the concrete foundation.
- After concrete has cured, remove the entire paper or cardboard form portion.

**Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).**
**SIGNAL STANDARD FOUNDATION PLACEMENTS**

**STANDARD PLAN J-26.15-01**

---

**EFFECTIVE:** AUGUST 5, 2013 TO August 3, 2014

---

**NOTE**

\* = 2'-0" FOR 3'-0" DIAM. FOUNDATION
2'-6" FOR 4'-0" DIAM. FOUNDATION
2'-6" FOR 3'-0" SQUARE FOUNDATION

---

**PLAN**

- **SECTION A**
  - **CASE A**
  - **Existing Grade or Fill Slope = Flat to 10H : 1V**
  - **Slope to Drain Away from the Foundation**
  - **Slope Not Steeper Than 5%**

- **CASE B**
  - **Slope to Drain Away from the Foundation**
  - **Slope Not Steeper Than 5%**
  - **Slope Steeper Than 3H : 1V**
  - **But Not Steeper Than 2H : 1V**

- **CASE C**
  - **Slope to Drain Away from the Foundation**
  - **Slope Not Steeper Than 5%**
  - **Existing Grade or Fill Slope = > 3H : 1V to 2H : 1V**

- **CASE D**
  - **Slope to Drain Away from the Foundation**
  - **Slope Not Steeper Than 5%**
  - **Existing Grade or Fill Slope = > 3H : 1V to 2H : 1V**

---

**ELEVATION**

- **CASE A**
  - **Finished Grade Slope = Flat to 2H : 1V**
  - **(4H : 1V Slope Shown)**
  - **Slope to Drain Away From the Foundation**
  - **Slope Not Steeper Than 5%**

- **CASE B**
  - **Finished Grade Slope = Flat to 10H : 1V**
  - **Slope Shown**
  - **Slope to Drain Away From the Foundation**
  - **Slope Not Steeper Than 5%**

- **CASE C**
  - **Finished Grade Slope = Flat to 10H : 1V**
  - **Slope Shown**

---

**TOP OF FOUNDATION LEVEL WITH GRADE**

**SIGNAL STANDARD FOUNDATION**

- **See Standard Plan J-26.10**

---

**EXISTING GRADE OR FILL SLOPE = > 3H : 1V**

**PLAN**

- **CASE B**
  - **Slope to Drain Away From the Foundation**
  - **Slope Not Steeper Than 5%**
  - **Slope Steeper Than 3H : 1V**
  - **But Not Steeper Than 2H : 1V**

---

**EXISTING GRADE OR FILL SLOPE = FLAT TO 10H : 1V**

**PLAN**

- **CASE A**
  - **Slope to Drain Away From the Foundation**
  - **Slope Not Steeper Than 5%**

---

**EXISTING GRADE OR FILL SLOPE = FLAT TO 2H : 1V**

**ELEVATION**

- **CASE C**
  - **Slope to Drain Away From the Foundation**
  - **Slope Not Steeper Than 5%**

---

**EXISTING GRADE OR FILL SLOPE = FLAT TO 10H : 1V**

**PLAN**

- **CASE D**
  - **Slope to Drain Away From the Foundation**
  - **Slope Not Steeper Than 5%**

---

**EXISTING GRADE OR FILL SLOPE = FLAT TO 2H : 1V**

**ELEVATION**

- **CASE D**
  - **Slope to Drain Away From the Foundation**
  - **Slope Not Steeper Than 5%**

---
EXISTING GRADE OR CUT SLOPE FLAT TO 10H : 1V 
CASE F

EXISTING GRADE OR CUT SLOPE STEEPER THAN 3H : 1V (2H : 1V MAX.) 
CASE H

SIGNAL STANDARD FOUNDATION PLACEMENTS

STANDARD PLAN J-26.15-01

APPROVED FOR PUBLICATION

Pasco Bakotich III 05/17/12

State Engineer

Washington State Department of Transportation
### ALTERNATE #1 DRILLED SHAFT-TYPE CONSTRUCTION - DEPTH "D"

<table>
<thead>
<tr>
<th>GROUND SLOPE = 3H : 1V OR FLATTER</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>GROUND SLOPE = 3H : 1V TO 3H : 1V</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUNDATION TYPE</td>
<td>POLE CLASS - RESULTANT HORIZONTAL TENSION (LBS)</td>
<td>FOUNDATION TYPE</td>
</tr>
<tr>
<td>1000 PSF</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td>1000 PSF</td>
</tr>
<tr>
<td>3'-0&quot; ROUND</td>
<td>11'-0&quot; 13'-0&quot; 15'-0&quot; 17'-0&quot; 19'-0&quot; 21'-0&quot;</td>
<td>3'-0&quot; ROUND</td>
</tr>
<tr>
<td>4'-0&quot; ROUND</td>
<td>10'-0&quot; 12'-0&quot; 14'-0&quot; 16'-0&quot; 18'-0&quot; 20'-0&quot;</td>
<td>4'-0&quot; ROUND</td>
</tr>
<tr>
<td>5'-0&quot; ROUND</td>
<td>9'-0&quot; 11'-0&quot; 13'-0&quot; 15'-0&quot; 17'-0&quot; 19'-0&quot;</td>
<td>5'-0&quot; ROUND</td>
</tr>
<tr>
<td>6'-0&quot; ROUND</td>
<td>8'-0&quot; 10'-0&quot; 12'-0&quot; 14'-0&quot; 16'-0&quot; 18'-0&quot;</td>
<td>6'-0&quot; ROUND</td>
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<td>7'-0&quot; 9'-0&quot; 11'-0&quot; 13'-0&quot; 15'-0&quot; 17'-0&quot;</td>
<td>7'-0&quot; ROUND</td>
</tr>
</tbody>
</table>

### ALTERNATE #2 CORRUGATED METAL PIPE TYPE CONSTRUCTION - DEPTH "D"

<table>
<thead>
<tr>
<th>GROUND SLOPE = 3H : 1V OR FLATTER</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>GROUND SLOPE = 3H : 1V TO 3H : 1V</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUNDATION TYPE</td>
<td>POLE CLASS - RESULTANT HORIZONTAL TENSION (LBS)</td>
<td>FOUNDATION TYPE</td>
</tr>
<tr>
<td>1000 PSF</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td>1000 PSF</td>
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<td>3'-0&quot; ROUND</td>
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<td>3'-0&quot; ROUND</td>
</tr>
<tr>
<td>4'-0&quot; ROUND</td>
<td>10'-0&quot; 12'-0&quot; 14'-0&quot; 16'-0&quot; 18'-0&quot; 20'-0&quot;</td>
<td>4'-0&quot; ROUND</td>
</tr>
<tr>
<td>5'-0&quot; ROUND</td>
<td>9'-0&quot; 11'-0&quot; 13'-0&quot; 15'-0&quot; 17'-0&quot; 19'-0&quot;</td>
<td>5'-0&quot; ROUND</td>
</tr>
<tr>
<td>6'-0&quot; ROUND</td>
<td>8'-0&quot; 10'-0&quot; 12'-0&quot; 14'-0&quot; 16'-0&quot; 18'-0&quot;</td>
<td>6'-0&quot; ROUND</td>
</tr>
<tr>
<td>7'-0&quot; ROUND</td>
<td>7'-0&quot; 9'-0&quot; 11'-0&quot; 13'-0&quot; 15'-0&quot; 17'-0&quot;</td>
<td>7'-0&quot; ROUND</td>
</tr>
</tbody>
</table>

### ALTERNATE #2 CONSTRUCTION METHOD

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

Place the concrete foundation. After concrete has cured, remove the entire paper or cardboard form portion. Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(3).
**NOTES**

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

2. Basic wind velocity 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.

3. Pole shaft shall have 0.14" ft/lb.


5. Hand holes may be 6" x 4", oval or rectangle. Provide a "J" or "C" hook at 90° or 180° off upper hand hole.


---

**STRAIN POLE DIMENSION CHART**

<table>
<thead>
<tr>
<th>KEY</th>
<th>ITEM</th>
<th>POLE CLASS (Resultant Horizontal Tension)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1900</td>
</tr>
<tr>
<td>A</td>
<td>BASE PLATE</td>
<td>15&quot;</td>
</tr>
<tr>
<td>B</td>
<td>ANCHOR BOLT CIRCLE DIAM.</td>
<td>15&quot;</td>
</tr>
<tr>
<td>C</td>
<td>POLE BASE DIAMETER</td>
<td>11&quot;</td>
</tr>
<tr>
<td>D</td>
<td>BASE PLATE THICKNESS</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>E</td>
<td>ANCHOR BOLT DIAMETER</td>
<td>1 1/4&quot;</td>
</tr>
</tbody>
</table>

**BASE PLATE CENTERED**

**BASE PLATE**

- 3/16" THICK
- 1" DIAMETER + 1/4" (TYP.)
- POLE WALL

**ANCHOR BOLT**

- DIAMETER + 1/4" (TYP.)
- FOR 3 GAGE
- FOR 1 1/4 GAGE

**POLE HOLE DETAIL**

- REMOVABLE RAIINTIGHT HAND HOLE COVER WITH GASKET — FASTEN WITH 2 STAINLESS STEEL (ASTM F-592) SCREWS

**STRAIN CLAMP DETAIL**

- 3/8" THICK (A36) STEEL CLAMP
- 1" DIAMETER + 1" SCHEDULE 40 PIPE SLEEVE
- CABLE CONNECT BOLT

**ATTACHMENT POINT ANGLES**

- 270° LUMINAIRE AND WIREFAY
- 0° LUMINAIRE AND WIREFAY

**BASE PLATE AND ANCHOR PLATE ASSEMBLY DETAIL**

- BASE PLATE
- ANCHOR PLATE — 2 REQUIRED
- ANCHOR BOLT & ANCHOR PLATE (TYP.) SUPPLIED BY SIGNAL POLE MANUFACTURER
- 6 HEX NUTS AND 6 PLAIN WASHERS REQUIRED PER BOLT
- 1" THICK ANCHOR BOLT ANCHOR PLATE — 2 REQUIRED
- 1" DIAMETER CIRCLE + 1/4" (TYP.)

**MAST ARM LENGTH — AS NOTED IN CONTRACT**

**POLE WALL**

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

**WIREFAY DETAIL**

- 2 1/2" DIAMETER CHASE NIPPLE
- 2 1/2" DIAMETER SHORT NIPPLE

**REMOVABLE CAP**

- STRAIN CLAMP — TIE TWO PER POLE (SEE DETAIL)
- HAND HOLE (TYP.) (SEE DETAIL) — PROVIDE A "J" OR "C" HOOK AT 90° OR 180° OFF UPPER HAND HOLE

**BASE PLATE**

- BASE PLATE (SEE DETAIL)

**TYPE IV STANDARD**

- BASE PLATE (SEE DETAIL)
- ANCHOR PLATE — 2 REQUIRED
- ANCHOR BOLT & ANCHOR PLATE (TYP.) SUPPLIED BY SIGNAL POLE MANUFACTURER
- 6 HEX NUTS AND 6 PLAIN WASHERS REQUIRED PER BOLT
- 1" THICK ANCHOR BOLT ANCHOR PLATE — 2 REQUIRED
- 1" DIAMETER CIRCLE + 1/4" (TYP.)

**TYPE V STANDARD**

- BASE PLATE (SEE DETAIL)
- ANCHOR PLATE — 2 REQUIRED
- ANCHOR BOLT & ANCHOR PLATE (TYP.) SUPPLIED BY SIGNAL POLE MANUFACTURER
- 6 HEX NUTS AND 6 PLAIN WASHERS REQUIRED PER BOLT
- 1" THICK ANCHOR BOLT ANCHOR PLATE — 2 REQUIRED
- 1" DIAMETER CIRCLE + 1/4" (TYP.)
NOTES

1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50' (H1).

3. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire 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.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

STEEL LIGHT STANDARD

STANDARD PLAN J-28.10-01

Sheet 2 of 2 Sheets

Approved for Publication
Pasco Bakaitis III 05-11-11
Washington State Department of Transportation

Effective: August 5, 2013 to August 3, 2014
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):

\[
\begin{align*}
20' & \text{ (longitudinal)} = \text{use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.} \\
6H:1V & \text{min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.}
\end{align*}
\]

**NOTES**

- Based on field conditions, steel light standard placement can be adjusted ± 4.0', when approved by the Project Engineer.
SECTION VIEW
CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

EMBANKMENTS

SECTION VIEW
CASE C
FORE SLOPES 4H:1V OR FLATTER

DITCH SECTIONS

SECTION VIEW
CASE D
FORE SLOPES STEEPER THAN 4H:1V (2H:1V MAX.)
NOTES

EMBANKMENTS

CASE E
SLOPES 2H:1V OR FLATTER BEHIND TRAFFIC BARRIER

CASE F
SLOPES STEEPER THAN 2H:1V BEHIND TRAFFIC BARRIER (SPECIAL DESIGN FOUNDATION)

BACK SLOPES

CASE G
ROADSIDE DITCH WITH FORE SLOPE STEEPER THAN 4H:1V (2H:1V MAX.)

CASE H
CUT SECTION WITH BACK SLOPE STEEPER THAN 3H:1V (2H:1V MAX.)
NOTES
NOTE

**CONSTRUCTION METHODS**

**METHOD 1**

This option is only used when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

**METHOD 2**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" diameter, corrugated metal (pipe) form. The corrugated metal form shall not extend more than 6" below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
HEAVY HEX NUT (TYP.)
SIZE TO MATCH ANCHOR BOLT
SEE TABLE - STD. PLAN J-28.30
ROUND WASHER (TYP.)
SIZE TO MATCH ANCHOR BOLT
LUMINAIRE POLE
POLE BASE PLATE
KEEPER PLATE
ANCHOR/SLIP PLATE ASSEMBLY
SEE STD. PLAN J-28.42
CAPPED CONDUIT
SLIP BASE FOUNDATION
SEE STD. PLAN J-28.30
3" DIAM. GROUT WELL (TYP.)


LEAVE 6" HOLLOW IN THE CENTER OF THE GROUT PAD

SECTION A
(CONDUIT NOT SHOWN)

3/8" D. DRAIN TUBE IN GROUT PAD

TOP OF ANCHOR/SLIP PLATE ASSEMBLY

APPLY GROUT EVEN WITH THE BOTTOM OF THE POLE BASE PLATE AFTER PLUMBING THE LUMINAIRE POLE

BOLT CAN PROTRUDE 5/8" MAX. WITH A MIN. OF TWO THREADS EXPOSED ABOVE NUT

STANDARD PLAN J-28.40-01

NOTE

1. 50' (H1) 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-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.

4. See Standard Specification Section 6-03.3(33) and B-20.3 (4) for the torque requirements for all of the Anchor Bolt installations. Install 1-inch diameter Clamping Bolts in all Slip Bases to a torque of 95 Foot-Pounds - See Standard Specification Section B-20.3 (13A).


APPLY GROUT EVEN WITH THE BOTTOM OF THE POLE BASE PLATE AFTER PLUMBING THE LUMINAIRE POLE

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
**NOTES**

1. 50' (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 Plate notched surfaces shall be finished smooth.

3. The Clamping Bolts shall be high strength steel, manufactured from AASHTO M164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M232.


5. Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

6. Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or reusing a luminaire pole.
LUMINAIRE POLE

ROUND AND SMOOTH INSIDE EDGES

POLE BASE PLATE

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

TYPICAL HAND HOLE ORIENTATION

THE CONDUCTOR ATTACHMENT CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS. CONDUCTOR ATTACHMENTS ARE REQUIRED ON ALL POLES, FIXED OR SLIP BASE.

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 Plate notched surfaces shall be finished smooth.


3. Galvanizing shall be in accordance with AASHTO M 111.

4. See Standard Plans C-8b, C-85.14, and J-28.60 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barrier.


Top View

POLE BASE PLATE DETAIL

FOR DETAILS NOT SHOWN, SEE VIEW A ABOVE

ORIENTATION FOR INSTALLATION ON BRIDGE OR RETAINING WALL - SEE STANDARD PLAN J-28.45

FOR PLATE THICKNESS, REFER TO NOTE 1

SECTION D

6" DIAM. HOLE

1/4" THICK, OR NO THINNER THAN POLE WALL THICKNESS. TACK WELD OR SEAL WELD TO BASE PLATE.

t = SIZE OF FILLET WELD BY LUMINAIRE POLE FABRICATOR.

NOTE

STEEL LIGHT STANDARD POLE BASE AND HAND HOLE DETAILS

STANDARD PLAN J-28.50-02

APPRISED FOR PUBLICATION

Pasco Bakotich III 06-02-11

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
REMOVABLE RAINTIGHT HAND HOLE COVER WITH GASKET - FASTEN WITH TWO STAINLESS STEEL (ASTM F 593) SCREWS

1 1/4" DIA. HOLE (TYP.)

STEEL PLATE 1 3/4" (ASTM A 572 GR. 50 OR ASTM A 588)

BACK-UP RING

5" DIA. HOLE

CONDUCTOR ATTACHMENT - SEE DETAIL

POLE WALL

GROUNDBOLT

HAND HOLE

T = RIM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR

1/4" THICK FILLET WELD BY LUMINAIRE POLE FABRICATOR

SECTION B

NOTES

2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.
4. Install grout after plumbing the pole.

LUMINAIRE POLE

HAND HOLE - CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS

ANCHOR BOLT (TYP.) - SEE NOTE 1

TOP OF POLE BASE PLATE

GROUT

TOP OF FOUNDATION / BARRIER

SEE NOTE 4

PLACEMENT DETAIL

3/8" DRAIN TUBE

CONDUCTOR ATTACHMENT DETAIL

CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS

SECTION B

CLAMP = 1/8" THICK STEEL, 2" WIDE X 3" LONG

CONDUCTOR ATTACHMENT BRACKET = 1/4" THICK STEEL, 2" WIDE X 4" LONG

T = SIZE OF FILLET WELD BY LUMINAIRE POLE FABRICATOR

0

T = RIM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR

STEEL LIGHT STANDARD BARRIER MOUNTED BASE

STANDARD PLAN J-28.60-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-02-11

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

DATE

WASHINGTON

STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

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LUMINAIRE HEAD

INSTALL SIZE REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT END OF MAST ARM (TYP.)

CONDUCTOR WIRES

REMOVE ALL SLACK BEFORE INSTALLING CABLE TIE

DETAIL "A" GRS CONDUIT

SEE DETAIL "A" OR "B" PER CONDUIT TYPE

CABLE TIE = 120 POUND TENSIION STRENGTH, BLACK

APPLICATION FOR FIXED BASE SIMILAR, EXCEPT NO CABLE TIE IS REQUIRED AT JUNCTION BOX

24" SLACK REQUIRED TO ALLOW QUICK DISCONNECTS TO BE PULLED OUTSIDE HAND HOLE 8" MIN.

BONDING JUMPER WIRE FOR GRS STEEL

EQUIPMENT GROUNDING CONDUCTOR

GROUNDING CONDUCTOR = FROM FOUNDATION

DOUBLE QUICK DISCONNECTS = PULL DOWN TIGHT TO CONDUIT (SHOWN LEFT UP FOR CLARITY)

POLE AND BRACKET CABLE TO LUMINAIRE HEAD

HAND HOLE

CONDUCTOR ATTACHMENT BRACKET

GROUNDING NUT

CONDUCTOR ATTACHMENT BRACKET

GROUNDING NUT

BASE WIRING DETAIL FOR SINGLE MAST ARM (SLIP BASE SHOWN)

TO GROUNDING NUT

CONDUCTOR WIRE

BASE WIRING DETAIL FOR DOUBLE MAST ARMS (SLIP BASE SHOWN)

TO GROUNDING NUT

CONDUCTOR WIRE

JUNCTION BOX WIRING DETAIL

FOR GROUNDING REQUIREMENTS, SEE STANDARD PLAN J-60.06

CONCRETE FOUNDATION

FINISHED GROUND LINE

NOTE

TYPICAL LOCATION OF JUNCTION BOX AND FOUNDATION

STEEL LIGHT STANDARD WIRING DETAILS

STANDARD PLAN J-28.70-01

APPROVED FOR PUBLICATION

Pasco Bakotich III 05-11-11

Washington State Department of Transportation
CONCRETE, ROUTE CONDUCTOR TO 2" DIAM. CONDUIT WITH GROUNDING CONDUCTOR
CAMERA REBAR CAMS ON BOTH ENDS PLACES, CONCRETE FULL LENGTH 6 - 6- HEAVY HEX
WITH LISTED CONDUCTOR CAMERA POLE GROUNDING STUD. 4.00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

ALTERNATE # 1

ALTERNATE # 2 - CONSTRUCTION METHOD
1. Shoring or Extra Excavation as Required. Excavated area shall be backfilled with Controlled-Density Fill or with soil in accordance with Standard Specification 8-20.3(2).

WIND VELOCITY:
90 MPH. Maximum Pole Deflection shall not exceed 0.7" in 30 MPH and 1.4" in 70 MPH wind.

LOAD CASE # 1
Camera (1) - EPA = 4.00 sq. ft. @ 2'-0" above pole top, and:
Dish (1) - 1'-0" diameter @ pole top level.

LOAD CASE # 2
Camera (1) - EPA = 4.00 sq. ft. @ 2'-0" above pole top, and:
Camera (2) - EPA = 0.54 sq. ft. each @ 1'-0" and 2'-0" from pole top, and:
NEMA Cabinet (2) - EPA = 1.33 sq. ft. each @ 3'-8" from pole top, install both NEMA cabinets back to back, and:
Radio Equipment (2) - EPA = 2.25 sq. ft. each @ 2'-0" and 9'-0" from pole top.

EPA = Effective Projected Area
**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**

**NOTES**

1. Verify Pole Top Plate, Camera Mount Plate, Bolt Circle, and Bolt Holes are adequate for the required Camera prior to releasing poles for manufacturing.

2. Steel shall be galvanized after fabrication per AASHTO M111. Hardware shall be galvanized per AASHTO M232. Fasteners less than 0.50" (in.) diameter shall be stainless or brass.

3. Attach Camera to Camera Mount Plate using four (4) 3/8"-16 UNC x 1.75" stainless steel bolts with eight (8) stainless steel washers and four (4) lock-nuts with nylon inserts, or as approved by the Camera Supplier.

4. For Ground Mount Details, see Standard Plan J-29.10. For Elbow Mount Details, see Standard Plan J-29.16.

**DESIGN CRITERIA:**

This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Signals, and Traffic Signals. Basic wind velocity is 90 MPH. Design Life/Recurrence Interval 50 years.

**WIND VELOCITY:**

90 MPH

Maximum Pole Deflection shall not exceed 0.7" in 30 MPH and 1.4" in 70 MPH wind.

**LOAD CASE #1:**

Camera (1) - EPA = 4.00 sq. ft. @ 2'-0" above pole top, and

Dish (1) - 1'-0" diameter @ pole top level.

**LOAD CASE #2:**

Camera (1) - EPA = 4.00 sq. ft. @ 2'-0" above pole top, and

Camera (2) - EPA = 0.54 sq. ft. @ 1'-0" and 2'-0" from pole top, and

NEMA Cabinet (2) - EPA = 1.33 sq. ft. @ 3'-0" from pole top, install back-to-back NEMA Cabinets, and:

Radio Equipment (2) - EPA = 2.25 sq. ft. each @ 2'-0" and 9'-0" from pole top.

EPA = Effective Projected Area
KEY
1. Camera/TA pole mounts
2. Nema 4X (Stainless Steel) - Size 16" H X 12" W X 6" D
3. Camera mount plate
4. Camera upper handhole
5. 2" coupling
6. 2" Short nipple
7. Channel drilled 18" oversize of nipple
8. Steel washer
9. Conduit watertight locknut
10. End bushing
11. Back plate - Drill oversize for conduit, seal, washer, and locknut
12. Terminal block
13. Hinged door with two pad-lockable flip latches (Typ.)
14. J-hook for wiring

NEMA BOX ATTACHMENT DETAIL

HAND HOLE (3' FROM TOP)
RADIO ATTACHMENT HOLE

UPPER HAND HOLE
WITH FRAME AND COVER ON FACE

LOWER HAND HOLE
WITH FRAME AND COVER ON FACE

HAND HOLE
270°

LOCATE HOOK OVER 0.25" x 1.00" LONG SLOT IN POLE WALL.

NEMA BOX DETAIL

POLE TOP PLATE

0.50" DIAM J-HOOK FOR WIRING WELDED TO INTERIOR OF POLE 3'-0" FROM TOP OF POLE AND 180° FROM UPPER HANDHOLE

RADIO EQUIPMENT REINFORCING PLATE

PLATE CENTERED OVER 2.50" DIAM HOLE IN POLE WALL

LOAD CASE #2

0.25" DIAM DRILL FROM INSIDE

1/4" DIAM DRAIN HOLE

GROUNDED RECEPTACLE - GFCI 20 AMP-125 VOLTS

GROUNDING BUSS

GROUNDED NUT/ANGLE 2" COUPLINGS

HAND HOLE (1' FROM TOP)
RADIO ATTACHMENT HOLE

NEMA 4X TERMINAL CABINET (STAINLESS STEEL WITH HINGED DOOR)

24 LUG TERMINAL STRIP WITH 6 JUMPERS

COMPLETE POLE DETAIL AND CAMERA POLE DATA TABLE

SEE DETAIL

LOAD CASE #2

CAMERA POLE FOR LOADING (TOP MOUNT Camera, 2 Sidedmont Cameras, 2 NEMA CABINETS & 2 RADIO EQUIPMENTS)

STANDARD PLAN J-29.15-00

STATE DESIGN ENGINEER
Pasco Bakotich III
06-27-11
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
Camera Pole Elbow Mount – 25" Square

**NOTES**

1. For information not shown, see Steel Light Standard Elbow detail, Standard Plan J-28.45. For Camera Pole Details, see Standard Plan J-29.15.

2. Round and smooth all edges along wire-way to protect conductors.

3. The manufacturer shall verify that the Elbow Top Plate matches the Camera Pole Base, and shall submit the shop drawings for approval.

4. Galvanize after fabrication according to AASHTO M111.

5. Install galvanized steel protective band (3/16" thick * 3 1/2" high (A36)) on all four sides after truing pole, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.

---

**Elevation View**

- 1.25" Dia. Hole (Typ.)
- For 1" Dia. Anchor Bolt Assembly to Barrier or Wall (ASTM A325 or F1554 GR. 105)

**View A**

- Tap for 1 1/4" Dia. Bolt for 1 1/4" - 8 UNC, 8" Long Bolt Threaded Full Length (ASTM A325) with Two Heavy Hex Nuts and 3 Round Washers (Typ.) (ASTM A325 or F1554 GR. 105)

**View B**

- 1 5/8" Plate (A36)

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**Effective:** August 5, 2013 to August 3, 2014

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**Pasco Bakotich III**

6/20/13

State Engineer

Washington State Department of Transportation
### JUNCTION BOX DIMENSION TABLE

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<th>MARK</th>
<th>ITEM</th>
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### EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

### NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. All lid thicknesses are minimum. The diamond pattern shall be 3/32" minimum thickness.
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 fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation around contact surfaces.
5. A 1/4-20 NC x 3/4" S. S. ground stud shall be welded to the bottom of each lid: include (2) each S. S. nuts and (2) each S. S. flat washers.
6. The hinges shall allow the lids to open 180°.
7. Bolts and nuts shall be liberally coated with anti-seize compound.
8. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-20 NC x 3/4" S. S. bolt, (2) each S. S. nuts, and (2) each S. S. flat washers. Equipment bonding jumper shall be #8 AWG min. 4' of tinned braided copper.
11. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty. Heavy-Duty Junction Boxes shall not be installed in sidewalks, walkways, and shared use paths.
12. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" min. to 8" max. for final grade of new construction only. See Standard Specification 8-20.3(8). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" min. to 10" max. See Standard Specification 8-20.3(6).

### HEAVY-DUTY JUNCTION BOX TYPES 4, 5, & 6

#### STANDARD PLAN J-40.20-01

- **DATE**: 05-17-12
- **SHEET**: 1 OF 2 SHEETS
- **APPROVED FOR PUBLICATION**

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**S:\**

**2019-2020 Roadway Standards - Volume 1**

**Engineer’s Shop Drawings**

**State of Washington**

**Washington State Department of Transportation**

**Pasco Bakotic III**

**05-17-12**

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**Cable Conduit**

**GRC Conduit**

**WELDED WIRE REINFORCEMENT**

(4 x 4 - W5) + GS

**Crushed Surfacing - Per Standard Specification 9-03.9(3)**

**SECTION A**

**DIAMOND PATTERN**

SEE DETAIL 2

**HINGE**

SEE DETAIL E

**NOTE**

---

**TOP VIEW**

1. Equipment Grounding Conductor
2. Copper Solderless Crimp Connector
3. Equipment Bonding Jumper ~ see note 8
4. See Contract Plans and Special Provisions for conduit size and number
5. See Detail Plans and Special Provisions for lid size and number

---

**ISOMETRIC VIEW**

1. TYPE 5 & 6 SHOWN

---

**NOTE 8**

---

**SECTION A**

---

**NOTE 2**

---

**NOTE 3**

---

**NOTE 5**

---

**NOTE 6**

---

**NOTE 8**

---
LOCKING LID STANDARD DUTY JUNCTION BOX

**PLAN VIEW**

1. **Equipment Grounding Conductor**
   - Copper Solderless Crimp Connector
   - Equipment Bonding Jumper
   - Foundation
   - See Contract for conduit size and number

2. **Node Pattern**
   - Top of soil surface
   - 3/16 (TYP.)
   - 42"

3. **Cover Marking Detail**
   - See Note 6
   - 5/16" (TYP.)

4. **NOTES**
   1. All box dimensions are approximate. Exact configurations vary among manufacturers.
   2. Minimum lid thicknesses are shown. The diamond pattern shall be a minimum of 28% of the overall thickness. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lip cover plate and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" inch line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.
   3. Lid support members shall be 3/16" min. thick steel C, L, or T shape, welded to the frame. Exact configurations vary among manufacturers.
   4. A 1/4-20 NC x 3/4" S. S. ground stud shall be welded to the bottom of each lid; include (2) S. S. nuts and (2) S. S. flat washers.
   5. The hinges shall allow the lids to open 180°.
   6. Bolts and nuts shall be liberally coated with anti-seize compound.
   7. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to the ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinged pocket with a 5/16-20 NC x 3/4" S. S. bolt, (2) each S. S. nuts, and (2) each S. S. flat washers. Equipment Bonding Jumper shall be #6 AWG min. x 4 of timed braded copper.
   9. See the Standard Specifications for alternative reinforcement and class of concrete.
   11. Capacity ~ conduit diameter = 24"
   12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement; actual configurations of assembly will vary among manufacturers. See approved manufacturers' shop drawing for specifics.
   13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults and Pull Boxes shall not be placed within the sidewalk, walkway, shared use path, traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.
   14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" min. to 8" max. for final grade of new construction only. See Standard Specification 8-20.3(5). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" min. to 10" max. See Standard Specification 8-20.3(6).

**SECTION A**

- PVC Conduit
- GRS Conduit

**SECTION B**

- Conduits Not Shown

**COVER MARKING DETAIL**

- See Note 6
- 5/16" (TYP.)

**GROUND STUD (TYP.)**

- See Note 4

**DIAMOND PATTERN**

- See Note 2

**INSIDE WIDTH OF FOUNDATION**

- See Note 10

**GROUND STUD**

- See Note 3

**HEX COUPLING NUT (TYP.)**

- See Note 11

**COVER PLATE**

- See Note 12

**LIFT HOLE = 1" x 2" DAM.**

- See Note 13

**STANDARD PLAN J-40.30-03**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III
5/20/13

Washington State Department of Transportation

**EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014**
FRAME - L 1 3/4 x 1/2 x 3/16

HOLE = 3/4" DIAM.

S. S. PIN W/ SNAP RING GROOVE

SNAP RING

WNR - TIED IN 2 PLACES TO HEADED ANCHOR SHEAR STUD (SEE NOTE 10)

3/8" x 3" HEADED ANCHOR SHEAR STUD - WELDED TO LIP PLATE (SEE NOTE 10)

GROUND STUD WITH 2 NUTS AND 2 WASHERS (TYP.) - SEE NOTE 4

3/8" x 3" LID SUPPORT - WELDED TO LIP PLATE (SEE NOTE 10)

3/16" MIN. THICKNESS

1/2" STEEL COVER PLATE

1/2" STEEL COVER PLATE - SHOWN CUT AWAY FOR CLARITY

1 3/8" DIAM. HOLE

1/2" STEEL COVER PLATE - WELD TO STEEL COVER PLATE

LOCKING LID STANDARD DUTY JUNCTION BOX

TYPE 8

STANDARD PLAN J-40.30-03

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 5/20/13

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel welded seam construction. Finish shall be # 2B for backbox and # 4 for the cover. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel.

2. Holes for conduit(s) shall be field drilled or punched in the box ends. See Section B.

3. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box conduit connection. Use an insulated, grounded end bushing on the inside for GRS conduit. Use a sealing lock nut and a rigid PVC conduit bushing on the inside for PVC conduit.

4. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 9-29.2(4) for details.

5. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.

6. Junction Box shall only be used in barriers with stationary-forms. If Slip-Form Traffic Barrier is required, use Conduit shown in the Alternative PVC Conduit detail.

7. Conduct Capacity = 8" (4" per end).

8. Conduits shall enter Junction Box from ends as shown.

9. When converting RMC to PVC in Stationary-Form Barriers, route a # 8 Stranded, Non-insulated Grounding Conductor along Conduit, secure Conductor to Conduit with clamp as shown on Conduit Deflection Fitting “B” detail, convert RMC to PVC in Stationary-Form Barrier (per Standard Plan J-60.11), omit Conductor when this detail is not used.
1/4 NC x 3/4" STAINLESS STEEL GROUND STUD WITH STAINLESS STEEL NUT AND (2) STAINLESS STEEL WASHERS

ROUTE TO GROUND STUD ON BACK OF BOX

TOP VIEW
ADJUSTABLE FACE

1/4 NC x 3/4" STAINLESS STEEL GROUND STUD WITH STAINLESS STEEL NUT AND (2) STAINLESS STEEL WASHERS

ROUTE TO GROUND STUD ON BACK OF BOX

SIDE VIEW

1/4 - 20 NC x 1" STAINLESS STEEL PHILLIPS PAN HEAD SCREW (TYP.) ~ (10) TOTAL

ADJUSTABLE FACE

1 1/4" x 1/4" CLOSED CELL NEOPRENE GASKET

TEMPORARY COVER

TEMPORARY ACCESS COVER

1/4 - 20 NC x 1" STAINLESS STEEL PHILLIPS PAN HEAD SCREW (TYP.) ~ (6) TOTAL

MOUNT BOX SO COVER IS FLUSH WITH BARRIER FACE WITH 1/8" TOLERANCE PROTRUDING BEYOND BARRIER FACE AND 1/8" RECESSED

ADJUSTMENT BOLT DETAIL

TEMPORARY COVER

5/16" x 5 3/4" THREADED ROD

TEMPORARY ACCESS COVER

12-GAGE STAINLESS STEEL

TEMPORARY COVER

12-GAGE STAINLESS STEEL

ADJUSTABLE FACE

TEMPORARY COVER

1/4 NC x 1" STAINLESS STEEL PHILLIPS PAN HEAD SCREW

1 1/4" x 1/4" CLOSED CELL NEOPRENE GASKET

TEMPORARY COVER

1/4 NC x 1" STAINLESS STEEL PHILLIPS PAN HEAD SCREW (TYP.) ~ (6) TOTAL

1/4 NC x 3/4" STAINLESS STEEL GROUND STUD WITH STAINLESS STEEL NUT AND (2) STAINLESS STEEL WASHERS

ROUTE TO GROUND STUD ON BACK OF BOX

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

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12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW

TEMPORARY COVER

12-GAGE STAINLESS STEEL

FRONT VIEW
1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6-02.3(20).

2. Mount the stainless steel support using an approved resin-bonded anchor system, installed per manufacturer's recommendation. Resin-bonded anchors shall be stainless steel and shall be of 3/8" diameter (Expansion Anchors are not allowed). Anchor bolt embedment shall be 4 1/2" min.

3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in concrete. See Standard Plan J-60.13 for Stainless Steel Channel details.

4. The System Identification letters on the box lid shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specifications 9-29.2(4).

5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimensions.

6. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit connection. An insulated grounded end bushing shall be used to terminate Rigid Metal Conduit.

7. Equipment Bonding Jumper shall be # 8 AWG (min.) x 1 foot of tinned, braided copper.

8. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.
1. For Installation Notes and Details see Standard Plan J-50.15.

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT (TYP.)

SEE ENTRANCE SAWCUT DETAIL THIS SHEET (TYP.)

SEE CORNER SAWCUT DETAIL (TYP.)

SEE T - SAWCUT DETAIL

PLAN

TYPE 1 STOP LINE LOOP WIRING DIAGRAM

TYPE 1 INDUCTION LOOP

STANDARD PLAN J-50.10-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III  06-03-11

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

1. For Installation Notes and Details see Standard Plan J-50.15.
3. All of the loop lead-in wires shall return to the Junction Box.
4. For Splice Detail, see Standard Plan J-50.15.
5. For additional Induction Loop details, see Standard Plan J-50.15.
NOTES

1. For Installation Notes and Details see Standard Plan J-50.15.


3. All of the loop lead-in wires shall return to the Junction Box.

4. For Splice Detail, see Standard Plan J-50.15.

5. For Loop numbering Layout Details, see sheet 3.

6. For additional Induction Loop Details, see Standard Plan J-50.15.
NOTES
Loop numbering layout will be similar to Loop Numbering Layout Detail, Sheet 3

TYPE 3 STOP LINE LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

TRAFFIC FLOW

SPLICE (TYP.)
OFFSET CRIMPS

S = START
F = FINISH

LOOP SERIES NUMBER (TYP.)

JUNCTION BOX

2C(SH) CABLE

TYPE 3 SAMPLING LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

TRAFFIC FLOW

SPLICE (TYP.)
OFFSET CRIMPS

S = START
F = FINISH

LOOP SERIES NUMBER

JUNCTION BOX

2C(SH) CABLE

TYPE 3 ADVANCE LOOP WIRING DIAGRAM

TRAFFIC FLOW

SPLICE (TYP.)
OFFSET CRIMPS

S = START
F = FINISH

LOOP SERIES NUMBER (TYP.)

JUNCTION BOX

2C(SH) CABLE

TYPE 3 INDUCTION LOOP
STANDARD PLAN J-50.12-00

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-03-11
State Design Engineer
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

- 13 -
CIRCULAR SAWCUT (TYP.)

EDGE OF SHOULDER

LEAD-IN SAWCUTS (TYP.)

SEE ENTRANCE SAWCUT DETAIL SHEET 1 (TYP.)

SHOULDER

EDGES OF LANE

2C(SH) CABLE

CABLE (TYP.)

OFFSET CRIMPS

PLAN

TYPE 3A STOP LINE LOOPS

JUNCTION BOX

CONDUIT

1' - 0"

8' - 0"

6' - 0"

6' - 0"

6' - 0"

6' - 0"

8' - 0"

8' - 0"

8' - 0"

8' - 0"

8' - 0"

8' - 0"

8' - 0"

6' - 0" DIAM. (TYP.)

EDGE OF SHOULDER

SEE STANDARD PLAN J-50.15 SHEET 2

DETAIL "B" SHOULDER

JOINT BOX

CABLE (TYP.)

OFFSET CRIMPS

LOOP NUMBER SLEEVE

LOOP NUMBER MARKING SLEEVE

S = START

F = FINISH

SLEEVE (TYP.)

LOOP SERIES NUMBER MARKING SLEEVE (TYP.)

LOOP SERIES START OR FINISH MARKING SLEEVE (TYP.)

LOOP SERIES NUMBER MARKING DETAIL

1 LOOP NUMBER MARKING SLEEVE

2 LOOP SERIES NUMBER MARKING SLEEVE (TYP.)

3 LOOP SERIES START OR FINISH MARKING SLEEVE (TYP.)

4 LOOP SERIES NUMBER MARKING SLEEVE

1 LOOP NUMBER MARKING SLEEVE

2 LOOP SERIES NUMBER MARKING SLEEVE (TYP.)

3 LOOP SERIES START OR FINISH MARKING SLEEVE (TYP.)

4 LOOP SERIES NUMBER MARKING SLEEVE

TYPE 3A INDUCTION LOOP

STANDARD PLAN J-50.12-00

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-03-11
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
LOOP INSTALLATION NOTES

1. Install the Junction Box and the stub-out conduit with PVC sleeve.
   Conduit for the loop stub-out shall be as required in the conduit size table shown on sheet 1 of this set.

2. Lay out loops and loop lead-ins to miss cracks/joints in road, when possible. Maintain 18" minimum clearance from manholes and valve boxes.

3. The opening around the loop stub shall be patched with matching paving material if opened larger than PVC sleeve + 2".

4. Sawcut the loop slots and the lead-in slots. Wash/dry cuts. File edges to remove burr of all saw-cuts into stub out sleeve.

5. Lay out the loop wire starting at the Junction Box, allowing 5' minimum slack.

6. Install the wire in the loop slot as shown.

7. Finish laying out the wire at the Junction Box and identify the leads with the loop number, the "S" for start and the "F" for finish, the loop series number, and the loop lead-in conductor number.

8. Twist each pair of the lead-in wires a minimum of two times per foot each foot, from the loop to the Junction Box. Reverse the direction of the twist for each successive pair installed. Seal loops/sawcuts.

9. Construct a supplemental splice containing any series loop connections in the adjacent junction box as required in the plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice.

10. Splice the loop lead-ins to the shielded cable as noted in the Contract.

11. All loop circuits shall be tested per Standard Specifications 8-20.3(14D) once installation is complete.

12. Existing stubouts shall be upgraded as necessary to conform to the conduit size table shown on sheet 1.

13. All loop lead-in sawcuts parallel to lane edge shall be at least 12" from edge of pavement and within six inches outside of lane or fog line when possible. Maintain 12" separation between parallel cuts or joints.

14. The loop stub-out sleeve shall have an inside diameter 1" larger than the outside diameter of the End Bell Bushing. Plug conduit and fill sleeve with sand until loops are installed to keep out Hot Asphalt during paving operations.
INDUCTION LOOP DETAILS
STANDARD PLAN J-50.15-00

STUB-OUT DETAIL
WITH CEMENT CONCRETE CURB OR GUTTER

STUB-OUT DETAIL
WITH GUARDRAIL AND CURB

LOOP STUB-OUT SLEEVE (1/4" TO 1/2" BELOW TOP OF PAVEMENT)
LEAD-IN CONDUIT SHALL EXTEND A MINIMUM OF 3/4" INTO PAVEMENT
(PAVEMENT DEPTH VARIES)
CONDUIT SECURED INTO ROAD SURFACE (TYP.)

CEMENT CONCRETE BARRIER ~ SINGLE SLOPE BARRIER SHOWN
SEE CONTRACT PLANS FOR SIZE AND TYPE

TO JUNCTION BOX

STUB-OUT DETAIL WITH ROADWAY

LOOP STUB-OUT SLEEVE (1/4" TO 1/2" BELOW TOP OF PAVEMENT)
LEAD-IN CONDUIT SHALL EXTEND A MINIMUM OF 3/4" INTO PAVEMENT
(PAVEMENT DEPTH VARIES)
CONDUIT SECURED INTO ROAD SURFACE (TYP.)

TO JUNCTION BOX

STUB-OUT DETAIL WITH CEMENT CONCRETE BARRIER

LOOP STUB-OUT SLEEVE (1/4" TO 1/2" BELOW TOP OF PAVEMENT)
LEAD-IN CONDUIT SHALL EXTEND A MINIMUM OF 3/4" INTO PAVEMENT
(PAVEMENT DEPTH VARIES)
CONDUIT SECURED INTO ROAD SURFACE (TYP.)

TO JUNCTION BOX
INDUCTION LOOP LEAD-IN TO JUNCTION BOX

LONGITUDINAL REBAR

LONGITUDE NUMBER

PLAN VIEW

LONGITUDINAL REBAR

PLAN VIEW

INDUCTION LOOP LEAD-IN TO JUNCTION BOX

LONGITUDINAL REBAR

PLAN VIEW

INDUCTION LOOP LEAD-IN TO JUNCTION BOX

LONGITUDINAL REBAR

PLAN VIEW

INDUCTION LOOP LEAD-IN TO JUNCTION BOX

LONGITUDINAL REBAR

PLAN VIEW

NOTES

1. Installation of signal detection loops in the bridge deck shall be cast-in-place and installation by saw cutting an existing bridge deck shall not be allowed. This plan is intended for new construction only (not allowed for existing structures).

2. For Supplemental Splice in adjacent junction box, see Splice Details, per Standard Plan J-50.16.

3. Preformed loops shall conform to the layouts, numbering details, marking requirements, and wiring diagrams of Standard Plan J-50.12 for the number and types of loops shown in the Contract Plans.

4. Loops shall be tested immediately prior to pouring concrete, per Standard Specification B-20.3(14)D.

5. Layout Preformed loops and loop lead-ins to maintain 1' (ft.) clearance from joints.

6. Construct a supplemental splice containing any series loop connections in adjacent Junction Box as required in the Plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice, as shown in Standard Plan J-50.12.

7. Barrier Junction Box ~ 8" x 8" x 18" NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slip-form barrier. (Junction Box can be recessed up to 1/8") See Standard Plan J-40.36 or J-40.37

8. For installation of Junction Box in the sidewalk, see Standard Plan J-40.40.
**PREFORMED LOOP INSTALLATION DETAILS**

**FOR NEW BRIDGE DECKS**

**STANDARD PLAN J-50.16-01**

**SHEET 2 OF 2 SHEETS**

APPROVED FOR PUBLICATION

Pasco Bakotich III

3/22/13

STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P2, Loop L4

**NOTES**

1. See Standard Plan J-50.30 for piezo axle sensor General Installation instructions, and Modified Type 2 Loop wiring details.

2. The contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo ohms readings shall be OIL from shield to center conductor. See piezo specifications for piezo capacitance readings.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @16 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also for concrete lanes, install the loops 4" and 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notches unless otherwise specified in the contract.

8. Use Schedule 40 PVC conduit from the Junction box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit in each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation see Standard Specification 8-20.3(5).

10. Junction boxes installed in the paved shoulder or median shall be a Heavy Duty Junction box. If box is installed in unpaved shoulder, use type 1 or 2. See Standard Plan J-40.10 for size and type. See Standard Specification 9.29.2(1)B, for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets, according to the Color Code Identification Chart. For Wire Color Code Details see Standard Plan J-50.30.

12. Cabinet can be placed on either side of road depending on terrain/slope, etc. It does not have to be placed on increasing milepost side of the roadway.

13. For 6 - lane layouts and above, see Contract.

**INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION**

Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P2, Loop L4

**PIEZO CAPACITANCE SPECIFICATIONS**

- 100 ft Coax: 5nf +
- 150 ft Coax: 6nf +
- 200 ft Coax: 7nf +
- 250 ft Coax: 8nf +

**SHEET 1 OF 3 SHEETS**

**PERMANENT TRAFFIC RECORDER INSTALLATIONS**

**STANDARD PLAN J-50.20-00**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 06-03-11

State Design Engineer

Washington State Department of Transportation

**STATE DESIGN ENGINEER**

John C. Nash, RPB

**APPROVED FOR PUBLICATION**

06-03-13

Washington State Department of Transportation
PLAN VIEW
TYPICAL 6 LANE PTR LAYOUT WITH MEDIAN

Lane 1 - (drive lane) ~ Loop L1, Piezo P1, Loop L2
Lane 2 - (center lane) ~ Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) ~ Loop L1, Piezo P1, Loop L6

INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

SHOULDER NOTCH
SEE NOTE 6 AND 7
FOR CONDUIT SIZE
SEE NOTE 8

HOME RUN CONDUIT UNDER ROADWAY
(UNDER ROADWAY)
(WHERE APPLICABLE)

SECTION A

PERMANENT TRAFFIC RECORDER INSTALLATIONS
STANDARD PLAN J-50.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-03-11

STATE DESIGN ENGINEER
WASHINGTO N STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. See Standard Plan J-50.30 for Piezo Axle Sensor General Installation instructions, and Modified Type 2 Loop Wiring Details.

2. The Contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo ohms readings shall be OSL from shield to center conductor. Class WIM piezo capacitance shall be 6nf to 20nt.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @ 16 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete pavement lanes, install the loops 4" to 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in Contract.

8. Use Schedule 40 PVC conduit from the Junction Box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit for each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation, see Standard Specification B-20.35.

10. Junction Boxes installed in the paved shoulder or median shall be a Heavy Duty Junction Box. If box is installed in unpaved shoulder use type 1 or 2. See Standard Plan J-40.10 for size and type. See Standard Specification B-22.4(B) for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets. For Wire Color Code Identification Chart & Detail see Standard Plan J-50.30.

12. Cabinet can be placed on either side of the road depending on terrain/slope, etc. It does not have to be placed on increasing mileage side of the roadway.

13. For 6-lane layouts and above, see Contract.

14. Concrete lanes shall use 11" class 1 piezos. Asphalt lanes with 1" shoulder or less may use 12" piezos. For shoulders over 1", use 13" piezos.
INCREASING DIRECTION

Lane 1 - (drive lane) = Loop L1, Piezo P1, Piezo P2, Loop L2
Lane 2 - (pass lane) = Loop L3, Piezo P3, Piezo P4, Loop L4

DECREASING DIRECTION

Lane 3 - (drive lane) = Loop L1, Piezo P1, Piezo P2, Loop L2
Lane 4 - (drive lane) = Loop L3, Piezo P3, Piezo P4, Loop L4

INDUCTION LOOP TO PIEZO AXLE SPACING

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<th></th>
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<th>B</th>
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<tbody>
<tr>
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<td>6'</td>
<td>12'</td>
</tr>
<tr>
<td>URBAN</td>
<td>2'</td>
<td>10'</td>
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</table>
SAW CUT LAYOUT
FOR PERMANENT TRAFFIC RECORDER SITE
(MODIFIED TYPE 2 LOOP SHOWN)

TOP OF EXISTING PAVEMENT OR LEVELING COURSE OF NEW PAVEMENT

SENSOR SLOT
HOME RUN SLOT

SECTION A
BEFORE SENSOR INSTALLATION

SECTION B

SECTION C

PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS
STANDARD PLAN J-50.30-00

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-03-11

STATE DESIGN ENGINEER

Washington State Department of Transportation

STATE OF WASHINGTON

THESE ARE GENERAL INSTALLATION INSTRUCTIONS
SEE SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS
IN THE SPECIAL PROVISIONS OF THE CONTRACT

1. Using paint and a straight edge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 8 ft. of cable inside the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" blade width, cut the piezo slot approximately 4 to 6 inches longer than the piezo length. The piezo slot depth must be a minimum of 1” to a maximum of 1 1/2”.

3. Lead-in cuts for the piezo coax should be 1 1/4” minimum wide, at a depth of 1 1/2” to 2”.

4. Using a pressure washer, remove all slurry and loose material from the piezo slot.

5. Completely dry piezo slot. No moisture or oily residue shall be allowed in piezo slot.

6. After piezo cut is dry, wire brush sides and bottom of entire piezo and pour toward the coax to piezo attachment point. Repeat until slot is complete, at least two passes.

7. Install the piezo according to manufacturer’s recommendations. Class 2 piezo sensors shall be placed at bottom of piezo slot. Class 1 sensors must be installed at a specific depth particular to each site location. This depth will be measured and set by Statewide Travel and Collision Data Office (formerly TDO) inspector on site.

8. Place two pieces of 2” duct tape along the length of the sensor slot. Tape should be about 1/16” from slot edge.

9. Mix epoxy according to manufacturer’s recommendations and pour in slot slowly to avoid air pockets. Start at the piezo end and pour toward the coax to piezo attachment point. Repeat until the slot is completely full, at least two passes.

10. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor.

11. Remove tape.

12. Class 2 sensor installation is complete after epoxy has cured. Class 1 WIM sensors shall be sanded flush with the pavement surface the entire length of the piezo sensor. Use a belt sander with a coarse grit paper to get an even surface finish.

13. Lead-in placement and saw-cut methods vary depending on Regional preference and location.

14. Place the Installation Brackets on the sensor every 12” for class 2 sensor, and every 6” for class 1 sensor, for the length of the sensor. Use the 3/4” brackets.
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 5" beyond conduit in all Junction Boxes.

2. The maximum load in the cabinet is 5 Amps.

3. The cabinet may be pedestal or pad mount. See Standard Plan J-10.10 for details.


5. For Grounding Details, See Standard Plan J-60.05. See Standard Specification 8-20.3(9) for other requirements.

COLOR CODE IDENTIFICATION

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COLOR CODE WIRE DETAIL

WHITE IS ALSO USED FOR DESIGNATING INCREASING MILE POSTS

SPLICE DETAIL

SEE SPECIAL PROVISIONS IN THE CONTRACT FOR SPLICE KIT ENCLOSURE.

SPICE DETAIL

SEE STANDARD SPECIFICATION 9-29.12 FOR SPLICE REQUIREMENTS

PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS
STANDARD PLAN J-50.30-00

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III  06-03-11
STATE DESIGN ENGINEER

Washington State Department of Transportation
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

NOTES
1. If parallel circuits of different sizes are contained in one conduit, the size of the grounding conductor shall be determined on the basis of the largest conductor. Only one grounding conductor is required for each conduit, regardless of the number of circuits contained.
2. Service ground per serving utility requirement. If the utility uses aluminum service conductors, an approved Al-Cu pressure type ground connector shall be used to secure the service neutral to the copper neutral bar in the service enclosure. Except for the above, all grounding conductors shall be copper.
3. Equipment grounding conductors and grounding electrode conductors shall be sized in accordance with the National Electric Code (No. 8 minimum).
Required to supplement equipment grounding for luminaire standards with direct burial aerial feeds, or where required in the plans.

Required at all service and separately derived systems.

Type D service cabinet shown. Use this concept for Type E cabinet or transformer.

Type D service cabinet shall be installed on lower surface of foundation only.

Type B service cabinet and transformer cabinet shall be installed on raised surface of foundation only.

Type B modified service cabinet.

Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing.

See Standard Plan J-10.10

See Standard Plan J-30

See Standard Plan J-30

See Key on Sheet 1 for parts.
3/8" x 2" x 2" Frame Bonding Stud Plate with 1/4NC x 1"
Stainless Steel Bonding Stud.
- Weld Bonding Stud to Frame Bonding Plate.
- Weld to lid support frame.
- 1/4" weld ~ 3 sides.
- Grind lid bearing surface flat after welding.
- All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (inch) chamfer or rounding.
- Protect conductors with fireproof cloth prior to welding.
- Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

Grind lid bearing surface flat after welding.

All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (inch) chamfer or rounding.

Protect conductors with fireproof cloth prior to welding.

Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

Weld all around lid bonding stud ~ 1/4 NC x 1" stainless steel ~ liberally coat entire assembly w/ anti-seize compound.

Fillet weld and edge weld (Typ.)

LID SUPPORT = FRAME VARIES AMONG MANUFACTURERS' (FIELD VARY)

BONDING JUMPER = #8 MINIMUM x # TINNED BRAIDED COPPER (BOND JUMPER TO EQUIPMENT GROUNDING CONDUCTOR)

STAINLESS STEEL FLAT WASHER
STAINLESS STEEL ADJUSTING NUTS

FRAME BONDING DETAIL A

EQUIPMENT GROUNDING CONDUCTOR

PVC

TED BONDING STUD ~ 1/4NC X 1" STAINLESS STEEL WELD TO FRAME BONDING STUD PLATE - LIBERALLY COAT THIS ASSEMBLY WITH ANTI-SEIZE COMPOUND

FRAME BONDING STUD ~ 1/4NC X 1" STAINLESS STEEL WELD TO FRAME BONDING STUD PLATE - LIBERALLY COAT THIS ASSEMBLY WITH ANTI-SEIZE COMPOUND

COPPER SOLDERLESS CRIMP CONNECTOR

STAINLESS STEEL FLAT WASHER - FENDER

STAINLESS STEEL FLAT WASHER - FENDER

STAINLESS STEEL FLAT WASHER

STAINLESS STEEL FLAT WASHER

ATTACH TO FRAME BONDING BOLT

BOND TINNED BRAIDED COPPER BONDING JUMPER ~ #8 MINIMUM + # TO FRAME BONDING STUD LOCATION

LID TO FRAME BONDING JUMPER
COPPER SOLDERLESS CRIMP CONNECTOR
BONDING JUMPER - FRAME TO EQUIPMENT GROUNDING CONDUCTOR

EDGE OF LID SUPPORT FRAME

LID BONDING DETAIL B

LID BONDING STUD

FRAME BONDING STUD

LID SUPPORT DEPTH

1/16" (inch) CHAMFER OR Rounding.

STANDARD PLAN J-60.05-00
NOTES

1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adaptor in the barrier.

PVC Conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adaptor.

RMC Conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.


3. Pipe wrap tape shall be 2" wide, 20 ml thick, and installed with 1" minimum overlap.

KEY NOTES


2. Type DX Deflection (DX) Fitting with Internal Bonding Jumper.

3. Wrap Conduit Pipe from Conduit Deflection Fitting to 1'-0" beyond (inside) barrier surface.

- 1'-0" long, 3/4" thick expanded polyethylene foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.

- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1'-0" on each side of the joint.

- 10'-0" long section of RMC conduit.

- Deflection Fitting shall be in neutral state after installation.

CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL

STANDARD PLAN J-60.11-00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
SCHEMATIC
SHOWN FOR DUAL-CONDUIT INSTALLATION
(CIRCUIT TYPES MAY VARY)

CONDUIT DEFLECTION FITTING "B" DETAIL
CONVERT RMC TO PVC IN STATIONARY-FORM BARRIER

CONDUIT DEFLECTION FITTING "A" DETAIL
CONDUIT FITTING - TYPE DX - PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE

CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL
STANDARD PLAN J-60.11-00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Pasco Bakotich III
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
APPROVED FOR PUBLICATION
5/20/13

DRAWN BY: Fern Ledell
KEY NOTES

1. Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance providing beyond the barrier face and 1/8" recessed). Use NEMA 4X Junction Box with stationary-forms. See Standard Plan J-40.10 or See Contract.

2. Where conduit in a structure is routed across a cold joint with continuous reinforcing steel, install preformed joint filler and wrap the conduit pipe for 1' - 0" on each side of the joint. Omit pipe-wrap tape on PVC conduit.

3. Where conduit exits from a structure, wrap the conduit pipe for 1' - 0" on each side from the exiting point.

4. 10' - 0" long section of RMC conduit.

5. Conduit Deflection Fitting shall be in neutral state after installation.

6. Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1' - 0" on each side of the joint.

NOTES

1. Install a Conduit Deflection (DX) Fitting "A" at the exit from the barrier. Install a Conduit Deflection (DX) Fitting "B" to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-60.11 for Conduit Deflection Fitting details.

2. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A." RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adaptor in the barrier. PVC conduit may be used only in stationary-form barriers. Connect to PVC using a PVC adaptor. RMC conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.

3. See Standard Plan C-80.10 for additional details on Single-Slope Concrete Barrier.

NOTES

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6-02.3(20). There shall be a minimum of a 3" edge distance to the centerline of anchor holes in concrete. Mount the stainless steel support using an approved resin bonded anchor system. Anchors shall be stainless steel and shall be of 3/8" diameter (expansion anchors are not allowed). Anchor bolt embedment of 4 1/2" minimum.

2. Number of clamps shall be determined by number of conduits to be attached to the Stainless Steel Channel Support. See Conduit Plans for conduit routing.

3. Add additional Attachment Bolts when required to maintain 8" maximum spacing between adjacent Attachment Bolts.

4. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line. When barrier is not plumb, size spacer to maintain back of barrier line.

NOTES

1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
6. Back plates shall be constructed of anodized aluminum and shall be mounted with stainless steel hardware. A 2"-wide strip of yellow retro-reflective, type IV prismatic sheeting, conforming to the requirements of Standard Specification 9-28.12, shall be applied in accordance with the manufacturer’s recommendations. The application surface of the back plate shall be cleaned, degreased with isopropyl alcohol, and dried prior to application of the sheeting. See Standard Specification 9-28.16(2).
7. Drill a 1/4" drain hole in the bottom of each signal assembly, and one in the bottom of each pedestrian head. When signal assembly is mounted horizontally, drill a 1/4" drain hole at the lowest point of each section of the signal assembly.
KEY

1. END CAP
2. 1 1/2" DAM CONDUIT LOCKNUT
3. 1 1/2" DIAM. LOCKNIPPLE
4. STEEL WASHER
5. NEOPRENE GASKET
6. BRONZE SERRATED ELL FITTING WITH:
   • 3/8" STAINLESS STEEL THROUGH BOLT AND NUTS
   • THREE STAINLESS STEEL SET SCREWS AT SLIPFITTER CONNECTION
   • THREE ALLEN HEAD STAINLESS STEEL SET SCREWS AT CONDUIT NIPPLE CONNECTION
7. SERRATED RING WITH PINS
8. HEX LOCKNUT WITH:
   • TWO ALLEN HEAD STAINLESS STEEL SET SCREWS
   • PIN RECEPTACLES
9. 1 1/2" DAM CONDUIT NIPPLE
10. 1 1/2" DAM HEX LOCKNUT
11. MOUNTING ASSEMBLY
12. BRONZE ELEVATOR PLUMBIZER WITH 3/8" STAINLESS STEEL THROUGH BOLT, WASHERS, AND TWO NUTS
13. ALUMINUM ARM WITH SET SCREW
14. SLOTTED TUBE WITH CLOSURE STRIP
15. 2 1/2" I.D. MIN. TUBE CLAMP
16. INTERNALLY THREADED CLAMP ASSEMBLY WITH:
   • TWO SET SCREWS
   • 1/2" X 0.040" STAINLESS STEEL BANDS
   • 7/16" BUCKLE WITH NYLONS, NUTS, AND WASHERS
   • BAND CLIPS WITH ALLEN HEAD STAINLESS STEEL SET SCREWS
17. BRONZE MESSENER HANGER WITH:
   • 1/2" DAM JACETS
   • CABLE LOCK BAR
   • INVERT
   • COTTER KEY
18. BRONZE INTERNALLY THREADED WIRE ENTRANCE WITH:
   • RUBBER INERT
   • ALLEN HEAD STAINLESS STEEL SET SCREW
19. BRONZE BALANCE ADJUSTER
20. MULTI-HEAD MOUNTING ASSEMBLY
21. SPIDER ASSEMBLY
22. SERRATED RING WITH NO PINS
23. SERRATED WASHER

SIGNAL HEAD MOUNTING
DETAILS MAST ARM AND SPAN WIRE MOUNTINGS
STANDARD PLAN J-75.20-00

NOTES
1. Type M mounting shall have "O" ring groove and seal top and bottom of signal attachment.
2. Type M mounting for conventional heads shall have a 2" diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2" diameter opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 14" nominal arms.
5. See Standard Plan J-75.30 for tether wire, and backplate requirements.
6. Apply bead of silicone around the perimeter of all top end cap openings prior to installation of the end cap assembly.

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
**NOTES**

1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder or the traveled way. Use a 9" 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, see Contract Plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Pull Box and Lid when placed in unpaved areas. Use Standard Duty Pull Box in sidewalks, walkways, and shared-use paths.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" thick.

4. Standard Duty Pull Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" inch line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

5. A 1/4-20 UNC x 3/4" S. S. ground stud with (2) S. S. nuts and (2) S. S. flat washers shall be attached to the Standard Duty Lid and coated with anti-seize compound. Provide a 5/8" diameter cored hole in the ductile iron lid gusset (Heavy Duty Lid) with 1/2-13 UNC x 1 1/4" S. S. bolt, (3) S. S. flat washers, and (2) S. S. nuts for the Bonding Jumper.

6. Connect a Bonding Jumper to the steel conduit bushing for GRS conduit and connect the steel conduit bushing jumper to the equipment ground at the threaded brass ground insert. Connect the equipment grounding conductors in the PVC and/or GRS conduits to the brass ground insert. The Bonding Jumper shall be 88 min. x 4" (ft.) of tinned braided copper between the lid and the frame of the Heavy Duty tops and from the Heavy Duty top to the threaded brass ground insert. The Bonding Jumper shall be 88 min. x 4" (ft.) of tinned braided copper between the lid and the frame of a Standard Duty Pull Box and the threaded brass ground insert. See Contract Plan Sheets and Standard Plan J-60.05 for Bonding Jumper requirements.

7. The system identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a S. S. weld bead. See COVER MARKING DETAIL. See Standard Specification 9-29.24. Ductile iron lid lettering shall be recessed.

8. Cement concrete shall be Class 4000.

9. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

10. Capacity - conduit diameter = 40" (in.).

11. Excavate material, place 6" crushed surfacing cad per Standard Specification Section 8-20.38. Field bend #3 reinforcing bar to allow conduit into the Pull Box. Field bend reinforcing bar back into place, wire tie in (2) pieces, and cast in commercial concrete (commercial concrete only allowed for box bottom/wall completion).

12. This drawing depicts a typical Pull Box assembly. Reinforcing 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.

**PULL BOX**

**STANDARD PLAN J-90.10-01**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 06-27-11

Washington State Department of Transportation

**GROUND STUD**

- See Note 4

**DIAMOND PATTERN**

- See Note 3

**RECESSED LIFTING RING AND LOCK**

**SECTION A**

- (LID NOT SHOWN)

- Equipment Grounding Conductor

- Copper Solderless Crimp Connector

- Equipment Bonding Jumper - See Note 5

- See Contract for conduit type

- PVC shown - See Contract for conduit type

- Location Wire

**SECTION B**

- Pull Box Assembly (Shown with Standard Duty Lid)

**GROUND STUD**

- See Note 5

**LIFT HOLE**

- 1" to 2" diameter hardware

**MOUNTING RACK**

- S. S. 1 58" slotted channel

**GALVANIZED PULLING IRON - 1/8 EACH CORNER (REQUIRED)**

**GROUND ROD KNOCKOUT**

**TOP OF PAVED SURFACE**

**TOP OF SOIL SURFACE**

**TOP OF GRADE**

**VIEW C**
LOCATION WIRE - PROVIDE 1"-0" DIAM. LOOP ABOVE CHANNEL SECTION. SECURE IN BRIDLE RING.

6" PIPE HANGER - SEE DETAIL

CABLE BUFFER - SEE PIPE HANGER DETAIL

HEAVY DUTY LID - SEE NOTE 1

1/4-20 UNC x 1.1115" MIN. LENGTH THREADED BRASS GROUND INSERT WITH STEEL LEAD GROUND ROD BONDED TO FRAME AND REINFORCING

ROUGHENED SURFACE REQUIRED PRIOR TO CASTING BOTTOM WALL CONCRETE

STEEL REINFORCING SYMMETRICAL ABOUT CENTERLINE

AT NO TIME SHALL THE CABLE'S MINIMUM BENDING RADIUS LIMITATIONS BE COMPROMISED

INTERNAL OBLIQUE VIEW

COIL THE CABLE BY USING A "FIGURE 8" FOLDED IN THE MIDDLE TO FORM A LOOP

COIL, THE CABLE BY USING A "FIGURE 8" FOLDED IN THE MIDDLE TO FORM A LOOP

1/4-20 UNC x 1.1115" MIN. LENGTH THREADED BRASS GROUND INSERT WITH STEEL LEAD GROUND ROD BONDED TO FRAME AND REINFORCING

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STEEL REINFORCING SYMMETRICAL ABOUT CENTERLINE

AT NO TIME SHALL THE CABLE'S MINIMUM BENDING RADIUS LIMITATIONS BE COMPROMISED

INTERNAL OBLIQUE VIEW

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ROUGHENED SURFACE REQUIRED PRIOR TO CASTING BOTTOM WALL CONCRETE

STEEL REINFORCING SYMMETRICAL ABOUT CENTERLINE

AT NO TIME SHALL THE CABLE'S MINIMUM BENDING RADIUS LIMITATIONS BE COMPROMISED

INTERNAL OBLIQUE VIEW

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ROUGHENED SURFACE REQUIRED PRIOR TO CASTING BOTTOM WALL CONCRETE

STEEL REINFORCING SYMMETRICAL ABOUT CENTERLINE

AT NO TIME SHALL THE CABLE'S MINIMUM BENDING RADIUS LIMITATIONS BE COMPROMISED

INTERNAL OBLIQUE VIEW
1. The Heavy Duty Lid shall be used when a Cable Vault is placed in the paved shoulder or the traveled way. Use a 9" thick lid for new Cable Vault installations. Use a 6" thick Heavy Duty Lid when converting a Standard Duty Cable Vault into a Heavy Duty Cable Vault in the paved shoulder or the traveled way and no overlay is called for in the Contract. Otherwise, see Contract Plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Cable Vault and Lid when placed in unpaved areas. Use Standard Duty Pull Box in sidewalks, walkways, and shared-use paths.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" thick.

4. Standard Duty Cable Vaults installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" inch line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

5. A 1/4 - 20 UNC x 3/4" S. S. ground stud with (3) S. S. nuts and (2) S. S. flat washers shall be attached to the Standard Duty Lid and coated with anti-seize compound. Provide a 5/8" diameter cored hole in the ductile iron gusset (Heavy Duty Lid) with 1/2 - 13 UNC x 1 1/4" S. S. bolt, (3) S. S. flat washers, and (2) S. S. nuts for the Bonding Jumper.

6. Connect a Bonding Jumper to the steel conduit bushing for GRS conduit and connect the steel conduit Bushing Jumper to the equipment grounding conductor at the threaded brass ground insert. Connect the equipment grounding conductors in the PVC and/or GRS conduits to the brass ground insert. The Bonding Jumper shall be #8 min. x 4" (ft) of tinned bared copper between the lid and the frame of the Heavy Duty tops and from the Heavy Duty top to the threaded brass ground insert. See Contract Plan Sheets and Standard Plan J-60.05 for Bonding Jumper requirements.

7. The system identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a S. S. weld bead. See COVER MARKING DETAIL, Standard Specification 9-25.2(4). Ductile iron lid lettering shall be recessed.

8. Cement concrete shall be Class 4000.

9. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

10. Capacity - conduit diameter = 60" (in.).

11. Excavate material, place 6" crushed surfacing pad per Standard Specification 8-20.3(6). Field bend #3 reinforcing bar to allow conduit into the Cable Vault. Field bend reinforcing bar back into place, wire ties in (2) places and cast in commercial concrete (commercial concrete only allowed for bottom/wall completion).

12. This drawing depicts a typical Cable Vault assembly. Reinforcing not shown. Each manufacturer's Cable Vault assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.
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.

NOTES
NOTES

1. For sign installation details, see Std. Plan G - series.

2. In rural areas, the "V" Height can be a minimum of 7 feet for primary signs and 6 feet for the supplemental plaques for greater visibility, as directed by the engineer.

3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

HEIGHT V

<table>
<thead>
<tr>
<th>TO BOTTOM OF SIGN</th>
<th>TO BOTTOM OF SUPPLEMENTAL PLAQUE</th>
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<tr>
<td>RURAL</td>
<td>5' MINIMUM</td>
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<td></td>
<td>4' MINIMUM</td>
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<tr>
<td>URBAN</td>
<td>7' MINIMUM</td>
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<tr>
<td></td>
<td>6' MINIMUM</td>
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CLASS A CONSTRUCTION SIGNING INSTALLATION
STANDARD PLAN K-80.10-00

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

Ken L. Smith 02-21-07

Washington State Department of Transportation

APPROVED FOR PUBLICATION
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.

---

**Diagram Details**

- **Type 3 Barricade**
  - Use attachment detail A or B.
  - Top of barricade support angle: Drill two 1/2" diam holes through barricade support angle.
  - Use attachment detail A.
  - Top of barricade support angle: Drill two 1/2" diam holes through barricade support angle.
  - 6' x 2" x 2" x 1/8" tubular steel with pre-drilled holes.
  - Sandbags as required to stabilize base of all legs.

**Elevation**

- Front of barricade:
  - 6' x 2" x 2" x 1/8" tubular steel.
  - Steel angle:
    - 1 1/2" x 1 1/2" x 1/8" steel angle 4 x 11" long (typ).
    - Flat washers.
    - Hex nut (typ).

**Isometric View**

- 3/4" ACH plywood panel.

---

**Notes for Use**

- **Design Engineer**: Kevin J. Dayton
- **Date**: 12-20-06
- **State**: Washington State Department of Transportation
- **Expiration**: August 5, 2013 to August 3, 2014

**Additional Notes:**

- All test requirements of NCHRP 350.
- All fasteners may be zinc plated, galvanized or stainless steel.
- Steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.
- Alternate designs may be approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.
- 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.
- When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.
USEABLE TRAFFIC LANE 2' MIN AREA CLOSED TO TRAFFIC

TYPE 3L BARRICADE

STRIPE ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

AREA CLOSED TO TRAFFIC 2' MIN USEABLE TRAFFIC LANE

TYPE 3R BARRICADE

ROAD CLOSURE AT INTERSECTION

TYPE 3L BARRICADE

ROAD CLOSURE AT OTHER LOCATIONS

TYPE 3R BARRICADE

BARRICADE PLACEMENT

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
1. The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2' wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

2. The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.

NARROW BASE

3/4" CHAMFER (TYP.) END

1 1/2" ± 1/8" CONTINUOUS KEYWAY

3/4" DIAM. LOOP BAR (TYP.)

TOP

CONNECTING PIN - SEE STD. PLAN C-8

SECTION

END DETAIL JOINING TWO BARRIER SEGMENTS

ALTERNATIVE LOOP BAR

2" DIAM. PINNING HOLE (TYP.) - WHEN REQUIRED

3/4" DIAM. LOOP BAR

SIDE

TOP

2' - 8'

3/4" DIAM. LOOP BAR HBAR (TYP.)

SIDE

ALTERNATIVE LOOP BAR

2" DIAM. (ASTM A 36) HOT DIP GALVANIZE AFTER FABRICATION (ASTM A 123)

SEE STD. PLAN C-8e FOR ANCHOR DETAILS
NOTES
1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2' wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrow base barrier.
2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.
3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.
4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
5. Remove the Type 3 Anchors by first driving the steel pins down through the barrier further into the pavement to allow lifting the barrier without interference, then remove the pins from the pavement.
6. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.

3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

4. Use shims to properly fit the anchors to the barrier and roadway surfaces.

5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
2 STRAND BARBED WIRE

END, CORNER, OR PULL POST

WIRE CINCH STAY (TYP.)

WIRE MESH 833-6-12-12

LINE POST W/ ANCHOR PLATE (TYP.)

18" SQUARE (TYP.)

14" - 0" MAX.

14" - 0" MAX.

2 STRAND BARBED WIRE (TYP.) - SPACED @ 12"

PULL POST - SPACED @ 1000' MAX.

BRACE (TYP.)

END POST

CORNER BRACING
(Shown For Wire Fence Type 1)

INTERSECTION BRACING
(Shown For Wire Fence Type 1)

WIRE FENCE TYPE 1
(Steel Posts Shown)

WIRE FENCE TYPE 2
(Steel Posts Shown)

INTERMEDIATE BRACING/PULL POST
(Shown For Wire Fence Type 1)

NOTES
1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.
2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts that mark the angle point of any sudden change in topography.
3. See Standard Specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2 x 4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

GRADE DEPRESSION (SAG) DETAIL
(Steel Posts Shown)

ADDITIONAL FASTENERS - SEE NOTE 2

WIRE FENCE TYPES 1 & 2 AND WIRE GATES

STANDARD PLAN L-10.10-02

SHORTH 12 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 06/21/12

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

STATE DESIGN ENGINEER

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
POST AND RAIL SPECIFICATIONS

<table>
<thead>
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<th>POST AND RAIL SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST</td>
</tr>
<tr>
<td>PIPE</td>
</tr>
<tr>
<td>ROLL FORMED</td>
</tr>
<tr>
<td>NOM. SIZE (SCH. 40)</td>
</tr>
<tr>
<td>END, CORNER, OR PULL POST</td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
</tr>
</tbody>
</table>

NOTES

1. All concrete post bases shall be 10" minimum diameter.
2. Along the top and bottom, using Hog Rings, fasten the Chain Link Fence Fabric to the Tension Wire within the limits of the first full fabric weave.
3. Details are illustrative and shall not limit hardware design or post selection of any particular fence type.

CHAIN LINK FENCE TYPES 3 AND 4

STANDARD PLAN L-20.10-02
FABRIC BAND (TYP.) - SPACED @ 12" MAX.

TENSION WIRE (TYP.)

HOG RINGS (TYP.) - SPACED @ 24" MAX.

BRACE POST

PULL POST

12'-6" MAX.

1/2" DIAMETER U-BOLT

1/2" HEAVY HEX NUT

1/2" EYE NUT

STEEL BODY PLATE

- SEE DETAIL

16d ANTI-ROTATION NAIL (TYP.) - SEE NOTE 1

16d ANTI-ROTATION NAIL (TYP.) - SEE NOTE 2

POST - SEE NOTE 1

STEEL POST

- SEE NOTE 4

ELEVATION VIEW

TENSION WIRE (TYP.)

FABRIC BAND (TYP.) - SPACED @ 12" MAX.

STRETCHER BAR (TYP.)

GLARE SCREEN FABRIC - 1" DIAMOND WIRE MESH

BEAM GUARDRAIL

NOTES

1. All glare screen posts shall be 2 1/2" I.D. galvanized steel.

2. Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toe-nailed to post with 16d galvanized nails to prevent block rotation. See Standard Specification 9-18.3(2).

3. Attach blocks to steel posts using bolt holes on approaching traffic side of post web.

FABRIC BAND (TYP.)

3/8" EYE BOLT (TYP.)
WITH HEX NUT AND WASHER

HOG RING - SPACED @ 24" MAX. (TYP.)

STRETCHER BAR (TYP.)

3/8" EYE NUT (TYP.)
WITH WASHER

GUARDRAIL POST (STEEL SHOWN)

5/8" EYE BOLT WITH WASHER

TURNBUCKLE

TENSION WIRE

TENSION WIRE

U-BOLT (TYP.)
- SEE DETAIL A

GUARDRAIL POST (STEEL SHOWN)

END OR CORNER (BRACE) POST DETAIL

PULL POST (WITHIN RUN) DETAIL

3/8" EYE BOLT (TYP.)
WITH HEX NUT AND WASHER

HOG RING - SPACED @ 24" MAX. (TYP.)

STRETCHER BAR (TYP.)

3/8" EYE BOLT (TYP.)
WITH HEX NUT AND WASHER

TENSION WIRE

TENSION WIRE

U-BOLT (TYP.)
- SEE DETAIL A

GUARDRAIL POST (STEEL SHOWN)

STRETCHER BAR (TYP.)

TENSION WIRE

TENSION WIRE

GUARDRAIL POST (STEEL SHOWN)
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP

= 48" x 12" (TYP.)

5/8" DIAM. WIRE ROPE

SEE MOUNTING DETAIL

ELEVATION

TOP VIEW
(CAP NOT SHOWN)

END POST

NOTE
Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

ACCESS CONTROL GATE

STANDARD PLAN L-70.10-01

APPROVED FOR PUBLICATION
Pasco Bakotich III 05-21-08
STATE DESIGN ENGINEER
Washington State Department of Transportation

EXPIRES JUNE 18, 2008

PLASTIC PIPE = 12" (NOM.) x 2'-7" LONG
COLOR SHALL BE HIGHLY VISIBILITY
(SAFETY YELLOW IS ACCEPTABLE)

3" WOOD SPACER
- 3" x 2 1/2" x 13"

PLASTIC PIPE CAP - 48" x 12" (TYP.)

TOP OF ROADWAY

± 12'-0"

TOP OF TIMBER POST

EYE SCREW = 5/8" Diam. x 8" with 2 flat washers

HEX LAG BOLT = 3/8-7UNC x 5" with 1" diam. flat washer
(4 sets total)

1 1/2" Diam. Hole (TYP.)
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-602 SP ~ 48" x 12" (TYP.) SEE MOUNTING DETAIL

MIDDLE POST ~ REMOVABLE

END POST

PLASTIC PIPE - 12" (NOM.) x 2' - 7" LONG COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW - 5/8" DIAM. x 6" WITH 2" FLAT WASHER (TYP.)

HEX LAG BOLT - 3/8-7UNC x 5" WITH 1" DIAM. FLAT WASHER (4 SETS TOTAL)

1 1/2" DIAM. HOLE (TYP.)

TOP OF TIMBER POST

WOOD SPACER ~ 3" x 2 1/2" x 12" (NOM.)

TIMBER POST ~ 4 X 6 (NOM.)

GALV. STEEL TUBE - 3/16" X 4" X 6"

COMMERCIAL CONCRETE

SECTION A

SECTION B

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

END POST

ELEVATION

TOP VIEW (CAP NOT SHOWN)

MIDDLE POST

PLASTIC PIPE - 12" (NOM.) X 48" X 12" (TYP.)

YELLOW REFLECTIVE TAPE - 3" (TYP.)

SIDE OPPOSITE STRIPES

SIGN PANEL MOUNTING DETAIL

TOP VIEW (CAP NOT SHOWN)

END POST

WOOD SPACER ~ 3" x 2 1/2" x 12" (NOM.)

TIMBER POST ~ 4 X 6 (NOM.)

GALV. STEEL TUBE - 3/16" X 4" X 6"

COMMERCIAL CONCRETE

SECTION A

SECTION B

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

- R = RAMP LANE WIDTH
- L = LANE WIDTH

**NOTES**

- **WHITE EDGE LINE**
- **YELLOW EDGE LINE**
- **LANE LINE**
- **WIDE LANE LINE**
- **DOTTED LANE LINE**

---

**RAMP CHANNELIZATION**

**TWO LANE**

**STANDARD PLAN M-1.40-02**

**EFFECTIVE:** AUGUST 5, 2013 TO August 3, 2014

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 06-03-11
Washington State Department of Transportation
NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND

C-D L = COLLECTOR DISTRIBUTOR LANE WIDTH
C-D R = COLLECTOR DISTRIBUTOR RAMP LANE WIDTH
R = RAMP LANE WIDTH
L = LANE WIDTH

appears in the Standard Plans for RPM supplement and substitution patterns.
### TABLE

<table>
<thead>
<tr>
<th>SPEED</th>
<th>D (SEE TABLE)</th>
</tr>
</thead>
<tbody>
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<td>35 MPH</td>
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<tr>
<td>70 MPH</td>
<td>1250'</td>
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</table>

### NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. When weaving section is more than 3/4 of a mile in length, use lane line.

3. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

### LEGEND

- L = LANE WIDTH
- R = RAMP LANE WIDTH
- WHITE EDGE LINE
- YELLOW EDGE LINE
- DOTTED LANE LINE

### RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION

**STANDARD PLAN M-1.80-03**

**EFFECTIVE:** AUGUST 5, 2013 TO August 3, 2014

**APPROVED FOR PUBLICATION**

**Pasco Bakotich III**

06-03-11

Washington State Department of Transportation
NOTES

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' spacing is standard; however, for gore areas shorter than 150' use a 25' spacing, and for gore areas greater than 400' a spacing of 100' may be used.

2. The acute angle of the diagonals shall always point in the direction of main line traffic.
NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways, with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12’ Typical Lane Width. See Contract for specified lane widths.

 Type 2L (SL) Traffic Arrow

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>Approach Taper A</th>
<th>Approach Taper B</th>
<th>Approach Taper C</th>
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<tbody>
<tr>
<td>60 MPH</td>
<td>360</td>
<td>90</td>
<td>720</td>
</tr>
<tr>
<td>55 MPH</td>
<td>330</td>
<td>90</td>
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</tr>
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<td>540</td>
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<td>40 MPH</td>
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</tr>
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<td>30 MPH</td>
<td>180</td>
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<td>360</td>
</tr>
<tr>
<td>25 MPH</td>
<td>150</td>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>20 MPH</td>
<td>120</td>
<td>20</td>
<td>240</td>
</tr>
</tbody>
</table>
NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12’ Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER G</th>
<th>APPROACH TAPER J</th>
<th>APPROACH TAPER K</th>
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<tr>
<td>20 MPH</td>
<td>63’</td>
<td>10’</td>
<td>125’</td>
</tr>
</tbody>
</table>

Left-Turn Channelization

Reduced Taper Lengths - Symmetrical Widening

(for limited use in urban areas with posted speeds of 40 MPH or less)

Reduced Taper Lengths - Asymmetrical Widening Right of Center Line

(for limited use in urban areas with posted speeds of 40 MPH or less)

Reduced Taper Lengths - Asymmetrical Widening Left of Center Line

(for limited use in urban areas with posted speeds of 40 MPH or less)
LEFT-TURN CHANNELIZATION

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double centerline.

6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

NOTES

POSTED SPEED APPROACH TAPER A DIMENSION

<table>
<thead>
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<th>Speed</th>
<th>Approach</th>
<th>Taper A</th>
<th>Dimension</th>
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<td>60 MPH</td>
<td>360'</td>
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<td>55 MPH</td>
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<td>20 MPH</td>
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<td>20'</td>
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</tr>
</tbody>
</table>

LEGEND

- L = 12' Typical Lane Width. See Contract for specified lane widths.

- Type 2L (SL) Traffic Arrow

- Type 6R (SR) Traffic Arrow

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-03-11

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
LEFT-TURN CHANNELIZATION IN TWO-WAY LEFT-TURN LANE

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double centerline.

6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

NOTES

POSTED DIMENSION APPROACH TAPER F

APPROACH TAPER F

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.

\[ \text{Can be reduced to a minimum of 50'} \text{ to increase storage capacity.} \]
NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two lane highway. The channelization plan may be used on four lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD Figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four lane undivided highways shall be double centerline.

6. All turn traffic arrows are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

Type 2R (SR) Traffic Arrow

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
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<td>140'</td>
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DOUBLE LEFT-TURN CHANNELIZATION

STANDARD PLAN M-3.50-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-03-11

Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double center line.
6. All Traffic Arrows not required are optional, but recommended. Arrows may be added for longer storage lanes, or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.
* = Denotes required traffic arrow. Accompanying ONLY word message optional. See Standard Plan M-80.10 for spacing.

Type 2R (SR) Traffic Arrow
Type 3L (SL) Traffic Arrow
NOTE

When specified in the Contract Plans, the HOV Symbol Marking shall be installed with an offset of 1 foot max. from the lane centerline.
BICYCLE LANE SYMBOL LAYOUT

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

TOTAL MARKING AREA 10.27 SQ.FT.

GRID IS 1" SQUARE
MARKING AREA 6.02 SQ.FT.

MARKING AREA 4.25 SQ.FT.

BIKE RIDER SYMBOL DETAIL

BIKE LANE ARROW DETAIL

GENERAL NOTE
See contract for location and material requirements.
1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle. (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.

**NOTE:**

**SHARED - USE PATH MARKINGS**

**STANDARD PLAN M-9.60-00**

**PLAN**

**MARKING AROUND BOLLARD**

**PLAN**

**MARKING AROUND MULTIPLE BOLLARDS**

**MARKING AT INTERSECTION WITH ROADWAY**

**DETAIL**

**PAVED PATH**

**BOLLARD**

**FOOTING**

**5' - 0"**

**10' - 0" OR MIN. SIGHT DISTANCE (SEE NOTE 1)**

**PLAN**

**CENTRELINE MARKING**

**MARKING AROUND BOLLARD**

**SHARED - USE PATH**

**NOT LESS THAN 10'**

**PAVED PATH**

**BOLLARD**

**5' - 0"**

**5' - 0"**

**9' - 0"**

**3' - 0"**

**4" WIDE SOLID YELLOW PAINTED LINE**

**MARKING**

**AROUND MULTIPLE BOLLARDS**

**SHOWN AT REDUCED DRAWING SCALE**

**NOTE:**

1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle. (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.
GENERAL NOTE
See contract for location and material requirements.

KEY NOTES
1. Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" white transverse lines.
2. 24" white transverse line
3. W10-1 Advance Warning Sign (not included in RR Crossing Symbol Bid Item)
4. Place Stop Line 15' from the nearest rail or approximately 8 feet from RR gate, if present.

GRID IS 1" SQUARE
"R" DETAIL

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 109.75 SQ.FT.

SYMBOL DETAIL

THE HONORABLE J. TRENTIN
PRESIDENT OF THE STATE

APPROVED FOR PUBLICATION
Ken L. Smith 01-30-07
STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STANDARD PLAN M-11.10-01
SHEET 1 OF 1 SHEET

RAILROAD CROSSING LAYOUT
EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

LAYOUT

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 111.59 SQ.FT.

SYMBOL DETAIL

ALTERNATIVE SYMBOL

LAYOUT

TOP LINE
LANE LINE OR ROADWAY CENTERLINE

EDGE LINE

LANE LINE OR ROADWAY CENTERLINE

EDGE LINE

LAYOUT

TOP LINE
LANE LINE OR ROADWAY CENTERLINE

EDGE LINE

LAYOUT

TOP LINE
LANE LINE OR ROADWAY CENTERLINE

EDGE LINE

LAYOUT

STOP LINE
LANE LINE OR ROADWAY CENTERLINE

EDGE LINE

SYMBOL DETAIL

GRID IS 1" SQUARE
"R" DETAIL

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 109.75 SQ.FT.

SYMBOL DETAIL

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 111.59 SQ.FT.

SYMBOL DETAIL

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 109.75 SQ.FT.

SYMBOL DETAIL

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 111.59 SQ.FT.

SYMBOL DETAIL

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 109.75 SQ.FT.

SYMBOL DETAIL

TOTAL MARKING AREA
(PER 12' WIDE LANE)
= 111.59 SQ.FT.
NOTES

1. See the Contract Plans for locations of crosswalk centerlines.

2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.

3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
**NOTES**

1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.


**LEGEND**

- Reserved Parking Sign and post with (R7-801A) Plaque, if indicated
- Access Parking Space Symbol
- Manufactured wheel stop
- Detectable Warning Pattern

**PARKING SPACE LAYOUTS**

**STANDARD PLAN M-17.10-02**

Approved for Publication: Pasco Bakotich III 07-03-08

State Design Engineer

Washington State Department of Transportation

Effective: August 5, 2013 to August 3, 2014
NOTES

1. Dotted Extension Line shall be the same color as the line it is extending.

2. Edge Line shall be white on the right edge of traveled way, and yellow on the left edge of traveled way (on one-way roadways). Solid Lane Line shall be white.

3. The distance between the lines of the Double Centerline shall be 12" everywhere, except 4" for left-turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-state routes) may specify a 4" distance for all locations. The distance between the lines of the Double Lane Line shall be 4".
GENERAL NOTE
See Standard Plan M-20.10 for pattern and color requirements.

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
DOUBLE CENTER LINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

PROFILED EMBOSSED PLASTIC
(SOLID OR BROKEN LINE)
FOR:
CENTER LINE & LANE LINE
NO-PASS LINE
TWO-WAY LEFT-TURN CENTER LINE
REVERSIBLE LANE LINE
DOUBLE CENTER LINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

PROFILED PLASTIC
(SOLID LINE)
FOR:
NO-PASS LINE - W = 4"
TWO-WAY LEFT-TURN CENTER LINE - W = 4"
DOUBLE CENTER LINE & DOUBLE LANE LINE - W = 4"
EDGE LINE & SOLID LANE LINE - W = 4"
WIDE LANE LINE & WIDE LINE - W = 8"
DOUBLE WIDE LANE LINE - W = 8"
BARRIER CENTER LINE - W = 20"

SECTION A

TOP VIEW

DETAIL C

SIDE VIEW

CENTER LINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE
REVERSIBLE LANE LINE
DOUBLE CENTER LINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

DOTTED EXTENSION LINE - W = 4"
DROP LANE LINE - W = 8"

WIDE BROKEN LANE LINE - W = 8"

TOP VIEW

SIDE VIEW

DETAIL B

SIDE VIEW

/profiled_and_embossed_plastic_lines/

STANDARD PLAN M-20.20-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Ken L. Smith
01-30-07
Washington State Department of Transportation

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
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.

TYPE 2 RPM RAISED FACE COLORS

- TYPE 2YY YELLOW AND YELLOW
- TYPE 2W WHITE - ONE SIDE ONLY
- TYPE 2Y YELLOW - ONE SIDE ONLY

LEFT EDGE OF LANE PLACEMENT DETAIL

SEE NOTE 2
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.

Type 2L (SL) Traffic Arrow

Notes
LONGITUDINAL MARKING SUPPLEMENT WITH RPMs ~ TURN Lanes

STANDARD PLAN M-20.40-02

TYPE 2YY RPM (TYP.)

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

TYPE 2YY RPM (TYP.)

20' - 0" SPACING

40' RPM SPACING

40' - 0" SPACING

INSIDE EDGE OF LANE

DOUBLE CENTERLINE (YELLOW)

TYPE 2YY RPM (TYP.)

TWO-WAY LEFT-TURN CENTERLINE

4" (TYP.)

4" (TYP.)

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

TYPE 2YY RPMs = 10' O.C. (TYP.)

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO AUGUST 3, 2014

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-03-11

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTE
1. The NO PASS LINE (when required) is applied parallel to the CENTERLINE, 4" away, with the Type 2YY RPM's aligned (similar to TWO-WAY LEFT-TURN LINE).
NOTE

Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher.
SYMBOL MARKINGS
TRAFFIC ARROWS FOR
HIGH SPEED ROADWAYS
STANDARD PLAN M-24.20-01
SHEET 3 OF 3 SHEETS
APPROVED FOR PUBLICATION
Harold J. Peterfeso 05-31-06
WASHTON STATE DEPARTMENT OF TRANSPORTATION

SYMBOL & LANE CENTERLINE
SYMMETRICAL ABOUT CENTERLINE
GRID IS 4" SQUARE
MARKING AREA 45.17 SQ.FT.

ELLIPSE "A"
1' - 8"
1' - 0"
2' - 0"
3' - 6"

ELLIPSE "B"
1' - 8"
1' - 0"
2' - 0"
3' - 6"

1' - 8"
1' - 0"
2' - 0"
3' - 6"

MARKING AREA 35.88 SQ.FT.
TYPE 6L (LEFT)
TRAFFIC ARROW
TYPE 6R (RIGHT)
TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6L
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

SYMMETRICAL ABOUT V CENTERLINE
GRID IS 4" SQUARE
MARKING AREA 45.17 SQ.FT.

ELLIPSE "A"
1' - 8"
1' - 0"
2' - 0"
3' - 6"

ELLIPSE "B"
1' - 8"
1' - 0"
2' - 0"
3' - 6"

1' - 8"
1' - 0"
2' - 0"
3' - 6"

MARKING AREA 35.88 SQ.FT.
TYPE 6L (LEFT)
TRAFFIC ARROW
TYPE 6R (RIGHT)
TRAFFIC ARROW
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.
Reversing curve ellipses are symmetrical about center.

Grids are 4" square. Assume points not dimensioned to be coincident with grid lines.

Component key:

- Common
- "C" area
- "T" area
- "R" area
- "L" area

The labeled areas above correspond to the portions needed for each type of roundabout traffic arrow.

For example: The roundabout traffic arrow type TRC requires the "common", "T", "R", and "C" areas.

Center the arrow on the lane centerline between the lateral extremities of that arrow type.
LENGTH VARIES - SEE CONTRACT

MARKING AREA = 11.73 SQ.FT.
HALF-MILE MARKER

MARKING AREA = 0.56 SQ.FT.
CROSS CULVERT MARKINGS

MARKING AREA = 0.56 SQ.FT.
JUNCTION BOX, PULL BOX, OR CABLE VAULT MARKINGS

MARKING AREA = 0.56 SQ.FT.
DRAINAGE STRUCTURE INLET

CROSSHATCH MARKING

WHITE OR YELLOW - SEE CONTRACT PLANS
CHEVRON OR DIAGONAL

PAVED SHOULDER

AERIAL SURVEILLANCE MARKERS

PAVED SHOULDER

MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

PAVED SHOULDER

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

NOTES

1. If Rumble Strips are present, install marking outside of the Rumble Strip.

LENGTH VARIES - SEE CONTRACT

1'-0' UNLESS NOTED

OTHERWISE IN CONTRACT

STOP LINE

WHITE OR YELLOW - SEE CONTRACT PLANS
CHEVRON OR DIAGONAL

PAVED SHOULDER

MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

PAVED SHOULDER

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

SYMBOL MARKINGS
MISCELLANEOUS

STANDARD PLAN M-24.60-03

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014

APPROVED FOR PUBLICATION
Pasco Bakotich III 05-11-11
Washington State Department of Transportation
### Access Parking Space Symbol

**Minimum**

- Grid is 4" square marking area = 1.41 sq. ft.

**Standard**

- Grid is 4" square marking area = 3.09 sq. ft.

### Speed Bump Symbol

- Marking area = 13.08 sq. ft.

### Yield Ahead Symbol

- Symbol marking area = 25.90 sq. ft.
- Type 1: 6'-0" 2'-6" 13'-0"
- Type 2: 6'-0" 3'-0" 20'-0"

### Yield Line Symbol

- Symbol marking area = 36.54 sq. ft.
- Type 1: 1'-0" 6" 1'-6" 6" 0.75 sq. ft.
- Type 2: 2'-0" 1'-0" 3'-0" 1'-0" 3.00 sq. ft.

### Miscellaneous

- Standard Plan M-24.60-03
- Sheet 2 of 2 sheets

**Effective:** August 5, 2013 to August 3, 2014
BARRIER DELINEATOR REQUIREMENTS

- Spacing of Barrier Delineators shall be as shown in the Plans.
- The housing or bracket can be flexible or rigid, molded from a durable plastic or other durable material approved by the engineer, and shall be attached to the barrier with an adhesive recommended by the manufacturer. The attachment point on the barrier surface shall be free of dirt, curing compound, moisture, paint, or any other matter that would adversely affect the adhesive bond.
- Barrier Delineators shall be one-sided for single direction traffic, or two-sided for bi-directional traffic. Color shall be white on the right of traffic, and yellow on the left of traffic.
- The reflective surface shall be rectangular or trapezoidal.
- Reflective Sheeting: 12 square inches minimum surface area; Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.
- Plastic Reflector: 9 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:

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<thead>
<tr>
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<th>OBSERVATION ANGLE</th>
<th>SPECIFIC INTENSITY (cdsr-0)</th>
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<th>SPECIFIC INTENSITY (cdsr-0)</th>
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GUIDEPOST TYPE DEFINITIONS – REFLECTIVE SHEETING APPLICATIONS

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<th>REFLECTIVE SHEETING APPLICATION</th>
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<tr>
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<td>FACING TRAFFIC</td>
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GUIDEPOSTS AND BARRIER DELINEATORS

STANDARD PLAN M-40.10-02

BARRIER DELINEATORS

(CONCRETE BARRIER TYPES AND LOCATIONS VARY, SINGLE SLOPE IN MEDIAN SHOWN)

NOTES

1. When the Contract Plans require a guidepost with concurrent guardrail runs, the Contractor shall either:
   A. Drive the flexible guidepost in line with the guardrail posts, or
   B. Mount the shorter flexible guidepost onto the guardrail post.

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

3. Guideposts shall be fastened to the steel guardrail posts using two galvanized 2" x 3/8" bolts with a washer on both sides, a lock washer, and nut. The nut shall be tightened to properly compress the lock washer. The drilled holes in the guardrail post web shall be painted with galvanizing repair paint as described in Standard Specification Section B-11.3(1C). Also acceptable is any approved attachment method submitted by the guidepost manufacturer.

4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delineators where guideposts are required.
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.
GUIDE POST SPACING (FEET)

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INTERPOLATE FROM THE TABLE FOR RADIUS NOT SHOWN

NOTE 1

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.

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

TWO-WAY UNDIVIDED HIGHWAYS
GUIDE POSTS ON OUTSIDE OF CURVE IN DIRECTION OF TRAVEL

MULTI-LANE DIVIDED HIGHWAYS
GUIDE POSTS ON INSIDE AND OUTSIDE OF CURVE FOR EACH DIRECTION OF TRAVEL

NOTE 2

NOTE 3

NOTE 1

PT

PC

S

1/2 S

1/2 S

1/2 S

1/2 S
1. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

2. Locate the initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

NOTE

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

MEDIAN Crossovers

100' 100' 100'

LANE REDUCTIONS

100' (Typ.)
**Shouler Rumble Strip**

**Type 1**

For Divided Highways

**Standard Plan M-60.10-01**

**Sheet 3 of 4 Sheets**

*Approved for Publication*

**Pasco Bakotich III**

**06-03-11**

Washington State Department of Transportation

**Effective: August 5, 2013 to August 3, 2014**
IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

40' MIN.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE END OF THE TAPER.
ISOMETRIC VIEW
TYPICAL SHOULDER INSTALLATION

UNIT SECTION A
5" ± 1/2"
3/8"

UNIT SECTION B
12" - TYPES 2 AND 4
16" - TYPE 3
3/8"

PERSPECTIVE VIEW
UNDIVIDED HIGHWAY
(TYPE 4 PATTERN SHOWN)
SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN M-60.20-02

SHOULDER TAPER DETAIL

1. NOT LESS THAN 4' - PROVIDE 8' WHEN BARRIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGE APPROACH SLABS

60' MIN.
100' MIN.
60' MIN.
100' MIN.

TERMINE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

EDGE LINE

EPS

26 MILLED UNITS 12' GAP 28 MILLED UNITS 12' GAP 28 MILLED UNITS

TYPE 2 - 12' GAP AND 12' WIDE STRIP
TYPE 3 - 16' GAP AND 16' WIDE STRIP

TYPE 4 - 12' WIDE STRIP

48 MILLED UNITS 12' OR 16' GAP 48 MILLED UNITS

EDGE OF PAVED SHOULDER - EPS

SHOULDER RUMBLE STRIPS

EDGE LINE

SHOULDER RUMBLE STRIPS

EDGE LINE

SHOULDER RUMBLE STRIPS

EDGE LINE

SHOULDER RUMBLE STRIPS

EPS

40' MIN.

40' MIN.

MAJOR ROAD

MINOR ROAD

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

TERMINE SHOULDER RUMBLE STRIPS 40' MINIMUM FROM THE BEGINNING OR END OF EACH RIGHT TURN RADIUS.

STRICTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH

Pasco Bakotich III 06-27-11

STATE DESIGN ENGINEER

STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 5, 2013 TO August 3, 2014
NOTES

1. Centerline Rumble Strip installation requires a minimum distance of 12 feet from Centerline to edge of paved shoulder.

2. When directed by the Engineer, Rumble Strips may be installed along the turn pocket taper where there is a history of rear-end collisions in the turn pocket.
**Rumble Strip Usage as Directed by Engineer**

**Terminate Rumble Strip at Beginning and End of Approach or Intersection**

**Centerline Rumble Strip**

**Standard Plan M-65.10-02**

**Effective: August 5, 2013 to August 3, 2014**

**Pasco Bakotich III 05-11-11**

**Washington State Department of Transportation**

**Approved for Publication**
TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

TRAFFIC LANE
VEHICLE WHEEL PATH

LOW-SPEED APPLICATION

TRAFFIC LANE
VEHICLE WHEEL PATH

NOTE
1. Typically, four times the letter or numeral height - minimum, up to ten times - maximum, or according to Plans.
EIGHT FOOT HIGH LETTERS AND NUMERALS
ARE SHOWN ON A FOUR-INCH SQUARE GRID
FOR USE ON ROADWAYS WITH A POSTED SPEED OF 45 MPH OR MORE
SIX FOOT HIGH LETTERS AND NUMERALS SHOWN ON A THREE-INCH SQUARE GRID

TEN FOOT HIGH LETTERS SHOWN ON A FIVE-INCH SQUARE GRID

TRAFFIC LETTERS AND NUMERALS
(LOW SPEED ROADWAYS)
STANDARD PLAN M-80.30-00

FOR USE ON ROADWAYS WITH A POSTED SPEED OF 40 MPH OR LESS

EFFECTIVE: AUGUST 5, 2013 TO AUGUST 3, 2014

Pasco Bakotich III 06-10-08
STATE DESIGN ENGINEER
Washington State Department of Transportation