Standard Plans

M 21-01
August 1, 2016

Engineering and Regional Operations
Development Division, Design Office
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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
Foreword

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

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

Contact the Design Standards Team at:

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Further information, as well as Bentley Micro Station (.dgn) CAD files, Adobe Acrobat (.pdf) files, and some AutoCAD (.dwg) CAD files, can be found on the Design Standards website at: www.wsdot.wa.gov/eesc/design/designstandards

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/s/ Jeff Carpenter
Jeff Carpenter
State Design Engineer
## Comments

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<td>M-65.10-02</td>
<td>Centerline Rumble Strip</td>
<td>5/11/11</td>
<td>2</td>
</tr>
<tr>
<td>M-80.10-01</td>
<td>Traffic Letter and Numeral Applications</td>
<td>6/3/11</td>
<td>2</td>
</tr>
<tr>
<td>M-80.20-00</td>
<td>Traffic Letters and Numerals (High Speed Roadways)</td>
<td>6/10/08</td>
<td></td>
</tr>
<tr>
<td>M-80.30-00</td>
<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
<td></td>
</tr>
</tbody>
</table>
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 (4H:1V)
SIDE SLOPE RATIO
BACK OF DITCH

LATH FOR SLOPE REFERENCES

SLOPE TREATMENT (ST) STAKE
FOR CUT SECTIONS

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)
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 3" 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).
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>10 1/2&quot; Diam.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 1/2&quot; Diam.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8&quot; Diam.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 1/2&quot; Diam.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PLAN VIEW

SECTION OF RISER RING

SECTION COVER

SECTION INSTALLATION

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

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

ISOMETRIC

SECTION OF LETTER

CONCRETE BASE

SOIL

GROUT

2" O.D. GALVANIZED STEEL PIPE - NOTE 4

MONUMENT CASE AND COVER

STANDARD PLAN A-10.30-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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.

<table>
<thead>
<tr>
<th>Cut Slope (H : V)</th>
<th>Ground Line (H : V)</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L = 10.0'</td>
<td>L = 5.0'</td>
<td></td>
</tr>
<tr>
<td>+2 : 1</td>
<td>0.5'</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+3 : 1</td>
<td>1.0'</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>+4 : 1</td>
<td>1.0'</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>+6 : 1</td>
<td>1.2'</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>≥ Level</td>
<td>2.0'</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>-4 : 1</td>
<td>2.0'</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>-3 : 1</td>
<td>3.0'</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>+3 : 1</td>
<td>0.5'</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+4 : 1</td>
<td>0.5'</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+6 : 1</td>
<td>1.2'</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>2 : 1</td>
<td>≥ Level</td>
<td>1.5'</td>
<td>0.5'</td>
</tr>
<tr>
<td>-4 : 1</td>
<td>2.0'</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>-3 : 1</td>
<td>3.0'</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>+6 : 1</td>
<td>0.5'</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>5 : 1</td>
<td>≥ Level</td>
<td>1.5'</td>
<td>0.5'</td>
</tr>
<tr>
<td>-4 : 1</td>
<td>1.2'</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-3 : 1</td>
<td>2.0'</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>+6 : 1</td>
<td>0.5'</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>4 : 1</td>
<td>≥ Level</td>
<td>0.5'</td>
<td></td>
</tr>
<tr>
<td>-4 : 1</td>
<td>1.0'</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-3 : 1</td>
<td>1.5'</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>6 : 1</td>
<td>≥ Level</td>
<td>0.5'</td>
<td></td>
</tr>
<tr>
<td>-4 : 1</td>
<td>1.2'</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-3 : 1</td>
<td>1.5'</td>
<td>0.8</td>
<td></td>
</tr>
</tbody>
</table>

Slope treatment not required.
10 GAUGE 5" X 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE (SEE STD. SPEC. 8407)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

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

EXISTING SOIL

SECTION A

EXISTING SOIL

SECTION B

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

CERTIFICATE NO. 001580

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CONCRETE SLOPE PROTECTION

STANDARD PLAN A-30.10-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
**NOTES**

- 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.

**MAXIMUM ANCHOR SPACING (A)**

<table>
<thead>
<tr>
<th>H</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>0' -10'</td>
<td>50'</td>
</tr>
<tr>
<td>100' - 200'</td>
<td>35'</td>
</tr>
<tr>
<td>200' - 300'</td>
<td>25'</td>
</tr>
</tbody>
</table>

**MAXIMUM LENGTH - TOP HORIZONTAL SUPPORT ROPE (B)**

<table>
<thead>
<tr>
<th>H</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>50'</td>
<td>450'</td>
</tr>
<tr>
<td>100'</td>
<td>900'</td>
</tr>
<tr>
<td>200'</td>
<td>1000'</td>
</tr>
<tr>
<td>300'</td>
<td>1250'</td>
</tr>
</tbody>
</table>

**WIRE MESH SLOPE PROTECTION**

**STANDARD PLAN A-30.30-01**

**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017
NOTES

- Suggested minimum depth
- Minimum allowable anchor capacity shall be 20,000 lbs.

GROUND LINE
WIRE ROPE
CLIP (TYP.)

REINFORCED CONCRETE POST - 8" SQUARE OR 9" DIAM. X 66" MIN.
PLACE WIRE ROPE AT CENTER OF POST

#3 BAR (TYP.) - FOUR REQUIRED

TYPE 1 DEADMAN
(For use in soil)

#3 BAR (TYP.) - FOUR REQUIRED
14" MIN.

GROUND_LINE
WIRE_ROPE_CLIP (TYP.)

REINFORCED CONCRETE POST - 12" X 12" x 66".
PLACE WIRE ROPE AT CENTER OF POST

#3 BAR (TYP.) - FOUR REQUIRED
14" MIN.
10'-2" MIN.

TYPE 2 DEADMAN
(For use in soil)

GROUND LINE
WIRE ROPE CLIP (TYP.)

REINFORCED CONCRETE POST (TYP.) - 12" X 12" X 66".
PLACE WIRE ROPE AT CENTER OF POST

#3 BAR (TYP.) - FOUR REQUIRED
14" MIN.

GROUND LINE
WIRE ROPE CLIP (TYP.)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE
CEMENT GROUT

TYPE 3 DRILLABLE - GROUTABLE
(For use in rock)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE
Cement Grout

HOLLOW CORE THREADED BAR
SACRIFICIAL DRILL BIT
CEMENT GROUT

TYPE 4 MECHANICAL ANCHOR
(For use in soil)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE
CEMENT GROUT

THIMBLE
FERRULE

HOLLOW CORE THREADED BAR
SACRIFICIAL DRILL BIT

CEMENT GROUT

TYPE 5 MECHANICAL ANCHOR
(For use in soil)

3/4" DIAM. 6 X 19 IWRC GALVANIZED WIRE ROPE
CEMENT GROUT

THIMBLE
FERRULE

HEX NUT
STEEL BEARING PLATES

NO. 8 GRADE 80 DEFORMED STEEL THREADED BAR

TYPE 6 DEFORMED STEEL THREADED BAR
(For use in rock)
NOTES
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.

DOWEL BAR BASKETS

STANDARD PLAN A-40.00-00

WASHINGTON DEPARTMENT OF TRANSPORTATION

July 7, 2009

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
**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>Distance From Nearest Transverse Joint</th>
</tr>
</thead>
<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>
<td>-</td>
<td>USE</td>
<td>&lt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>F</td>
<td>Grate Inlet, Catch Basin or Concrete Inlet</td>
<td>-</td>
<td>USE</td>
<td>&gt; 4 FT FROM JOINT</td>
</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 Pavement Section

- **Isolation Joint - 3/4" Premolded Joint Filler**
  - Edges, Flanges or Lips in Pavement Section
  - Continuous Vertical Face Through the Pavement Section
1. Use the 1/2 inch joint details for bridges with expansion length less than 100 feet and for bridges with L type abutments. Use the 1 inch 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 sawcutting concrete at all locations. For Details 1 and 2, the construction tolerance to locate the sawcut is 1/4 inch (0 min. to 1/2 inch max.) from the concrete.

4. For Details 1, 2, 3, and 4, the item "HMA SAWCUT AND SEAL" shall be used for payment. For Details 5 and 6, the item "PAVED PANEL JOINT SEAL" shall be used for payment. For Detail 7, the item "SEALING EXISTING LONGITUDINAL AND TRANSVERSE JOINT" shall be used for payment.
NOTES

1. All edges of the approach slab shall have 1/2" (in) radii except at longitudinal construction joints and adjacent to L-Type abutments.

2. Longitudinal joints shall be placed on lane lines and shall be constructed and sealed in accordance with Standard Specification Section 6-05.3(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 sawcut as soon as possible after placement of concrete.

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

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

3. The minimum lap splice of #5 is 2'-0", #6 is 2'-8", #8 is 3'-0", and #10 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 #4 and #6.

Bridge Approach Slab

Standard Plan A-40.50-0:

For Local Agency Use Only

Bijan Khaleghi, Bijan
Khaleghi, Bijan

Dec 18 2014 5:06 PM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Ballew, Pasco

Dec 23 2014 4:57 PM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Effective: August 1, 2016 to August 6, 2017

Embankment Widening
For Bridge End
With Wing Wall
Standard Plan A-50.10-00

Sheet 2 of 2 Sheets

Approved for Publication

Edge Conveniences: 3' 0" Width

2001

Washington State Department of Transportation

WIRE ROPE LOOPS
- See Standard Plan C-8

EDGE OF SHOULDER
(CURB LINE)

SEE NOTE
OMIT TAPERED BARRIER TOE

BACK OF PAVEMENT SEAT

BRIDGE F-SHAPE TRAFFIC BARRIER

PRECAST CONCRETE BARRIER
TYPE 2 (UNRESTRAINED)

CONCRETE BARRIER TRANSITION TYPE 2
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8

VARIIES - SEE CONTRACT

PLAN WITH TYPE 2 UNRESTRAINED BARRIER

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

EDGE OF PAVED EMBANKMENT WIDENING

PRECAST CONCRETE BARRIER
TYPE 2 (ANCHORED)

CONCRETE BARRIER TRANSITION TYPE 2
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8

VARIIES - SEE CONTRACT

PLAN WITH ANCHORED BARRIER

1 1/4" PVC CONDUIT SLEEVE

EDGE OF SHOULDER
(CURB LINE)

SEE NOTE
BACK OF PAVEMENT SEAT

THREE #9 (EPoxy COATED) BARS
- SEE STD. PLAN C-16a

OMIT TAPERED BARRIER TOE

BRIDGE TRAFFIC BARRIER

PLAN WITH SINGLE SLOPE BARRIER

CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER

SINGLE SLOPE CONCRETE BARRIER
(DUAL FACE)

VARIIES - SEE CONTRACT

EDGE OF EMBANKMENT WIDENING
EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL TYPE 31 TRANSITION SECTION TYPE 31 – SEE STANDARD PLAN C-26.20

PLAN

EMBANKMENT
CURTAIN WALL
BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

ELEVATION

CURTAIN WALL
END PIER
PRECAST GIRDER

ISOMETRIC VIEW
EMBANKMENT WIDENING AT BRIDGE END WITH "L" SHAPED ABUTMENT
STANDARD PLAN A-50.30-00

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

PRECAST GIRDER

END WALL

RETAINING WALL OR CURTAIN WALL (OR ACCORDING TO PLANS)

3'-6" (MIN.) OR SEE CONTRACT PLANS

3'-6"

SHAPED ABUTMENT

L" SHAPED ABUTMENT

END WALL

RETAINING WALL OR CURTAIN WALL (OR ACCORDING TO PLANS)

EF F E C T I V E :  AUGUST 1, 2016 TO August 6, 2017
EMBANKMENT WIDENING
AT BRIDGE END WITH
SIDEWALK
STANDARD PLAN A-50.40-00

SIDEWALK CONNECTION TO BRIDGE PEDESTRIAN TRAFFIC BARRIER

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

1. Install tie bars across longitudinal joints between new panels (complete and partial) and existing
cement concrete pavement lane or shoulder when four or more adjacent panels are replaced.
Place new tie bars between existing tie bars. Tie bars are not installed between cement concrete
pavement and hot mix asphalt shoulders.

2. Place a bond-breaking material such as polyethylene film, roofing paper, or other material
approved by the Engineer along all existing concrete surfaces and between the bottom of
the slab and bases prior to placing concrete.

3. Place new dowel bars between existing dowel bars. The 1” - 0” dimension from the edge
of the panel may be increased by 6” (in) to avoid bar in existing panel.

4. Bars shall meet the requirements of Standard Specification 9-07.5(1) or 9-07.5(2).
PLAN VIEW
PARTIAL PANEL REPLACEMENT
WITHOUT JOINT REPLACEMENT

PLAN VIEW
PARTIAL PANEL REPLACEMENT
WITH JOINT REPLACEMENT

EXISTING TRANSVERSE JOINT

NEW DOWEL BARS
1'-6" ON CENTER

SAWED GROOVE (TYP.)

SAWED GROOVE
SEE STD. PLAN A-40.10

NEW TIE BAR - #5 x 30" (IN)

DRILL 7/8" (IN) MIN. TO 1 1/8" (IN) MAX. DIAM. + 15" (IN) LONG HOLE IN EXISTING CEMENT CONCRETE FOR NEW TIE BAR

SECTION B

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

PLAN VIEW
DOWEL BAR RETROFIT
FOR TWO-LANE DIVIDED HIGHWAY (ONE-WAY TRAFFIC)
FOR EACH LANE IN UNDIVIDED HIGHWAY (TWO-WAY TRAFFIC)

SECTION B

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

SECTION A

SECTION C

DOVER BAR (TYP.) – SEE PLACEMENT DETAIL, SHEET 2
EXISTING CEMENT CONCRETE PAVEMENT

EXISTING CEMENT CONCRETE PAVEMENT

DOWEL BAR (TYP.) – SEE PLACEMENT DETAIL, SHEET 2

SKEWED TRANSVERSE CONTRACTION JOINT
SEE STD. PLAN A-60.10

PLAN VIEW
SKewed JoINT DETAIL
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.
DELAMINATION AND FULL DEPTH REPAIR

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.(6).

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

LEGEND

CONCRETE REMOVAL AREA
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.
**NOTES**

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

2. The knockout shall not be greater than 28", 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.
One #3 bar for each 6" height increment, spaced equally.

Rectangular Adjustment Section

#3 bar each corner
#3 bar each side
#3 bar each way
#3 bar hoop

Precast Base Section

Alternative Precast Base Section

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.

Catch Basin Type 1P
(For Parking Lot)

Standard Plan B-5.60-01
### 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>
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### PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH CONCRETE</th>
<th>ALL METAL</th>
<th>MAXIMUM CPSSP</th>
<th>INSIDE DIAMETER PROFILE WALL PVC</th>
<th>WALL PVC</th>
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1. Corrugated Polyethylene Storm Sewer Pipe (Standard Specification 9-05.20)
2. (Standard Specification 9-05.12(1))
3. (Standard Specification 9-05.12(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 Aluminumized 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 30B.

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

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

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

11. All shear gate bolts shall be stainless steel.

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

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

NOTES
NOTES
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.
GRAVEL BACKFILL FOR PIPE ZONE BEDDING

STEPS OR LADDER

24:1 SLOPE

CIRCULAR ADJUSTMENT SECTION (TYP.)

ECCENTRIC CONE SECTION

REINFORCING STEEL (TYP.)

CHANNEL AND SHELF

PRECAST RISER SECTIONS

MANHOLE RING AND COVER

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

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MANHOLE TYPE 1

STANDARD PLAN B-15.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: LSC COMPANY

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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

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MANHOLE TYPE 2
STANDARD PLAN B-15.40-01

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

1-3-12.
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.

MANHOLE DIMENSION TABLE

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MANHOLE TYPE 3
STANDARD PLAN B-15.60-01

DRAWN BY: LISA CYFORD

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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.
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.

FINISHED SURFACE

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

CIRCULAR GRATE - SEE STANDARD PLAN B-30.80

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

UNDERGROUND DRAINAGE GEOTEXTILE, MODERATE SURVIVABILITY, CLASS A

CRUSHED SURFACING BASE COURSE

NO PIPE JOINTS ALLOWED IN GRAVEL BACKFILL ENVELOPE

FLOW

INLET PIPE - SEE NOTE 3

ALTERNATIVE PRECAST FOOTING DETAIL

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

ALTERNATIVE PRECAST FOOTING PRECAST INTEGRAL BASE PRECAST WITH RISER

SEEPAGE PORT - SEE NOTE 2

INTEGRAL BASE DETAIL

GRANV, BACKFILL FOR DRYWELL

ADJUSTMENT SECTION (TYP.)

CONC. SECTION

4" CONCRETE SLAB - COMMERCIAL CONCRETE

72"

48" I.D.

12"

12"

5" MIN.

VARY

VARY

INTEGRAL BASE DETAIL

ALTERNATIVE PRECAST FOOTING DETAIL

DRAIN BY FERN L. DRILL

CUTAWAY ELEVATION VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
CIRCULAR FRAME (RING) – SEE STANDARD PLAN B-30.70
CIRCULAR GRATE – SEE STANDARD PLAN B-30.90
FINISHED SURFACE
ADJUSTMENT SECTION (TYP.)
CONE SECTION
4" CONCRETE SLAB – COMMERCIAL CONCRETE
CRUSHED SURFACING BASE COURSE
UNDERGROUND DRAINAGE G sediment, moderate survivability, CLASS A
LIMIT OF EXCAVATION 1H : 2V SLOPE (MAX.)

NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. For depths over 18" - 2" use 72" x 8" Alternative Precast Footing.
4. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.

ALTERNATIVE PRECAST FOOTING DETAIL
FOUR 6"-DIA. DRAIN HOLES (TYP.) POSITIONED NOT TO INTERFERE WITH REINFORCING BARS

INTEGRAL BASE DETAIL
FOUR 6"-DIA. DRAIN HOLES (TYP.) POSITIONED NOT TO INTERFERE WITH REINFORCING BARS

INTEGRAL BASE PRECAST WITH RISER
ALTERNATIVE PRECAST FOOTING
CUTAWAY ELEVATION VIEW

GRAVEL BACKFILL FOR DRYWELL
SEEPAGE PORT – SEE NOTE 2

ALTERNATIVE FOOTING PRECAST

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE INSPECTOR – D.O.T.

MADDY M. BROWN

REGISTERED PROFESSIONAL ENGINEER

3/4/12

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. For depths over 18" - 2" use 72" x 8" Alternative Precast Footing.
4. 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. 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.
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.
NOTES

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 9-06.15(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 9-06 (8)(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.
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.
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 × 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”.

RECTANGULAR HERRINGBONE GRATE

STANDARD PLAN B-30.50-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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" x 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-20.60.
Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 189.

MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES

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.
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>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION DESCRIPTION</th>
<th>QTY.</th>
<th>SIZE</th>
<th>LENGTH Description</th>
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<tr>
<td>1</td>
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<td>3</td>
<td>5' - 9&quot;</td>
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<tr>
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<td>2</td>
<td>7' - 2&quot;</td>
<td>STRAIGHT</td>
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<td>4</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>2</td>
<td>2' - 9&quot;</td>
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<td>WALL</td>
<td>4</td>
<td>9' - 1&quot;</td>
<td>HOOP</td>
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<td>3</td>
<td>14' - 6&quot;</td>
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<tr>
<td>7</td>
<td>UNIT J</td>
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<td>14' - 2&quot;</td>
<td>HOOP</td>
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<td>9</td>
<td>UNIT K</td>
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<td>SIDE WALL</td>
<td>4</td>
<td>14' - 0&quot;</td>
<td>HOOP</td>
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</table>

**BENDING DIAGRAM**

- **Steel Angles (3 BOTH ENDS)**

---

**GRATE INLET TYPE 2**

**STANDARD PLAN B-35.40-00**

**SHEET 2 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DATE:** 6/8/06

**EXPIRES:** JULY 1, 2007
ELEVEN EQUAL SPACES

TOP

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

SIDE

GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

WELDED GRATES FOR GRATE INLET
STANDARD PLAN B-40.20-00

ISOMETRIC
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 9-06.15(2) for additional requirements.

4. Frame and Grates shall be Ductile Iron.
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.

DIKE INSTALLATION FOR PREFERRED SLOPE

SECTION ON DITCH LINE

DIKE INSTALLATION FOR PREFERRED SLOPE

SECTION A

SECTION B

GRATE SUPPORT (TYP.)
- SEE DETAIL

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

TOP

SIDE

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

5 1/2" x 1" x 14" STEEL ANGLE

END

ANCHOR STUD OPTION

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

ISOMETRIC
(SHOWN WITH TYPE 1 GRATE)

DROP INLET TYPE 1
STANDARD PLAN B-45.20-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
APPROVED: 6/1/06
EXPIRES: JULY 4, 2007

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 graters, see Standard Plan B-60.20.

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.
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 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

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

GRIND TOP AND BOTTOM FLUSH AFTER WELDING

GRATES FOR DROP INLET

STANDARD PLAN B-50.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

DRAWN BY: MARK SLAMA

EXPRES JEL. 3, 2001

1/4" = 1'-0" SCALE 1/4" = 1'-0" SCALE

6/1/06

SHEET 1 OF 1 SHEET
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 (DIAMETER)</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>18&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>
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<tr>
<td></td>
<td>148&quot; to 200&quot;</td>
<td>48&quot;</td>
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PIPE ZONE BEDDING AND BACKFILL
STANDARD PLAN B-55.20-00

EXPRESS JULY 1, 2001

APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

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 x 6 W1.4 x W1.4 (10 Gage) Steel Welded Wire Fabric or one wrap for any of the following sizes:
   - 6 x 6 W2.1 x W2.1 (8 Gage)
   - 6 x 6 W2.9 x W2.9 (6 Gage)
   - 4 x 4 W2.9 x W2.9 (6 Gage)
   - 4 x 4 W4.0 x 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 flat Type K Coupling Band. Type K Coupling Bands with dimples are not allowed for the installation detail shown. The Coupling Band option shall only be used for extending existing pipes that have an inside diameter of 36" or less.
### Coupling Band Dimension Table

<table>
<thead>
<tr>
<th>Band Type</th>
<th>Corrugation Pitch + Depth</th>
<th>Pipe Diameter (in)</th>
<th>Min. Width (in)</th>
<th>Gasket Type</th>
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</thead>
<tbody>
<tr>
<td>D</td>
<td>2 2/3 x 1/2, 3 x 1</td>
<td>12 – 84</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2, 3 x 1</td>
<td>90 – 144</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>2 2/3 x 1/2</td>
<td>12 – 48</td>
<td>2 3/4</td>
<td>BUTYL</td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>3 x 1</td>
<td>54 – 84</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>D</td>
<td>2 2/3 x 1/2</td>
<td>12 – 72</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2</td>
<td>12 – 48</td>
<td>10 1/2</td>
<td>O-RING</td>
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</tr>
<tr>
<td>K</td>
<td>3 x 1</td>
<td>54 – 84</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
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<td>36 – 60</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2</td>
<td>12 – 48</td>
<td>10 1/2</td>
<td>O-RING</td>
</tr>
<tr>
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<td></td>
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</tr>
<tr>
<td>K</td>
<td>3 x 1</td>
<td>54 – 84</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
</tbody>
</table>

* Pipe Arch Only

### Effective Dates

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 GAUGE THICK CORRUGATED METAL</th>
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<tr>
<td></td>
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<td>COVER</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIN.</td>
</tr>
<tr>
<td>6'-6&quot;</td>
<td>7'-1&quot;</td>
<td>4</td>
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<tr>
<td>6'-10&quot;</td>
<td>8'-2&quot;</td>
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### Dimensions

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<th>Span</th>
<th>Rise</th>
<th>ANGLES (DEGREES)</th>
<th>RADI (INCHES)</th>
<th>A (INCHES)</th>
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<td>AT</td>
<td>AS</td>
<td>AC</td>
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<td>11' - 11&quot;</td>
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<td>14' - 1&quot;</td>
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<td>14' - 6&quot;</td>
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<td>15' - 6&quot;</td>
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<td>15' - 9&quot;</td>
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<td>16' - 4&quot;</td>
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<td>16' - 1&quot;</td>
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<td>17' - 2&quot;</td>
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<td>17' - 10&quot;</td>
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### Allowable Heights of Cover

<table>
<thead>
<tr>
<th></th>
<th>12 GAGE</th>
<th>10 GAGE</th>
<th>8 GAGE</th>
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<tr>
<td>MIN</td>
<td>MAX</td>
<td>MIN</td>
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<td>19'</td>
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<tr>
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<td>12'</td>
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</tr>
<tr>
<td>4'</td>
<td>8'</td>
<td>5'</td>
<td>16'</td>
</tr>
</tbody>
</table>

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

THERMOPLASTIC PIPE

4H:1V OR STEEPER

4" MAX.

CONCRETE PIPE

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

METAL PIPE

NOTES

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

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

FOR CULVERTS 30" DIAMETER OR LESS

EXPIRES JULY 1, 2007

6/1/06

BEVELED END SECTIONS

STANDARD PLAN B-70.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

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".

STRUCTURAL PLATE PIPE ARCHES AND UNDERPASSES

PIES AND STRUCTURAL PLATE PIPES

HEADWALLS FOR CULVERT PIPE AND UNDERPASS

STANDARD PLAN B-75.20-01
**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.

**CULVERT DIAM.**

<table>
<thead>
<tr>
<th>NUMBER OF BARS REQUIRED</th>
<th>UP TO 36&quot;</th>
<th>42&quot; - 60&quot;</th>
<th>66&quot; - 90&quot;</th>
<th>96&quot; - 120&quot;</th>
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<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<tr>
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</tbody>
</table>

**HEADWALL**

- Place Resin Bonded Anchors in Full Depth Concrete (Typ.)
- See Note 4

**CUT AND WELD**

- 3/4" Diam. + 16" Threaded Rod Centered Through Pipe, Secured with Nuts. Or 3/4" x 9" Anchor Stud Welded to Pipe, Spacing Shall Be 8" from Top and 8" from Bottom of Concrete (Typ.).
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.
NOTES
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.

<table>
<thead>
<tr>
<th>METAL END SECTIONS FOR CIRCULAR PIPES</th>
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<tbody>
<tr>
<td>PIPE DIAM. (INCHES)</td>
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<tr>
<td>---------------------</td>
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<td>36</td>
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<table>
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<tr>
<th>METAL END SECTIONS FOR ARCHED PIPES</th>
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<tr>
<td>PIPE ARCH ( \text{DIMENSIONS (INCHES)} )</td>
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<tr>
<td>---------------------------------------------</td>
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<tr>
<td>EQUV.</td>
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<tr>
<td>30</td>
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</tr>
<tr>
<td>60</td>
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<td>72</td>
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</table>

* SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"
WHEN REQUIRED; 

REINFORCED EDGE—FULL LENGTH OF END SECTION
(SEE SECTION)

EDGE OF END SECTION SHEET ROLLED SNUGLY AGAINST STEEL ROD

SIDE VIEW

REINFORCED EDGE SECTION

7/16" DIA. MIN. GALVANIZED STEEL ROD OR NO. 4 GALVANIZED REINFORCING BAR

FLATTEN END, THEN BEND OUTSIDE 4" TO MATCH END SECTION SIDES

NOTE:
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.

GAGE A

<table>
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<tr>
<th>PIPE DIA. (INCHES)</th>
<th>MINIMUM THICKNESS</th>
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EQUIV. PIPE ARCH DIMENSIONS (INCHES)

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<td>58</td>
<td>.041</td>
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<tr>
<td>60</td>
<td>.041</td>
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</tbody>
</table>

THREADED END BOLTS OVER TOP OF END SECTION. SIDE LOGS TO BE BOLTED TO END SECTION.

CROSS ROAD DRAINAGE STRUCTURE

NOTES

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 SIDEWALK

PLANTING STRIP

CONCRETE CURB - TYPE MAY VARY

ROADWAY

CONCRETE CURB - TYPE MAY VARY

ROADWAY

VARES

ISOMETRIC

4" DRAIN PIPE

DUMMY JOINT

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

REINFORCEMENT NOT SHOWN

(SEE STD . SPEC . 9-07 .7)

1/2" MINIMUM COVER

4" DRAIN PIPE CAPPED AT EDGE OF RW

WIRE MESH REINFORCEMENT

6 x 6 4.0 x 4.0 (4 GAGE)

4 x 4 2.9 x 2.9 (6 GAGE)

(SEE STD . SPEC . 9-07 .7)

4" DRAIN PIPE

WIRE MESH

4" MIN.

12" MIN.

6" MIN.

SECTION A

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

RESIDENTIAL STORM DRAIN, UNDER SIDEWALK

STANDARD PLAN B-82.20-00

SHEET 1 OF 1 SHEET

DATE: 6/1/06

APPROVED FOR PUBLICATION

Washington State Department of Transportation

6/1/06

STATE DESIGN ENGINEER

6/1/06
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

VERTICAL CONNECTION
STANDARD PLAN B-85.10-01

FOR SANITARY SEWER USE

SECTION A

SECTION B

ELEVATION

COMMERCIAL CONCRETE

4" TYP.
50" MIN.

6" WYE

6" SINGLE BRANCH WYE FOR TWO CONNECTIONS

45° BEND

39" x 39" MIN.

6" WYE

6" WYE

6" SEWER PIPE

6" SEWER PIPE

6" (SEWER SIZE) TEE

4" (SEWER SIZE) TEE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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.
45° BEND

4" OR 6" SEWER PIPE
(SEE CONTRACT)

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

SEWER MAIN

STANDING SIDE SEWER CONNECTION
STANDARD PLAN B-85.30-00

FOR SANITARY SEWER USE
1/2" WIDE, 1/8" HIGH_/
RAISED BORDER

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

PLAN

1/2"

SECTION a
CAST IRON RING AND COVER

FOR SANITARY SEWER USE

8 INCH SEWER CLEAN-OUT
STANDARD PLAN B-85.40-00

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
One length of ductile iron pipe (Class 50) to solid bearing when span is more than 48".

Backfill with compacted material as directed by engineer.

Flexible joint.

Mortar dam or plug as required by engineer.

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

For sanitary sewer use.

DROP CONNECTIONS

STANDARD PLAN B-85.50-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO AUGUST 6, 2017
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.

PROPERTY LINE

LENGTH OF LOWER BARREL TO SUIT TRENCH DEPTH

6" PIPE

6" GATE VALVE (FLANGE BY MECHANICAL JOINT)

WATER MAIN

ELEVATION

TYPE A

VALVE BOX

WATER MAIN

PLATE

12" TIE RODS

SLOPE

LENGTH OF LOWER BARREL TO SUIT TRENCH DEPTH

ASPHALTIC FELT

VARIES

15 POUND CONCRETE BLOCK

MECHANICAL JOINT WITH TIE ROD LUG

6 CUBIC FEET MIN.

GRAVEL POCKET

12" x 12" x 4" MIN.

WATER MAIN

ELEVATION

TYPE B

VALVE BOX

WATER MAIN

PLATE

12" TIE RODS

SLOPE

LENGTH OF LOWER BARREL TO SUIT TRENCH DEPTH

ASPHALTIC FELT

VARIES

15 POUND CONCRETE BLOCK

MECHANICAL JOINT WITH TIE ROD LUG

6 CUBIC FEET MIN.

GRAVEL POCKET

12" x 12" x 4" MIN.

HUB AND FLANGE CASTING

AUXILIARY GATE VALVE

6" PIPE

6" GATE VALVE (FLANGE BY MECHANICAL JOINT)

WATER MAIN

ELEVATION

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

2 INCH BLOWOFF ASSEMBLY
STANDARD PLAN B-90.20-00
SHEET 1 OF 1 SHEET

CONCRETE BLOCK
4" x 8" x 16"
GALVANIZED OUTLET PIPE SHALL BE SAME SIZE AS INLET PIPE WITH BEEHIVE STRAINER AND OUTLET

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>TEE AND DEAD ENDS</td>
<td>90° BEND</td>
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<tr>
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<table>
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<tr>
<th>SOIL TYPE</th>
<th>SAFE BEARING LOAD (PSF)</th>
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<td>MUCK, PEAT, ETC.</td>
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<td>SOFT CLAY</td>
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<tr>
<td>SAND</td>
<td>2,000</td>
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<tr>
<td>SAND AND GRAVEL</td>
<td>3,000</td>
</tr>
<tr>
<td>SAND AND GRAVEL CEMENTED WITH CLAY</td>
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<tr>
<td>HARD SHALE</td>
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CONCRETE THRUST BLOCK

STANDARD PLAN B-90.40-00

NOTE: DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EXPIRES JULY 1, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Two tie rods with turnbuckles

Thread 6" — 1" thread

Pipe Test

Diameter (in.) Pressure (psi)
4" 250
6" 250
8" 250
10" 250
12" 250
14" 250
16" 250

<table>
<thead>
<tr>
<th>Pipe Diam.</th>
<th>Test Pressure</th>
<th>Bend Angle</th>
<th>Concrete Volume (ft³)</th>
<th>Cube Size (in.)</th>
<th>Tie Rod Diameter (in.)</th>
<th>Tie Rod Embedment (in.)</th>
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<td>1.8</td>
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<td>12</td>
<td>2.3</td>
<td>5/8&quot;</td>
<td>17&quot;</td>
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<td></td>
<td>45°</td>
<td>22</td>
<td>2.8</td>
<td>5/8&quot;</td>
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<td>355</td>
<td>7.1</td>
<td>1 1/8&quot;</td>
<td>30&quot;</td>
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NOTE
Steel tie rods to be heavily coated with asphalt after installation.
MEDIAN BARRIER (SINGLE SLOPE CONCRETE BARRIER SHOWN) – SEE SECTION BELOW FOR USE WITH CONCRETE BARRIER TYPE 2

PIPE (TYPICAL) – SEE CONTRACT

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

FINISHED GRADE

CONCRETE BARRIER TYPE 2

SECTION A

Prepared by: BILL BURGESS

PLAN VIEW

GRAVE INLET TYPE 2 (TYP.) – SEE STANDARD PLAN B-35.40

FRAME AND DUAL VANED GRATES (TYP.) – SEE STANDARD PLAN B-40.40

UNIT 1/2" (TYP.) – SEE STANDARD PLAN B-35.40

MEDIAN BARRIER

FINISHED GRADE

HMA OR CONCRETE (SEE CONTRACT FOR SURFACE DETAILS)

CONCRETE BARRIER TYPE 2

SECTION B

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

MEDIAN BARRIER DRAINAGE INSTALLATION STANDARD PLAN B-95.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

UPDATE DESIGNER

DATE
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

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" (in) 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 16d 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” (in) high and 3/4” (in) 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” (in). 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 the stamped numbers remain visible.

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

8. Holes shall be located on approaching traffic side of web.
NOTES

1. Type 10 post shall be 6 x 8 timber, OR either W6 x 9, or W6 x 8.5 steel.
   Type 11 post shall be 10 x 10 timber or W6 x 15.
   For additional details see Standard Plan C-1.b.

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.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

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. W6×8.5 or W6×9 steel posts and timber blocks are alternates for 6x8 timber posts and blocks. W6×15 steel posts and timber blocks are alternates for 10×10 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" (m) min. high and 3/4" (m) 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" (m). 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 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.
NOTES

1. For post details see Standard Plan C-1b.
INTERMEDIATE GUARDRAIL
POST CONNECTION DETAILS
(Type A shown)

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

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

THRIE BEAM GUARDRAIL REDUCER SECTION
TYPE B
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.

---

**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE</th>
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<tr>
<td>70</td>
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<tr>
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<td>14:1</td>
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<td>12:1</td>
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<td>50</td>
<td>11:1</td>
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<tr>
<td>45</td>
<td>10:1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>9:1</td>
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</table>

---

**GUARDRAIL PLACEMENT**

**STANDARD PLAN C-2a**

Sheet 1 of 1 Sheet

**APPROVED FOR PUBLICATION**

[Signature]

6/21/06

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
NOTES
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+ post of the Beam Guardrail Transition Section Type 16, and by lapping it behind the second 6+ 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 10+ post. Place nested third beam with 10+ posts at 3' - 1 1/2" maximum spacing between the end of the transition and the structure.

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

TERMINAL PAY LIMIT - SEE NOTE 1

EDGE OF SHOULDER

TWO-WAY TRAFFIC

VARIES - SEE CONTRACT

CASE 10A

ANCHOR PAY LIMIT - SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT

3' - 0" MIN.

EDGE OF SHOULDER

ONE-WAY TRAFFIC

VARIES - SEE CONTRACT

CASE 10B

BEAM GUARDRAIL EXTENSION

LENGTH VARIES - SEE CONTRACT

EDGE OF SHOULDER

ONE-WAY TRAFFIC

VARIES - SEE CONTRACT

CASE 10C

ONE-WAY TRAFFIC OR

TWO-WAY TRAFFIC

CASE 10 A, B, or C

GUARDRAIL PLACEMENT

STANDARD PLAN C-2d

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

08/2016 CLARIFIED DIMENSION OF CLEARANCE FOR HAZARD

DATE

REV.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JULY 24, 2018

SHEETS 1 OF 1 SHEET

APPROVED FOR PUBLICATION

08/2016 CLEARANCE OF HAZARD

DATE

REV.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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 for guardrail connection to bridge rail and concrete barrier.

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

3. Attach to rail with $\frac{3}{4}'' \times 9''$ long bolt, nut and $\frac{1}{2}''$ washer on back of post.

4. For terminal type and details, see Contract and applicable Standard Plans.

5. Radius dimensions shall be etched into plate replacing the letters "HH", shown on the Identification Plate Detail. Digits shall be $\frac{1}{2}''$ MIN height and $\frac{3}{4}''$ MAX width. The plate shall be galvanized after etching.

6. The guardrail radius Identification Plate shall be mounted on the back side of the Rail Element using the lowest splice bolt at the P.C. of the guardrail radius.

1. First letter of case designation placement indicates end treatment on side road. Second letter indicates and treatment on main road. For instance, a Type 5 Anchor on the side road and a bridge connection on the main road would be Case 12 AC.

8. For the 8'- 6" radius, five CRT posts are required including the CRT post at point B.

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

GUARDRAIL PLACEMENT

WEAK POST INTERSECTION

DESIGN (8'- 6" MAX RADIUS)

IDENTIFICATION PLATE

MOUNTING DETAIL

SEE NOTE 2

SEE NOTE 2

SEE NOTE 2

SEE NOTE 2

SEE NOTE 2

SEE NOTE 2
REQUIREMENTS

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>CLEAR AREA</th>
</tr>
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<tbody>
<tr>
<td>17'-0&quot;</td>
<td>30' 10'</td>
</tr>
<tr>
<td>25'-6&quot;</td>
<td>40' 20'</td>
</tr>
<tr>
<td>35'-0&quot;</td>
<td>50' 20'</td>
</tr>
</tbody>
</table>

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, Weak Post Bridge Roll System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.

CASE 14

GUARDRAIL PLACEMENT

STANDARD PLAN C-2h

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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

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


NOTES

1. Type 4 anchor required. For details, see applicable Standard Plans.

2. For terminal type and details, see contract and applicable Standard Plans.

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

4. For guardrail to bridge rail connection see applicable Standard Plans or Contract.

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

1. See Standard Plan C-1b for additional details.

2. One-way traffic layouts are identical to the two-way layout with the exception that only the posts trailing the span need to be CRT's with double blocks.
NOTES

1. See Contract for transition and connection type.

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

3. Guardrail installation shall be Beam Guardrail Type 1 with standard post and block.

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

5. For terminal type and details, see Contract and Applicable Standard Plans.

6. Radius dimensions shall be etched into plate replacing the letters "HH" shown on the Identification Plate Detail. Digits shall be 1/2" MIN height and 3/8" MAX width. Plate shall be galvanized after etching.

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

IDENTIFICATION PLATE MOUNTING DETAIL

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

BEAM GUARDRAIL TRANSITION SECTION TYPE 1 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

THREE BEAM GUARDRAIL REDUCER SECTION TYPE B
(10 GAGE)

GROUND LINE

TERMINATE CURB AT BRIDGE RAIL OR BARRIER MATCH FACE

4" EXTRUDED CURB SEE NOTE 1

6'-0" LONG, 10 + 10 POSTS WITH 6 X 8 BLOCKS

5'-0" POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL TRANSITION SECTION TYPE 1A - PAY LIMIT

SEE STANDARD PLAN C-24.10, B OR E CONNECTION

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

THREE BEAM GUARDRAIL REDUCER SECTION TYPE B
(10 GAGE)

GROUND LINE

TERMINATE CURB AT BRIDGE RAIL OR BARRIER MATCH FACE

4" EXTRUDED CURB SEE NOTE 1

6'-0" LONG, 10 + 10 POSTS WITH 8 X 8 BLOCKS

6 X 8 POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL TRANSITION SECTION TYPE 1B - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

GROUND LINE

TERMINATE CURB AT BRIDGE RAIL OR BARRIER MATCH FACE

4" EXTRUDED CURB SEE NOTE 1

6'-0" LONG, 10 + 10 POSTS WITH 8 X 8 BLOCKS

6 X 8 POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL TYPE 10 PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

GROUND LINE

6'-0" LONG, 6 X 8 POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL TRANSITION SECTIONS
STANDARD PLAN C-3
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

7-2-2017
BEAM GUARDRAIL TRANSITION SECTION TYPE 2 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

5' - 6" LONG, 10x10 POSTS WITH 6x8 BLOCKS

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

TYPE 2

BEAM GUARDRAIL TRANSITION SECTION TYPE 4 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

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

TYPE 4

FOR 45 MPH AND BELOW

BEAM GUARDRAIL TRANSITION SECTION TYPE 5 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

1' - 3" MAX. FOUR SPACES @ 1' - 6 3/4", TWO SPACES @ 2 - 1 1/2"

TOTAL LENGTH = 6' - 0"

TYPE 5

TOTAL LENGTH = 6' - 3"

BEAM GUARDRAIL TRANSITION SECTION TYPE 6 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

6' - 7" POST SPACING

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

TOTAL LENGTH = 25'- 0"

TYPE 6

G-2 POST (TYP.) SEE STD. PLAN C-1b

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

BEAM GUARDRAIL TRANSITION SECTIONS

STANDARD PLAN C-3a

SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EXPRES JULY 24, 2017

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
THREE BEAM GUARDRAIL TRANSITION SECTION TYPE 10 - PAY LIMIT

12' - 6" THREE BEAM (10 GAGE)

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

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

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

THREE BEAM GUARDRAIL REDUCER SECTION TYPE B

10 GAGE

TWO SPACES @ 2'-3"

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 1:1 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.
BEAM GUARDRAIL TRANSITION SECTION TYPE 13 - PAY LIMIT

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

BEAM GUARDRAIL TRANSITION SECTION TYPE 14 - PAY LIMIT

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

BEAM GUARDRAIL TRANSITION SECTION TYPE 15 - PAY LIMIT

TYPE 15
TRAILING END
THREE BEAM INSTALLED AT FACE OF BRIDGE RAIL
NOTES
1. See Contract for the number of three 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" three beam sections, add a 6' - 3" nested section of three 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

---

**BEAM GUARDRAIL**

**FLARED TERMINAL**

**STANDARD PLAN C-4b**

**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017

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**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017

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**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017

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**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017
NOTES

1. 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 SKT-TL2 as manufactured by Road Systems, Inc. shall be installed according to the 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 the shoulder.

5. Length for SKT-350 is 50’ (ft). Length for SKT-TL2 is 25’ (ft).
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.
PLAN
GUARDRAIL POST LAYOUT - DESIGN 1

5" NOMINAL

GUARDRAIL BOLT 5/8" DIAM. X 20" LONG
THREE BEAM WOOD 6" x 8" BREAKAWAY POST - SEE STANDARD PLAN C-1b
5/8" x 9" BOLT NUT AND WASHER
8" - 0" STEEL FOUNDATION TUBE T.S 8" x 0.1875"
TAPERED BLOCK
POST 3R & 3L TO 5R & 5L
THREE BEAM
5/8" x 9" BOLT NUT AND WASHER
8" - 0" STEEL FOUNDATION TUBE T.S 8" x 0.1875"
TAPERED BLOCK
POST 2R & 2L

NOTE: CABLE BEARING PLATE NOT SHOWN

PLAN
GUARDRAIL POST LAYOUT - DESIGN 2

W-Beam Wood Block for Wood Posts - See Standard Plan C-1b
THREE BEAM WOOD 6" x 8" BULL NOSE TERMINAL

NOTE: CABLE BEARING PLATE NOT SHOWN

BEAM GUARDRAIL BULL NOSE TERMINAL
STANDARD PLAN C-4f

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
**NOSE CABLE ASSEMBLY**

- **U-BOLT**:
  - 1/4" DIA. 2 1/2" LONG
  - STEEL FOUNDATION TUBE
  - CABLE BEARING PLATE
  - TWO 1" NUTS AND WASHER

- **NOSE CABLE**:
  - 5/8" DIA. STEEL WIRE ROPE

- **ANCHOR CABLE & BRACKET ASSEMBLY**:
  - FOR ANCHOR CABLE - SEE STANDARD PLAN C-6f

- **NOSE CABLE ANCHOR PLATE**
  - 5/8" x 1 1/4" BUTTON HEAD SLICE BOLT AND NUT (TYP.)

- **CABLE BEARING PLATE**
  - 1 1/4" THREAD

- **U-BOLT PLATE WASHER**
  - THE U-BOLT PLATE WASHER SHALL BE MADE FROM ASTM A36 STEEL, AND GALVANIZED ACCORDING TO STANDARD SPEC. 9-16.3(3).

- **NOSE CABLE**
  - 5/8" DIA. STEEL WIRE ROPE

- **POST**
  - 11/4" x 20 HEX NUT
  - 5/8" DIA. HOLE (TYP.)

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

- **NOSE CABLE ANCHOR PLATE**
  - SEE STANDARD PLAN C-6f

- **NOSE CABLE AND PLATE**
  - 3" - 1 1/2" ARC LENGTH AT FACE OF RAIL (TYP.)

- **BEAM GUARDRAIL BULL NOSE TERMINAL**

---

**PLAN - THRIE BEAM NOSE**

**SECTION A**

**SECTION B**

---

**DATE**

Washington State Department of Transportation

**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017
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" (in) plates welded to equal strength and dimensions as shown.
2. For end section details see Standard Plan C-7.
3. For post details, see Standard Plan C-1b.
4. Eight 5/8" (in) x 1/2" (in) 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 r-lbs.
6. Toenail bearing plate with 10d nail at corners to prevent turning.
7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

ELEVATION

ANCHOR PLATE
(SEE NOTE 1)

SECTION A

BEARING PLATE

1 1/16" (IN) HOLE

3/4" (IN) CABLE
SWAGE

1" (IN) x 7" (IN) STUD
THREADED FULL LENGTH (TYP.)

5/8" (IN) STEEL PLATE

3/16" (IN) x 1" (IN) x 8" (IN) PLATE
TACK WELDED TO 5/8" (IN) PLATE

11/16" (IN) HOLE (EIGHT REQUIRED)

3" (IN) x 2 1/4" (IN) x 1/2" (IN) END PLATE

15/16" R (TYP.)

3/8" R (TYP.)

SEE NOTE 4

11/16" R

35°
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 anchor details, see Standard Plan C-6.
2. For end section details see Standard Plan C-7 or C-7a.
3. For post details, see Standard Plan C-1b.
4. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
5. Post and block shall match beam guardrail posts.
1. Attach W-beam to steel pipe with 5/8" (in) x 1 1/4" (in) button head bolt with no washer. No connection to the post is required.

2. For end section details see Standard Plan C-7.

3. For anchor details see Standard Plan C-6.

4. For post details see Standard Plan C-1b.

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

1. For anchor details, see Standard Plan C-6.

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 post details, see Standard Plan C-1b.

4. Post material shall match beam guardrail posts on rest of guardrail run.

TYPE 7 ANCHOR
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 an anchor rail washer shall be placed under the splice bolt heads.

Beam Guardrail End Sections

Standard Plan C-7

Sheet 1 of 1 Sheet

Effective: August 1, 2016 to August 6, 2017

Washington State Department of Transportation

Approved for Publication

Printed in Canada
NOTES
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. B-96.8(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 anchor rail washer) will be placed under the splice bolt heads.

DESIGN C (THRIE BEAM)

29/32" x 1 1/8" SLOTS (TYP)

30°

8.1/2"

25° MIN

DESIGN D (THRIE BEAM)

29/32" x 1 1/8" SLOTS (TYP)

12 GAGE PLATE

DESIGN F (THRIE BEAM) END SECTION

29/32" x 1 1/8" SLOTS (TYP)

DESIGN G (THRIE BEAM)

29/32" x 1 1/8" SLOTS (TYP)

THRIE BEAM END SECTIONS

STANDARD PLAN C-7a

4-8-2011

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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).
**Plate Washer**

1/8" Thick

**Reinforcing Steel Bending Diagram**

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

**Barrier Terminal Reinforcing Steel Bending Diagram**

- 2" R. BEVEL OR ROUND EDGES 3/4" MAX (TYP.)
- 2" R. BEVEL OR ROUND EDGES 3/4" MAX (TYP.)

**Notice:**

1. Wire Seizing shall be eight wraps of 19-gage wire with the ends twisted together, or equivalent fastening.
2. 1" diam. pin with rounded bottom edges.
3. Plate washer 1/8" thick.
4. See note 4.

**Barrier Loop Detail**

- 5/8" wire rope
- 1 3/4" I.D. loop
- Wire Seizing - shall be eight wraps of 19-gage wire with the ends twisted together, or equivalent fastening.

**Barrier Terminal**

- 2" MN. 2 1/2" Max.
- 2" MN. 2 1/2" Max.

**Connecting Pins and Drift Pins**

- See note 3.

**Wire Rope Loops**

- 2" R. Bevel or round edges 3/4" Max (TYP.)

**Concrete Barrier Type 2**

**Standard Plan C-8**

- Sheet 2 of 2 sheets
Wire rope loop (TYP)

INTERMEDIATE PLAN

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

INTERMEDIATE ELEVATION

CONCRETE BARRIER TYPE 4
AND TRANSITION SECTION

SECTIO N A - A

TYPE 4

TRANSITION END VIEW

SECTION B - B

TRANSITION SECTION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES
1. This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 16' (ft) max. length double mast arms.
3. 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. See the Contract Plans for conduit size and placement.
5. Concrete shall be Class 4000.
6. Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If PVC conduits are specified, the conduit stub and end bell bushing shall not be glued to the coupling.

Zeldenrust, Richard
Feb 1 2016 11:51 AM

CONCRETE BARRIER
LIGHT STANDARD SECTION
STANDARD PLAN C-8b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Carpenter, Jeff
Feb 29 2016 12:30 PM
Washington State Department of Transportation
ANALOR BOLT OR ROD (TYP) – SEE DETAIL

DETAIL "A"

POLE BASE PLATE –
SEE STD. PLAN J-28.60

HEAVY HEX NUTS
AND WASHERS

TOP OF BARRIER

1" (IN) DIAM. FULL LENGTH
THREADED ROD OR BOLT –
ASTM F1554 GRADE 105

ANCHOR PLATE (TYP) –
SEE DETAIL

THREADED
ROD OR BOLT

HEAVY HEX NUT
AND WASHER (TYP)

ANCHOR BOLT DETAIL

ALL NUTS, BOLTS, WASHERS, AND RODS SHALL BE FULLY
GALVANIZED IN ACCORDANCE WITH ASTM F2329

BAR LIST

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>QTY.</th>
<th>SIZE</th>
<th>LENGTH</th>
</tr>
</thead>
</table>
| 1    | FOOTING - DOWEL | 28   | 6"   | 4'-0"
| 2    | FOOTING   | 18   | 6"   | 4'-0"
| 3    | FOOTING   | 9    | 6"   | 6'-0"
| 4    | BARRIER   | 4    | 6"   | 21'-0"
| 5    | BARRIER   | 4    | 6"   | 21'-0"
| 6    | BARRIER   | 30   | 6"   | 5'-3" TO 6'-0"

BENDING DIAGRAM

ALL DIMENSIONS ARE OUT TO OUT

FIELD BEND

ANCHOR PLATE –
ASTM A38
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.

TRAFFIC SIDE

2" DIAM PINNING HOLE (TYP.)

HMA

1" DIAM. + .50" GALVANIZED STEEL PIN (TYP.)

TWO PINS REQUIRED ON THE TRAFFIC SIDE = TWO PINS TOTAL, PER BARRIER SECTION

SECTION VIEWS

TYPE 3 ANCHOR PIN LOCATIONS

PRECAST CONC. BARRIER TYPE 2

TRAFFIC SIDE

SHOULDER WIDENING

TRAFFIC SIDE

TRAFFIC SIDE

5/8" (TYP.)

HMA

1 1/4" (TYP.)

TWO PINS REQUIRED PER TRAFFIC SIDE = FOUR PINS TOTAL, PER BARRIER SECTION

PLAN VIEW

TYPE 3 ANCHOR PIN LOCATIONS

PRECAST CONC. BARRIER TYPE 2

PINNING HOLE (TYP.) = ONLY REQUIRED ON TRAFFIC SIDE(S) OF BARRIER

2'-0"

2'-0"

2'-0"

1'-0" MIN.
CONCRETE BARRIER TYPE 2 (NJ-SHAPE)

END VIEW

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, W8 x 8.5 or W6 x 9 shall be determined by measurement from ground line to top of grout pad. This distance shall be verified by the Contractor.

2. Attach Guardrail Post to Box Culvert with 3/4" (in) diameter high-strength bolts with resin-bonded anchors.

3. Drill 1 1/4" (in) diameter hole in concrete slab for 7/8" (in) 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-21.
NOTE
1. For W-Beam Type 3 shoulder application, see Standard Plan C-28.40.

PRECAST CONC. BARRIER TYPE 2

ANCHORED PRECAST CONC. BARRIER TYPE 2

SINGLE SLOPE CONC. BARRIER CAST-IN-PLACE

SINGLE SLOPE CONC. BARRIER PRECAST

CABLE BARRIER

BEAM GUARDRAIL TYPE 1
(SEE NOTE 1)

BEAM GUARDRAIL TYPE 1 ON STEEP SLOPES
(SEE NOTE 1)

TRAFFIC BARRIER SHOULDER WIDENING ~ FOR SHOULDERS 6.0' AND WIDER
STANDARD PLAN C-16a

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
**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.
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.
6. Timber or steel post. Steel post shown.

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.

4. Timber or steel post. Steel post shown.
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 "2'-0" from the edge of the shoulder.

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

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

4. Timber or steel post. Steel post shown.
**NOTES**

1. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10\(\text{H} : 1\text{V}\) 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" (in) x 4" (in) 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-22.60.

6. Timber or steel post. Steel post shown.

**STATE DESIGN ENGINEER**

Washington State Department of Transportation
NOTES

1. Attach Guardrail Post to Box Culvert with 7/8" (in) diameter high-strength threaded rods 8 1/2" (in) in length with resin bonded anchors.

2. Wood blocks are shown. Blocks of an approved alternative may be used. See Standard Specification 9-16.3(2).
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 blocks, if block combinations are used) with 16d galvanized nails to prevent block rotation.
3. Attach blackouts 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).

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

1. The implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan, or the elimination of guardrail terminals that are on this plan. Non-flared terminals shall be selected from the WSDOT Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

2. This terminal is FHWA eligible at Test Level Three (TL-3) and may be used for all posted speeds.

3. An SKT-MGS (TL-3) or an SKT-SP-MGS (TL-3) as manufactured by Road Systems, Inc. or SOFTSTOP (TL-3) as manufactured by Trinity Highway Products, LLC shall be installed according to manufacturer’s recommendations.

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

5. 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.

6. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While this terminal does not require an offset at the end, a flare is recommended. For the SKT-MGS (TL-3) and the SKT-SP-MGS (TL-3), a maximum flare of 25’1” or flatter over the length of the terminal is allowed with a maximum offset of 24” (in) over 50’ (ft).

6. For the SOFTSTOP (TL-3) a maximum flare of 25’4’” or flatter is allowed over the system length of 50’ - 1/2” with a maximum offset of 24” (in) at the anchor post.

7. For terminal details, see WSDOT approved manufacturer’s drawings.

8. The SOFTSTOP terminal is supplied with steel posts only. It can be used with guardrail runs composed of steel or wood guardrail posts.
The Implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan, or the elimination of guardrail terminals that are on this plan. Non-Flared terminals shall be selected from the WSDOT Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

2. This terminal is FHWA eligible at Test Level Two (TL-2) and may be used in applications with posted speeds of 45 mph or less.

3. An SKT-SP-MGS (TL-2) as manufactured by Road Systems, Inc. or SOFTSTOP (TL-2) as manufactured by Trinity Highway Products, LLC shall be installed according to manufacturer’s recommendations.

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

5. 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.

6. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While this terminal does not require an offset at the end, a flare is recommended. For the SKT-SP-MGS (TL-2), a maximum flare of 25° or flatter over the length of the terminal is allowed with a maximum offset of 24” (in) over 50’ (ft).

For the SOFTSTOP (TL-2) a maximum flare of 38° 29' - 1° or flatter is allowed over the system length of 38’ - 3 1/2” with a maximum offset of 12” (in) at the anchor post.

7. For terminal details, see WSDOT approved manufacturer’s drawings.

8. The SOFTSTOP terminal is supplied with steel posts only. It can be used with guardrail runs composed of steel or wood guardrail posts.
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-13a.

5. Fasten the Anchor Cable using two 1/4" (in) 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).

7. Posts shall match those of the connecting run: timber or steel.

---

**BEAM GUARDRAIL (TYPE 31) ANCHOR TYPE 10**

**STANDARD PLAN C-23.60-03**
**TRANSITION SECTION - PAY LIMIT**

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

2. If the last guardrail post is 3" (in) or less from the end of the bridge barrier, the 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).

7. Steel posts shown. Timber posts may be used.

---

**PLAN A CONNECTION**

**PLAN B CONNECTION**

**PLAN C CONNECTION**

**PLAN D CONNECTION**

**PLAN E CONNECTION**

**PLAN F CONNECTION**

---

**NOTES**

- See Contract Plans.
- See Bridge Plans for additional connection details.
- Steel posts shown. Timber posts may be used.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTES
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, 4, and 6 require an additional hole to attach tapered blocks and/or rubrail.
6. Posts 1 and 2 are 10 x 10 timber posts, or WB x 15 steel posts. 7" - 6' long. Posts 3 through 9 are 6 x 8 timber posts, or either WB e 8.5 or WB x 9 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-slope barrier. The toe of the single slope and the safety-slope 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.
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


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.
NOTES
1. Refer to Standard Plans C-1 and C-10b 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. Accommodating the wider blockout (12" in width) used with Type 31 guardrail will require widening the embankment by 4" (in) or narrowing the shoulder by 4" (in).
4. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
5. All posts for any standard barrier run shall be of the same type: timber or steel.
LEGEND

---
- Design Layout Line

PLAN VIEW

CABLE BARRIER TERMINAL

LENGTH OF NEED

EDGE OF TRAVELED WAY

HIGH TENSION CABLE BARRIER

MAX. DEFLECTION - AS SHOWN IN CONTRACT PLANS

EXISTING REDIRECTIONAL LANDFORM

MAX. DEFLECTION - AS SHOWN IN CONTRACT PLANS

LENGTH OF NEED

CABLE BARRIER TERMINAL

EDGE OF TRAVELED WAY

HIGH TENSION CABLE BARRIER

EXISTING BRIDGE PIER

EXISTING REDIRECTIONAL LANDFORM

MAX. DEFLECTION - AS SHOWN IN CONTRACT PLANS

EDGE OF TRAVELED WAY

SECTION A

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) Premolded Joint Filler between segments; fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.

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

3. Installation on a horizontal curve with a radius less than 2,000' (ft) 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.

CONNECTION BLOCKOUT FILL VOID WITH GROUT

REBAR GRID - FOR PERMANENT INSTALLATION (SEE BARRIER CONNECTION DETAIL)

BARRIER TRANSITION DETAIL

PREPARED GRADED BASE
HYPOTHETICAL GRADE DIFFERENTIAL

REINFORCING STEEL BENDING DIAGRAM

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

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>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>HORIZONTAL BAR ( qty.)</th>
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NOTE:
STEEL WELDED WIRE REINFORCEMENT DEFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 6-10.3

ISOMETRIC VIEW

SINGLE-SLOPE CONCRETE BARRIER (PRECAST)
STANDARD PLAN C-70.10-0

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
SECTION A
3'-6" BARRIER SHOWN LEVEL

SECTION B
3'-6" BARRIER FOR USE WITH A 0" (IN) TO 0" (IN) MAX. GRADE SEPARATION

SECTION C
3'-6" BARRIER FOR USE WITH A GREATER THAN 7" (IN) TO 10" (IN) MAX. GRADE SEPARATION

SECTION D
4'-0" BARRIER FOR USE WITH A GREATER THAN 2" (IN) TO 7" (IN) MAX. GRADE SEPARATION

STANDARD MOUNTING HEIGHT
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) 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. This plan is for transitions to precast concrete barriers only.

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" (in).
NOTES

1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) 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. 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" (in).

NOTE: STEEL WELDED WIRE REINFORCEMENT DEFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 6-10.3

REBAR GRID (SEE NOTE 3)

TOP OF ROADWAY

3/4" (IN) CHAMFER (TYP.) (SEE NOTE 4)

SECTION A

ELEVATION

PLAN

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 9-07.1(2) FOR BENDING DIAMETERS
SINGLE-SLOPE CONCRETE BARRIER (BID ITEM)

10 1/2" I ~--------D~U~A~F=----------

1. SEE STANDARD PLAN C-70.10 _ DIRECTION OF TRAVEL

3/8" (IN) PREMOLDED JOINT FILLER­ FOR PERMANENT INSTALLATION

2__ 3/8" (IN) CHAMFER (TYP.)

8' - 0" 4-5 SPACES @6" ;;; 5' - 0"

2'-0" (TYP.)

NOTE:

8' - 0"

4-5 SPACES @6"

5' - 0"

ELEVATION

STEEL WELDED REINFORCEMENT DEFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 6-10.3

REINFORCING STEEL BENDING DIAGRAM

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

VARIES: 7 1/2" to 1" - 4"

135° HOOK

135° HOOK (TYP.)

4 21

4 21

135° HOOK (TYP.)

8 4

4 21

8 4

135° HOOK (TYP.)

VARIES: 7 1/2" to 1" - 4"

4 21

4 21

135° HOOK (TYP.)

BARRIER HEIGHT A B D E F G HORIZONTAL BARS (QTY.)

STANDARD

3'-6" 8" 2'-0" 3' 2'-8" 2'-9" 1'-7" 8

H/P 4'-0" 9 1/8" 2'-2" 2'-4" 4 3'-2" 3'-3" 1'-9" 10

DIMENSION TABLE (SEE NOTE 5)

SINGLE-SLOPE CONCRETE BARRIER (PRECAST) TERMINAL

STANDARD PLAN C-75.30-0

NOTE:

1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) 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 HIP row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3" (in).
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" (in) 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.

---

**NOTES**

Steel welded wire reinforcement deformed for concrete may be substituted for reinforcing steel in accordance with Standard Specification 6-10.3.

---

**ELEVATION**

**EXPANSION JOINT DETAIL**

Ensure no cement concrete enters the PVC conduit when pouring.

\[ \text{PDF} = \text{Epoxy Coated} \]

---

**DIMENSION TABLE**

(See Note 3)

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<thead>
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<th>BARRIERS</th>
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<tr>
<td>HEIGHT</td>
<td>A</td>
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<tr>
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<td>8</td>
</tr>
<tr>
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<td>9/16&quot;</td>
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<tr>
<td>4'-6&quot;</td>
<td>10/16&quot;</td>
</tr>
</tbody>
</table>

---

**EXPANSION JOINT DETAIL**

**SECTION B**

---

**ISOMETRIC VIEW**

**SINGLE-SLOPE CONCRETE BARRIER (CAST-IN-PLACE) DUAL-FACED STANDARD PLAN C-80.10-0**

**APPROVED FOR PUBLICATION**

**SHEET 1 OF 3 SHEETS**

---

**STATE DESIGN ENGINEER**

May 19, 2014 6:50 AM

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**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

---
STANDARD MOUNTING HEIGHT

SECTION A

3'-6" BARRIER FOR USE WITH A 0" (IN) TO 5" (IN) MAX. GRADE SEPARATION
(SEE NOTE 3)

SECTION A

4'-0" BARRIER FOR USE WITH A GREATER THAN 5" (IN) TO 7" (IN) MAX. GRADE SEPARATION
(SEE NOTE 3)
HIGH-PERFORMANCE BARRIER

SECTION A
4'-0" BARRIER SHOWN LEVEL

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

SECTION A
4'-0" BARRIER FOR USE WITH A GREATER THAN 3" (IN) TO 6" (IN) MAX. GRADE SEPARATION (SEE NOTE 3)
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" (in).
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 2 1/2" (in) 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” (in).

OTHER NOTES

- STEEL WELDED WIRE REINFORCEMENT DEFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 8-10.3.

- 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” (in).

- 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" (in) and adjust steel dimensions as required.

- 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” (in).
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" (in) 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" (in).
NOTE
This plan is for transitions to Precast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.

REINFORCING STEEL BENDING DIAGRAM

NOTES
1. Field bend as required in transition.
2. All bends are 2" radius.
STEEL WELDED WIRE FABRIC—
COMPLY WITH STANDARD SPEC 5-07.7
6 × 6 W2.1 × W2.1 (8 GAGE)
6 × 6 W2.9 × W2.9 (6 GAGE)
6 × 4 W4.4 × W4.4 (10 GAGE)
4 × 4 W1.4 × W1.4 (10 GAGE)
4 × 4 W2.9 × W2.9 (8 GAGE)
1 1/2" CLEARANCE ON ALL SURFACES

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).
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).
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-70.10.

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' (ft) and 50' (ft) Light Standards with 16" (ft) max. length double mast arms.

6. Concrete shall be Class 4000.

7. This spread footing is designed for an allowable soil bearing pressure of 2500 psf or better.
NOTES

1. This Barrier/Foundation combination has been designed in accordance with AASHTO LRFD Test Level 4 requirements. The horizontal vehicle impact force at the top of the barrier is taken at 54 kips for Strength and Extreme Limit States, and 10 kips for footing stability (overturning and sliding) in the Service Limit State.

2. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-70.10.

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

6. This plan shall be used for 40'(ft) and 50'(ft) Light Standards with 16'(ft) max. length double mast arms.

7. Concrete shall be Class 4000.

8. The factored soil bearing resistance shall equal or exceed the following:
   i) Service limit state = 6 ksf
   ii) Strength limit state = 24 ksf
   iii) Extreme limit state = 48 ksf

ALWAYS CONSULT INSTRUMENT DRAWES (I) FOR DETAILS.
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-70.10.

2. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 9'-0" min. 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.
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-70.10.
2. All concrete shall be class 4000.
3. This barrier transition section is designed for an allowable soil bearing pressure of 2500 psf or better.

<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>9</td>
</tr>
</tbody>
</table>

See dimension table - not counting splices.

ALL DIMENSIONS ARE OUT TO OUT
ALL BENDS ARE 2" RADIUS

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

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

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

GRADE SEPARATION

<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&quot; TO 5&quot;</td>
<td>3&quot; - 6&quot;</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>UP TO 7&quot;</td>
<td>4&quot; - 6&quot;</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>UP TO 10&quot;</td>
<td>4&quot; - 6&quot;</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
1. See Standard Specification 8-21.3(b) for construction requirements.

2. Use a template to locate and secure the bolts during foundation installation.

3. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.

4. 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.

5. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.
ANCHOR ROD - 1 3/4" (IN) DIAM. (BARRIER HEIGHT = 4 - 2") LONG, HEADED 8" (IN) MIN. EACH END, WITH FOUR HEAVY HEX NUTS NO TWO WASHERS - GALVANIZED EXPOSED ANCHOR ROD END 1 - 0" MIN. (TYP.)

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

CONDUIT COUPLING (SEE NOTE 5)

PROVIDE SCREEN AROUND BASE - SEE SCREEN DETAIL, STANDARD PLAN G-80.10, SHEET 4

3/4" (IN) CHAMFER (TYP.)

SECTION A

SECTION B

SECTION C

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>Q</th>
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<tr>
<td>0 TO 5&quot;</td>
<td>3 - 6&quot;</td>
<td>8</td>
<td>2 - 0&quot;</td>
<td>4 - 7&quot;</td>
<td>3 MIN</td>
<td>4</td>
<td>10</td>
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<tr>
<td>UP TO 7&quot;</td>
<td>4 - 0&quot;</td>
<td>9 1/8&quot;</td>
<td>2 - 1/4&quot;</td>
<td>4 - 9 1/4&quot;</td>
<td>7 MIN</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>UP TO 10&quot;</td>
<td>4 - 0&quot;</td>
<td>10 1/4&quot;</td>
<td>2 - 1/2&quot;</td>
<td>4 - 11 1/2&quot;</td>
<td>10 MIN</td>
<td>6</td>
<td>14</td>
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BAR LIST

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<thead>
<tr>
<th>MARK NO.</th>
<th>LOCATION</th>
<th>QTY</th>
<th>LENGTH</th>
<th>SIZE</th>
<th>TYPE</th>
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<tbody>
<tr>
<td>①</td>
<td>BARRIER - TOP VERTICAL</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>BARRIER - HORIZONTAL</td>
<td></td>
<td>23 - 8&quot;</td>
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<td>STR.</td>
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<tr>
<td>④</td>
<td>BARRIER - HORIZONTAL</td>
<td></td>
<td>3 - 8&quot;</td>
<td></td>
<td>STR.</td>
</tr>
<tr>
<td>⑤</td>
<td>BARRIER - TOP VERTICAL</td>
<td>8</td>
<td></td>
<td></td>
<td>STR.</td>
</tr>
<tr>
<td>⑥</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>8</td>
<td></td>
<td></td>
<td>STR.</td>
</tr>
<tr>
<td>⑦</td>
<td>CAP - HOOP</td>
<td>5</td>
<td>15 - 9&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>⑧</td>
<td>CAP - TOP</td>
<td>4</td>
<td>10 - 10&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>⑨</td>
<td>CAP - VERTICAL, EACH CORNER</td>
<td>4</td>
<td>3 - 4&quot;</td>
<td></td>
<td>STR.</td>
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<tr>
<td>⑩</td>
<td>SHAFT - SPIRAL</td>
<td>1</td>
<td>AS REQD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>⑪</td>
<td>SHAFT - VERTICAL</td>
<td>12</td>
<td></td>
<td></td>
<td>STR.</td>
</tr>
</tbody>
</table>

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

SEEN TABLE, THIS SHEET, COLUMN "Q"

IF JOINING TWO SPIRALS, SEE LAP SPlice

DETAIL, STANDARD PLAN G-80.20, SHEET 2

ADD TWO #6 BARS, EQUALLY SPACED, AT THE TOP OF THE FOUNDATION BARRIER

SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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. Products not listed on the Qualified Products List 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.

EXAMPLE CONFIGURATION

ATTENUATOR CONFEGRATIONS

STANDARD PLAN C-90.10-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JULY 24, 2008

IMPACT ATTENUATOR
INERTIAL BARRIER
CONFIGURATIONS

PLAN VIEW

ATTENUATOR CONFIGURATIONS

(NUMBERS INSIDE BARRELS INDICATE LBS.)
### Wall Heights and Types

<table>
<thead>
<tr>
<th>WALL HT H</th>
<th>TYPE 2A</th>
<th>TYPE 2B</th>
<th>TYPE 2C</th>
<th>TYPE 2D</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td>W</td>
<td>t</td>
<td>BAR &quot;A&quot;</td>
<td>BAR &quot;B&quot;</td>
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<tr>
<td>0</td>
<td>2'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>2'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>2'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
</tr>
<tr>
<td>12'-0&quot;</td>
<td>3'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
</tr>
<tr>
<td>14'-0&quot;</td>
<td>3'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
</tr>
<tr>
<td>16'-0&quot;</td>
<td>3'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
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<td>18'-0&quot;</td>
<td>4'-0&quot;</td>
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<td>3-4</td>
<td>#4 @ 18&quot;</td>
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<td>5'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
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<td>22'-0&quot;</td>
<td>6'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
</tr>
<tr>
<td>24'-0&quot;</td>
<td>6'-0&quot;</td>
<td>5&quot;</td>
<td>3-4</td>
<td>#4 @ 18&quot;</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Wall to be designated Noise Barrier Wall Type 2A, 2B, 2C or 2D. The Contract specifies actual wall designations.
2. For intermediate wall heights not listed, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.

### Wind Exposure & Velocity

<table>
<thead>
<tr>
<th>NOISE BARRIER TYPE</th>
<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td>1B</td>
<td>80</td>
</tr>
<tr>
<td>2B</td>
<td>1B</td>
<td>90</td>
</tr>
<tr>
<td>2C</td>
<td>2B</td>
<td>80</td>
</tr>
<tr>
<td>2D</td>
<td>2B</td>
<td>90</td>
</tr>
</tbody>
</table>

**EXPIRES:** AUGUST 23, 2006

**CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING**
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

JOIN T AND CORNER DETAIL

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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.

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL TYPE 4

STANDARD PLAN D-2.08-00

SHEET 1 OF 2 SHEETS

APPROVED FOR CONSTRUCTION

11-05

Washington State Department of Transportation

EXPIRES AUGUST 23, 2006

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

CONCRETE SHAFT

SHAFT REINFORCEMENT

W 3.5 SPIRAL @ 6" PITCH

DEPTH DI OR B2 - SEE NOTE 6

SPACING @ 12"

THREE SPACES @ 9"

#4 STIRRUP

DETAIL "B"

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

JOINT AND CORNER DETAIL

FREEDER: AUGUST 1, 2016 TO August 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOISE BARRIER WALL TYPE 4

STANDARD PLAN D-2.08-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

11-10-05

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

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.

Cast-in-Place Conc. Wall
W/ Single Slope Traffic Barrier on Spread Footing

Notes:

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.

Cast-in-Place Conc. Wall
W/ Single Slope Traffic Barrier on Spread Footing

Notes:

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.

Cast-in-Place Conc. Wall
W/ Single Slope Traffic Barrier on Spread Footing

Notes:

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.

Cast-in-Place Conc. Wall
W/ Single Slope Traffic Barrier on Spread Footing

Notes:

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.

Cast-in-Place Conc. Wall
W/ Single Slope Traffic Barrier on Spread Footing

Notes:

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.

Cast-in-Place Conc. Wall
W/ Single Slope Traffic Barrier on Spread Footing

Notes:

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.

Cast-in-Place Conc. Wall
W/ Single Slope Traffic Barrier on Spread Footing

Notes:

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 01 or 02.

EXTEND SHAFT REINFORCEMENT INTO BARRIER AND BEND AS REQUIRED AT FACE OF BARRIER (TYP.)

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

SOIL TYPE

ANGLE OF INTERNAL FRICTION (DEGREES)

D1 32
D2 38

NOISE BARRIER WALL

TYPE 7

STANDARD PLAN D-2.18-00

LENS C-3D SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE
1. Wall to be designated Noise Barrier Wall Type 7SSA, 7SSB, 7SSC or 7SSD. The Contract specifies actual wall designs.

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.
WALL HT

TYPE 9B

W BARS
A' X A'' BAR "B"
BAR "D"
BAR "G"

3' - 0" 3 - 0" 5" 5" @ 18" W0.0 @ 2" W0.0 @ 2" W3.0 @ 2"
5' - 0" 5' - 0" 9" @ 18" W0.0 @ 2" W0.0 @ 2" W3.0 @ 2"
9' - 0" 9" @ 18" W0.0 @ 2" W0.0 @ 2" W3.0 @ 2"
12' - 0" 12" @ 18" W2.0 @ 2" W2.0 @ 2" W3.0 @ 2"
15' - 0" 15" @ 18" W2.0 @ 2" W2.0 @ 2" W3.0 @ 2"
18' - 0" 18" @ 18" W2.0 @ 2" W2.0 @ 2" W3.0 @ 2"
21' - 0" 21" @ 18" W2.0 @ 2" W2.0 @ 2" W3.0 @ 2"
24' - 0" 24" @ 18" W2.0 @ 2" W2.0 @ 2" W3.0 @ 2"

WIND EXPOSURE & VELOCITY

TYPE 9A

W BARS
A' X A'' BAR "B"
BAR "D"
BAR "G"

9A 81 80
9B 81 90
9C 82 80
9D 82 90

WALL HT

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.
FILL THE JOINT HOLE WITH GROUT USING DUCTS.
Ducts shall be located on panel face opposite traffic.

JOINT AND CORNER DETAIL

FILL THE JOINT HOLE WITH GROUT USING DUCTS.
Ducts shall be located on panel face opposite traffic.

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP.
**NOTES**

1. Wall to be designated Noise Barrier Wall Type 10A, 10B, 10C or 10D. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3'-0" of level ground on each side.
4. Construction joints in the footing shall be spaced at 120' feet maximum.
5. All joints shall be in full contact and sealed.

---

### BENDING DIAGRAM

**Wind Exposure & Velocity**

- **Noise Barrier Type**:
  - 10A: B1 80
  - 10B: B1 90
  - 10C: B2 80
  - 10D: B2 90

**Wind Exposure**

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<th>TYPE 10D</th>
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**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC.

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

PRECAST CONCRETE WALL ON OFFSET SPREAD FOOTING

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE: 12/31/08

APPROVED FOR SPECIFICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
### Notes

1. Wall to be designated Noise Barrier Wall Type 13A, 13B, 13C or 13D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher *H*.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet max.
5. All joints shall be in full contact and sealed.
6. The Contract specifies actual foundation requirements D1 or D2.

### Diagram Details

- **Joint and Corner Detail**
  - Reinforcing steel Bar "D" (centered on wall)
  - Wall reinforcement
  - Footing

- **Precast Panel**
  - To be placed vertically

- **Grout Pad Leveling Course**
  - Set panel immediately after placing grout

- **Typical Section**

- **Precast Concrete Wall**
  - WI Traffic Barrier on Spread Footing

- **Noise Barrier Wall Type 13**
  - Standard Plan D-2.42-00

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**Effective:** August 1, 2016 to August 6, 2017
1. Wall to be designated Noise Barrier Wall Type 13SSA, 13SSB, 13SSC or 13SSD. The Contract specifies actual wall designations.

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

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

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

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

6. The Contract specifies actual foundation requirements D1 or D2.
### Section A

**WESTERN WASHINGTON**

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<th>Shaft Depth</th>
<th>Rod &quot;A&quot;</th>
<th>Bar &quot;B&quot;</th>
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<th>Anchor Bolt Diam.</th>
<th>Base Plate</th>
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**EASTERN WASHINGTON**

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<td>4 - #4</td>
<td>3 - #3</td>
<td>3/4'</td>
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**Notes**

1. All rods "A" and Anchor bolts shall be per ASTM F1564 grade 105.
2. Anchor Bolts, Nuts, Washers and Rod "A" shall have a protective coating of either Hot Dipped Galvanizing per AASHTO M232 for hardware or AASHTO M111 for Washers and Plates.
3. For intermediate wall heights, use the next higher "H".
4. Panels shall have at least 3 feet of level ground on each side.
5. The Contract specifies actual foundation requirements for D1 or D2 and location of Western WA or Eastern WA.
6. Maximum panel length shall be 12 feet.
7. Materials shall meet the requirements of Standard Specifications Section 6-12 and Special Provisions Section 6-12.
8. Barrier shall only be used in the configuration shown in this Standard Plan. Barrier is precast as shown.
9. For cast-in-place barrier option, continuous barrier can be lengthened to 120' max. 1/2' pre molded joint filler on barrier shall be replaced with dummy joints adjacent at panel joints.

### Section B

**Typical Section**

- **Surface Treatment**: As Required
- **Optional Construction Joint**: See Shaft to Planter Connection Detail - Sheet 2
- **Anchor Bolts - Set Bolts with Template, Use Nuts to Top & Bottom of template to Secure Location**
- **Anchor Spiral with two turns Top and Bottom**

---

**Khaledi, Bijan**

**NOISE BARRIER WALL TYPE 14**

**STANDARD PLAN D-2.46**

Approved for publication:

Washington State Department of Transportation

[Signature]

[Date]

[Location]
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 6" of Bar B shall be painted with one coat of Formula A-6-86 Zinc Dust Oxide Primer OR, one coat of Formula A-11-99 Primer.

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

PRECAST CONCRETE WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SHAFT FOUNDATION
**Cells with Vertical Reinforcing and Bond Beams** shall be filled with grout.

**Expansion Joint Filler** placed in sash block recesses.

- **8" or 10" CMU**
- **6" CMU**

**Traffic Side**

**Plan View**

**Typical Expansion Joint**

**Typical Both Sides of Wall**

**Detail A**

**Masonry Wall on Trench Footing**

**Noise Barrier Wall Type 16**

**Standard Plan D-2.60-00**

Sheet 2 of 2 Sheets

Approved for Publication

Washington State Department of Transportation

**Effective:** August 1, 2016 to August 6, 2017
### Typical Section

#### Wind Exposure & Velocity

<table>
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<th>Wind Expos</th>
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CMU = Concrete Masonry Unit

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#### Wind Wall Configuration

<table>
<thead>
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<th>Wall</th>
<th>Config</th>
<th>Details</th>
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</tbody>
</table>

---

#### Bond Beam AT TOP

- CMU (Typ.) = See Note 5
- @4 - 10 Max. (Typ.)

---

#### Reinforcing Steel Bar "O"

- @4 - 10 Min. Max. (Typ.)
- 2" CLR (Typ.)

---

#### Bar W Standard Hook or Provide Footing Dowel Except When Bars "C" Are Required

- Final Ground Line

---

#### Two Blocks Min. Three Blocks Max.

- 3" CLR (Typ.)
- 2" CLR (Typ.)
- 2" CLR (Typ.)

---

#### Bar "C" = See Wall Table 24"

#### Bar "E"

---

#### Level (Typ.)

#### Elevation

---

#### Masonry Wall on Spread Footing

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#### Spread Footing

---

#### Construction Joint (See Note 7)

---

#### Expansion Joints @ 24" Max. Centers, See Contract for Locations

---

### Notes

1. Wall to be designated Noise Barrier Wall Type 17A, 17B, 17C or 17D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially insulated.
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.

---

### Standard Plan D-2.62-00

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### Effective: August 1, 2016 to August 6, 2017

---

### Drawn by: Adam Doohan
Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

 Typical Expansion Joint

Bond beam detail

Footing width transition detail

Traffic side

Traffic side

Typical both sides of wall

Masonry wall on spread footing

Noise barrier wall

Type 17

Standard plan D-2.62-00

Sheet 2 of 2 sheets

Expires August 23, 2016

No. 10-1405

Professional Engineer

Revised: 11-10-16

Approved for publication

Washington State Department of Transportation

Effective: August 1, 2016 to August 6, 2017
### WALL Ht CMU WIDTH X W BAR "A" BAR "C" BAR "D" BAR "E"

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<td>@ 48&quot;</td>
<td>@ 18&quot;</td>
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### Notes
1. Wall to be designated Noise Barrier Wall Type 1A, 1B, 1C or 1D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry 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. Panel 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.
COLUMNS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT.

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

6" OR 10" CMU

PLAN VIEW
TYPICAL EXPANSION JOINT

#5 (TYP.)

SEE DETAIL A

TRAFFIC SIDE

EXPANSION JOINT AT WIDTH STEP

8" CMU

10" CMU

TRAFFIC SIDE

#5 (TYP.)

SEE DETAIL A

PLAN VIEW

BOND BEAM DETAIL

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

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

4'-0" MAX.

BINDER BAR

BAR "A" (TYP.)

3'-0" CLR. (TYP.)

1'-0" MIN. (TYP.)

WALL

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

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

MASONRY WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
TYPE 18

STANDARD PLAN D-2.64-01

SHEET 2 OF 2 SHEETS

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
BOND BEAM DETAIL

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

TRAFFIC SIDE

SEE DETAIL B

PLAN VIEW

TYPICAL EXPANSION JOINT

8" CMU

#5 (TYP.)

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

10" CMU

TRAFFIC SIDE

SEE DETAIL B

EXPANSION JOINT AT WIDTH STEP

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

SECTION A

CONCRETE SHAFT

W 3/4 SPIRAL @ 6" PITCH

HANKS PARALLEL TO WALL LAYOUT LINE

SHOFT

DEPTH DI OR OD - SEE NOTE 9

SHAFT LENGTH FOR PAYMENT

MASONRY WALL ON SHAFT
W/ GRADE BEAM FOUNDATION

NOISE BARRIER WALL
TYPE 19

STANDARD PLAN D-2.66-00

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

APPROVED FOR PUBLICATION

Harold Petefee 11-10-05

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
### EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

**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.

---

### STANDARD PLAN D-2.68-00

**SHEET 1 OF 2 SHEETS**

---

**MASONRY WALL ON SHAFT FOUNDATION**

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TYPICAL EXPANSION JOINT

TRAFFIC SIDE

EXPANSION JOINT FILLED W/ NOISE SEALER

1 = #5 FULL HEIGHT
BAR "C"

BACKER ROD W/ POLYURETHANE SEALANT - BOTH WALL FACES

#6 x 5'-0" WITH GREASED OR TAPED END, PENETRATING PIPE SLEEVE 8" MIN.

Section 0

NOTE

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

Traffic Side

CAP ABOVE

1'-0" MIN. LAP

2" CLG

6" TYP

#2.5 @ 4" PITCH

PILASTER & SHAFT

BAR "A"

135° HOOK (TYP.)

PILASTER REINFORCEMENT

Section B

MASONRY WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL

TYPE 20

STANDARD PLAN D-2.68-00

EXPIRES AUGUST 23, 2006

SECTION A

1 = #5 FULL HEIGHT
BAR "C"

TRAFFIC SIDE

#2 PLASTER & SHAFT 1 1/2" CLR.

BAR "B" (TYP.) - FOR QUANTITIES GREATER THAN FOUR, PLACE BALANCE ON OUTSIDE FACES AS SHOWN

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

FILL PLASTER W/ CONCRETE

SECTION C

4'-0" COMPACTED LEVEL CRUSHED GRAVEL BASE

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

4" CMU

GROUT TOP COURSE W/ GROUT (TYP.)

BAR "D" @ CENTER OF WALL

VERTICAL REINFORCEMENT BAR "B" #4 @ 4'-0" MIN.

SECTION B

CAP ABOVE

0'-45'

0'-45'

RW SIDE

ANGEL POINT PLAN

PILASTER & SHAFT

BAR "A"

135° HOOK (TYP.)

PILASTER REINFORCEMENT

NOTE

SPIRAL REINFORCEMENT SHALL BE LAPPED 17" MIN. A 135° HOOK THAT IS HOOKED AROUND A LONGITUDINAL BAR SHALL BE USED TO TERMINATE THE ENDS OF THE SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.
1. All rebar shall have a minimum 1 1/2" cover.


EXPANSION JOINT

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

4" DOOR OPENING

ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

4' CONCRETE SLAB

CONCRETE SLAB DETAIL

FOR CAST-IN-PLACE WALL W/ TRAFFIC BARRIER

NOISE BARRIER WALL
ACCESS DOOR TYPE 2

STANDARD PLAN D-2.82-00

SHEET 2 OF 2 SHEETS

EXPRES AUGUST 23, 2006

HAZARD PLANNED 11.10.05

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
CONCRETE SLAB

SECTION

NOTES

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

CONCRETE SLAB NOT SHOWN
DOOR DETAIL
(SEE NOTE 2)

FINISHED GRADE

CONCRETE SLAB

WALL

CONCRETE SLAB

ACCESS DOOR TYPE 3

FOR PRECAST WALL ON SHAFT FOUNDATION

STANDARD PLAN D-2.84-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CONCRETE SLAB

FINISHED GRADE

CONCRETE SLAB

CONCRETE SLAB

CONCRETE SLAB

ISOMETRIC CUTAWAY VIEW

NOISE BARRIER WALL

DATE

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

90119}

EXPRESS 2006
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
CONCRETE SLAB DETAIL

DOOR DETAIL (SEE NOTE 2)

CONCRETE SLAB

GROUND LINE

WALL

CONCRETE SLAB DETAIL

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 11-10-05

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 23, 2006

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

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

CONCRETE SLAB DETAIL

SOLID GROUT CAP

FOR MASONRY WALL
(SHAFT FOUNDATION SHOWN)
All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.
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. "Ase") 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 "Ta" shall be determined in accordance with WSDOT Standard Practice TP25. See Qualified Products List (QPL) Appendix "D," for products in which "Ta" 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 "Ta" 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.

PERMANENT GEOSYNTHETIC WALL

STANDARD PLAN D-3.09-00

SHEET 1 OF 4 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
## Permanent Geosynthetic Wall - Geosynthetic Reinforcement Design

### Wall Geometry and Reinforcement Layer Location

<table>
<thead>
<tr>
<th>Total Wall Height, H (ft)</th>
<th>Depth Below Wall Top at Face, z (ft)</th>
<th>Geosynthetic Reinforcement Vertical Spacing, S (ft)</th>
<th>Geosynthetic Wall Type 1</th>
<th>Geosynthetic Wall Types 2 and 4</th>
<th>Geosynthetic Wall Type 3</th>
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**Note:** See Note 4, sheet 1.
### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

#### EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

#### INCLUDES DESIGN FOR LARGE EARTHQUAKE: Aeq = 0.51g

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

#### EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

#### INCLUDES DESIGN FOR LARGE EARTHQUAKE: Aeq = 0.20g

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</table>
GEOSYNTHETIC WALL CONSTRUCTION SEQUENCE

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).

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 course in place and reposition it for the next layer. See below.

GEOTEXTILE GEOSYNTHETIC WINDROW

1" THICK STRAP (STAPLED TO STEEL STRAP)

10" PIPE

3/8" STEEL STRAP

11/8" DIAM. STEEL PIN (WELDED TO STEEL STRAP)

ELEVATION

TEMPORARY FORM SYSTEM DETAIL

4" TO 6" CENTERS ALONG WALL FACE

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 course in place and reposition it for the next layer. See below.

GEOTEXTILE GEOSYNTHETIC WALL STANDARD PLAN D-3.09-00
NOTES

1. Anchor Rods shall be ASTM F1554 GR. 55.
2. All cast-in-place concrete shall be Class 4000.
3. Couplers shall conform to the same ASTM Standard Specification as that specified for the nut. Couplers shall be capable of developing 100% of the tensile strength of the anchor rod without evidence of any failure.

KEY NOTES

1. 7/8" (IN) DIAMETER THREADED ANCHOR ROD (STANDARD SPECIFICATION SECTION 9.06.4) GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A232. ANCHOR RODS SHALL BE THREADED TO A MINIMUM OF 12" - 0" AT ENDS. PLACE LEVEL AND NORMAL TO WALL. ENGAGE ANCHOR ROODS WITH PVC SLEEVE. EMBED PVC ENDS INTO GRADE BEAM AND EDGE BEAM.

2. BACKFILL VOID BEHIND WALL WITH SAND CONFORMING TO STANDARD SPECIFICATION SECTION 9.03.10(1) TO 6" (IN) ABOVE FINISHED GRADE ON FRONT FACE OF WALL.

3. LEVELING PAD, EDGE BEAM, AND GRADE BEAM ARE CAST-IN-PLACE CONCRETE PLACED AT 91: 1V MAXIMUM SLOPE AND THE VERTICAL CONSTRUCTION JOINTS SHALL BE SPACED AT 120" MAXIMUM.

4. ONE 2" (IN) DIAMETER WEEP HOLE PER FASCIA PANEL. HORIZONTAL LOCATION AT THE CENTERLINE FASCIA PANEL.

5. ALL VERTICAL PANEL JOINTS SHALL BE SEALED FOR FULL CONTACT WITH AN APPROVED JOINT SEALANT. SEE "EXPANSION JOINT DETAILS", SHEET 2.

6. UNLESS OTHERWISE SHOWN, MINIMUM CONCRETE COVER FOR REINFORCEMENT IS 1 1/2". INCREASE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES.

7. IF GRADE BEAM IS NEAR CENTERLINE OF ROADWAY, USE ONE GRADE BEAM AT CENTERLINE FOR FASCIA PANEL ON EITHER SIDE.

8. CONTACT BRIDGE OFFICE FOR ROADWAY CROSS SLOPES GREATER THAN 0.08'FT.

9. COORDINATE WALL FINISH AND CONFIGURATION WITH STATE BRIDGE AND STRUCTURES ARCHITECT PER WSDOT DESIGN MANUAL 730.04(3).

10. SEE PRECAST FASCIA TABLE, SHEET 2 OF 2.

TYPICAL SECTION
PRECAST CONCRETE FASCIA PANEL
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

REINFORCING STEEL BENDING DIAGRAM

ALL REINFORCING BARS SHOWN ON THIS PLAN SHALL BE ASH TO M 21 UNLESS OTHERWISE NOTED.
ALL DIMENSIONS ARE TO OUT OR TO CENTER.
1" = EPOXY COATED

TYPICAL SECTION SHOWN ON WALL

FLOOR OPENING

DUMMY JOINT DETAIL

RUSTICATION DETAIL

PERMANENT GEO SYNT HETIC WALL F-SHAPE BARRIER
STANDARD PLAN D-3.16-02

NOTE
1. All cast-in-place concrete shall be class 4000.
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

BACKFILL AND DRAINAGE
FOR RETAINING WALLS
STANDARD PLAN D-4
Unit A - 2 cell gabion = 6'
Unit B - 3 cell gabion = 9'
Unit C - 4 cell gabion = 12'

TYPICAL GABION

Cross-Connecting Wire Placement, End Cells

Cross-Connecting Wire Placement, Interior Cells of Front Gabions

Lacing Detail

Twisted Fabric

Welded Fabric

Gabions

Standard Plan D-6

Effective: August 1, 2016 to August 6, 2017
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 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 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.

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

BAR #4

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>WALL HEIGHT (FT)</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP OF FOOTING</td>
<td>17.5 ± 1.5</td>
<td>5</td>
</tr>
<tr>
<td>17 ± 2.0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>20 ± 3.0</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>BOTTOM OF FOOTING</td>
<td>≤ 12</td>
<td>5</td>
</tr>
<tr>
<td>17 ± 2.0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>20 ± 3.0</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>WALL HT</td>
<td>DIMENSIONS</td>
<td>BAR Ø #4</td>
</tr>
<tr>
<td>--------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>B</td>
<td>C&lt;sub&gt;y&lt;/sub&gt;</td>
<td>D</td>
</tr>
<tr>
<td>5'</td>
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<td>3'-0&quot;</td>
</tr>
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<td>6'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
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<td>7'</td>
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<td>8'</td>
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<td>3'-0&quot;</td>
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<tr>
<td>13'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
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<td>14'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
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<tr>
<td>15'</td>
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<td>3'-0&quot;</td>
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<tr>
<td>16'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>17'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
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<tr>
<td>18'</td>
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<td>19'</td>
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</tr>
<tr>
<td>20'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
</tbody>
</table>

**REINFORCEMENT NOTES**

1. If TRAFFIC BARRIER IS USED, ADD 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1.
ADD 0.162 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10

2. ADD 16 LBF/OF OF REINFORCING STEEL FOR BARRIER ALTERNATE 1 OR 23 LBF/OF OF REINFORCING STEEL FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10

**SLOPING FACE WALL DESIGN WITH A 250 PSF SURCHARGE**

**REINFORCED CONCRETE RETAINING WALL TYPE 2 AND 25W STANDARD PLAN D-15.10**

**APPROVED FOR SUB mission**

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
NOTES

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

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

3. When Wall Type 35W (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 35W (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 interim 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 35W
STANDARD PLAN D-10.20-00

SHEET 1 OF 2 SHEETS

Approved for Publication
July 2008
Washington State Department of Transportation

BAR ④ @ 4'
### VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE

#### EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

**REINFORCED CONCRETE RETAINING WALL STANDARD PLAN D-10.20-00**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

---

**DIMENSIONS**

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<th>B</th>
<th>Cw</th>
<th>D</th>
<th>Hs</th>
<th>A</th>
<th>LENGTH</th>
<th>h</th>
<th>SIZE</th>
<th>SPA. LENGTH</th>
<th>SIZE</th>
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<th>SIZE</th>
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</tr>
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</table>

**FOOTING REINFORCEMENT**

- BAR E:
  - @ Y'-F CENTERS
  - RADIUS (SEE TABLE)

**STEM REINFORCEMENT**

<table>
<thead>
<tr>
<th>MATERIAL QUANTITY</th>
<th>MAXIMUM SOIL PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
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</tbody>
</table>

**MATERIAL**

- CONCRETE
- SERVICE STRENGTH
- STRENGTH EXTREME

**DRAWN BY:** BILL HENDERSON

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

---

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

---

**STANDARD PLAN D-10.20-00**

---

**CONCRETE**

- RETAINING WALL
- SERVICE STRENGTH
- STRENGTH EXTREME

---

**MATERIALS**

- ...
NOTES

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

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

3. When Wall Type 4SW (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 4SW (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.

---

EXPANSION JOINT - 48' CENTERS, W/1/2" PREMOLDED JOINT FILLER

---

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

---

REINFORCED CONCRETE RETAINING WALL
TYPE 4 AND 4SW
STANDARD PLAN D-10.25-00

---

SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

---

KEY DETAIL
REQUIRED ON WALLS WHERE H ≥ 13'
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 interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

REINFORCED CONCRETE RETAINING WALL
TYPE 5
STANDARD PLAN D-10.30-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 / 8

KEY DETAIL
REQUIRED ON WALLS WHERE H ≥ 26'

REINFORCED CONCRETE RETAINING WALL
TYPE 6
STANDARD PLAN D-10.35-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Approved for Publication

DATE

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 at 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.
### EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

#### CENTERS

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<th>MATERIAL QUANTITY</th>
<th>MAXIMUM SOIL PRESSURE (PSF)</th>
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#### FOOTING REINFORCEMENT

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</table>

#### STEM REINFORCEMENT

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<th>1200</th>
<th>1500</th>
<th>2000</th>
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</tbody>
</table>

#### REINFORCEMENT NOTES

- IF TRAFFIC BARRIER IS USED, ADD 0.100 CYLV OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1.
- ADD 0.125 CYLV OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10
- ADD 28 LBF OF REINFORCING STEEL FOR BARRIER ALTERNATE 1 OR 19 LBF OF REINFORCING STEEL FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10

#### VERTICAL FACE WALL DESIGN

WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

#### BAR E

@ 1'-6" CENTERS

### BAR K AND M

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DESIGN BY: BILL MERRICK**

**DRM 15-04**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
250 PSF EQUIVALENT LIVE LOAD SURCHARGE WHEN SPECIFIED IN CONTRACT

Cement Conc. Gutter (CL. 3000, 4" THICK)

EXPANSION JOINT - 48" CENTERS, W/ 1/2" PREMOLDED JOINT FILLER

3" DIAM. DRAINS AT ABOUT 12" CENTERS AND 6" ABOVE FINAL GROUND LINE AT FRONT FACE OF WALL

CONSTRUCTION JOINTS IN FOOTING AT 12" CENTERS MAX.

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 interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

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

REINFORCED CONCRETE RETAINING WALL

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
### Reinforcement Details

<table>
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<tr>
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<th>Diameter (in)</th>
<th>Length (ft)</th>
<th>Embedment (in)</th>
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<tbody>
<tr>
<td>A</td>
<td>6</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td>20</td>
<td>40</td>
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</tbody>
</table>

**Notes:**
- All bars are Steel Grade 60 unless specified.
- Embedment depths are measured from the bottom of the footing.
- Bar positions are as per the diagram.

### Footing Reinforcement

<table>
<thead>
<tr>
<th>Bar</th>
<th>Diameter (in)</th>
<th>Length (ft)</th>
<th>Embedment (in)</th>
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<td>E</td>
<td>3</td>
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<td>36</td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>

**Notes:**
- 符号和尺寸信息反映在图中。

---

**Effective:** August 1, 2016 to August 6, 2017

---

**Design:**
- Standard Plan D-10-45-01

---

**Reinforced Concrete:**
- Retaining Wall Design with a 250 PSF Surcharge

---

**Materials:**
- Maximum soil pressure (p): 200 psi
- Service strength (f': 5000 psi

---

**Drawn By:** Bill Berens

---

**Effective Date:**
- 公开于8月1日，2016年到8月6日，2017年
REINFORCING STEEL BENDING DIAGRAM

NOTE
SEE ELEVATION FOR LAP SPICE 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" 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

May 19, 2016 11:28 AM
Bijan Khaleghi
STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.20-0
NOTE
FOR GUARDRAIL DETAILS NOT SHOWN - SEE BEAM GUARDRAIL
TYPE BP TRANSITION SECTION TYPE 21, STANDARD PLAN C-25.21
FOR GUARDRAIL, CONNECTION DETAIL (HOLE PATTERN)
AND HARDWARE REQUIRED - SEE BEAM GUARDRAIL
TRANSITION TYPE 21 CONNECTION, THIS SHEET

NOTE
FOR GUARDRAIL DETAILS NOT SHOWN - SEE BEAM GUARDRAIL
(TYPE 31) TRANSITION SECTION TYPE 22, STANDARD PLAN C-25.22

ATTACH GUARDRAIL TO CONCRETE
TRAFFIC BARRIER WITH 7/8" DIAM.
HIGH STRENGTH BOLTS (STANDARD
SPECIFICATION 9-06.5(4)) WITH
THIN SLAB FERRULE INSERTS
OR RESIN BONDED ANCHORS.
SEE THE CONTRACT PLANS.

NOTE
FOR GUARDRAIL DETAILS NOT SHOWN - SEE BEAM GUARDRAIL
(TYPE 31) TRANSITION SECTION TYPE 21,
STANDARD PLAN C-25.20

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH
ROUGHENED SURFACE

ALL DIMENSIONS ARE OUT TO OUT
SEE STD. SPEC. FOR BENDING DIAMETERS

TRAFFIC BARRIER DETAILS
FOR REINFORCED CONCRETE
RETAINING WALLS
STANDARD PLAN D-15.30-01

Sheet 2 of 2 Sheets

Approved for Publication
12/6/18

Washington State Department of Transportation

Effective: August 1, 2016 to August 6, 2017

Effective: August 1, 2016 to August 6, 2017

Effective: August 1, 2016 to August 6, 2017
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.
On pile trestles, when H exceeds 20’, longitudinal bracing shall be placed on outside piles on both sides of trestle in every third panel as required by local conditions. When H exceeds 20’, two-story bracing shall be used. Longitudinal struts and cross braces shall be fastened at each end with 3 1/2" DIA bolts and half-dowel washers.

On frame trestles, longitudinal bracing shall be placed on outside posts on both sides of trestle in alternate panels as required by local conditions when H exceeds 20’. Two-story bracing shall be placed. Longitudinal struts and cross braces shall be fastened at each end with 3 1/2" DIA bolts and half-dowel washers.

ELEVATION - PILE TRESTLE

ELEVATION - FRAME TRESTLE

DECK FRAMING PLAN - SINGLE LANE

DECK FRAMING PLAN - TWO LANE

HALF SECTION-PILE BENT

HALF SECTION-FRAME BENT

TYPICAL SECTION-SINGLE LANE BRIDGE

TYPICAL SECTION-TWO LANE BRIDGE

PILE OR FRAME DETOUR BRIDGE WITH ASPHALT OVERLAY

USE ONLY FOR TEMPORARY BRIDGES

STANDARD PLAN E-2

Sheet 1 of 2 Sheets

5-22-98

APPROVED FOR PUBLICATION

STATE DESIGN DIVISION
WASHINGTON DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
NOTES

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

SECTION A-A

SECTION B-B

STANDARD PLAN E-2

PILE OR FRAME
DETOUR BRIDGE WITH
ASPHALT OVERLAY
USE ONLY FOR TEMPORARY BRIDGES

EXPIRES JANUARY 17, 1999
**PILE DETAILS**

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

2. Spirals shall be spliced either by lapping one full turn and bending the end of the spiral to a 135° seismic hook, by welding, or by the use of a mechanical connector that develops 125% of the minimum yield strength of the spiral. Welding shall meet the requirements of Standard Specification 6-02.3(24)E.

3. All prestressing strands are 1/2" or 0.62" diameter (d_p), Grade 270, uncoated strands, AASHTO M203, jack to 0.75 F_pu maximum.

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

5. 2.1/2" cover if pile is exposed to salt water.

**SPIRAL TERMINATION DETAIL**

- **PRECAST PRESTRESSED CONCRETE PILES**

**STANDARD PLAN E-4**

Sheets 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 bunked on level dunnage at no more than 20' on center, with a maximum overhang of 10'.
FACE OF CURB VARIES 12" TO 24"
MATCH ROADWAY SLOPE 1/2" (IN) R. 
ROADWAY 11 1/2"

FACE OF CURB VARIES 10" TO 22" (SEE CONTRACT)
MATCH ROADWAY SLOPE 1/2" (IN) R. 
ROADWAY 11 1/2"

FACE OF CURB VARIES FROM 9" (IN) TO 0" (IN) - MAINTAIN 11 - 8V SLOPE ON SIDE OF CURB
MATCH ROADWAY SLOPE 1/2" (IN) R. 
ROADWAY 11 1/2"

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER
CEMENT CONCRETE TRAFFIC CURB AND GUTTER
DEPRESSED CURB SECTION

3/8" (IN) PREMOLDED JOINT FILLER (WHEN ADJACENT TO CEMENT CONCRETE SIDEWALK)

CEMENT CONCRETE PEDESTRIAN CURB
CEMENT CONCRETE PEDESTRIAN CURB

NOTE

STATE DESIGN ENGINEER
Washington State Department of Transportation

CEMENT CONCRETE CURBS
STANDARD PLAN F-10.12-0
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
May 6 2014 3:31 PM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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.
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 31, see Standard Plan C-20.10.
7. For extruded curb details, see Standard Plan F-10.42.
NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION

Washington State Department of Transportation
EXPRESS AUGUST 16, 2017

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
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EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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

EXTRAUDED CURB

STANDARD PLAN F-10.42-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.
TOP VIEW
INSIDE CORNER BLOCK

TOP VIEW
OUTSIDE CORNER BLOCK

18" RADIUS BLOCK

30" RADIUS BLOCK

#3 REBAR – REQUIRED ONLY IN TANGENT BLOCK WHEN LENGTH EXCEEDS 30" (IN) / 1 1/2" (IN) CLR. BOTH ENDS – SEE
STANDARD SPECIFICATION 9-07

TYPICAL OF ALL END VIEW

INSIDE CORNER BLOCK
18" (IN) RADIUS BLOCK

OUTSIDE CORNER BLOCK
30" (IN) RADIUS BLOCK

TANGENT BLOCK

ISOMETRIC VIEWS

STANDARD PLAN F-10.62-0

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PRESENTING ENGINEER

APPROVED FOR PUBLICATION

PRECAST SLOPED MOUNTABLE CURB

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

ISOMETRIC VIEWS
## 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&quot;</td>
<td>2&quot;</td>
<td>8&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'</td>
<td>12&quot;</td>
<td>1&quot;</td>
<td>10&quot;</td>
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<td>7'</td>
<td>12&quot;</td>
<td>7 1/8&quot;</td>
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<td>8'</td>
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<td>10'</td>
<td>18&quot;</td>
<td>7 1/8&quot;</td>
<td>16 1/4&quot;</td>
</tr>
<tr>
<td>11' TO 13'</td>
<td>18&quot;</td>
<td>3/4&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>14' TO 15'</td>
<td>18&quot;</td>
<td>5/8&quot;</td>
<td>18 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 48'</td>
<td>30&quot;</td>
<td>3/8&quot;</td>
<td>29 1/4&quot;</td>
</tr>
<tr>
<td>49' TO 60'</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.
NOTES
1. The dual faced curb may be constructed by using two precast sloped mountable curbs (longitudinal halves) so long as the installation is consistent with the dimensions shown in the plan.


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

NOTES

1. At marked crosswalks, the connection between the landing and the roadway must be contained within the width of the crosswalk markings.
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 on any part of the Curb Ramp or Landing, or in the Depressed Curb and Gutter where the Landing connects to the roadway.
6. The Bid Item "Cement Concrete Curb Ramp Type A" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length, the running slope of the curb ramp is allowed to exceed 6.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet. Do not include abutting landing(s) in the 15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the walkway.
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.

**Parallels Curb Ramp**

**Standard Plan F-40.12-0**

**Type Parallel A Pay Limit**

**Type Parallel B Pay Limit**

Scott Zeller
Jun 24 2016 7:19 AM
NOTES

1. This plan is to be used where pedestrian crossing in one direction is not permitted.

2. At marked crosswalks, the connection between the Landing and the roadway must be contained within the width of the crosswalk markings.

3. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.

4. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing or in the Depressed Curb and Gutter where the Landing connects to the roadway.


7. 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.

8. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the curb ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.


10. 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.

SECTION B

(Along inside radius at back of walkway)

CONTRACTION JOINT (TYP.) – SEE STANDARD PLAN F-30.10

FOR CURB RAMP LENGTHS GREATER THAN 8'-0" PROVIDE

CONTRACTION JOINT EQUALLY SPACED 4'-0" MIN. OC.

SINGLE DIRECTION CURB RAMP

STANDARD PLAN F-40.16-0

Zeller, Scott
Jan 24 2016 7:21 AM
NOTES

1. The Detectable Warning Surface (DWS) shall extend the full width of the curb ramp, landing, or other roadway entrance as applicable. Exception: If the Manufacturer of the DWS requires a concrete border around the DWS, a variance of up to 2 inches on each side of the DWS is permitted.

2. The Detectable Warning Surface (DWS) shall be placed at the back of curb, with the two leading corners of the DWS panel placed adjacent to the back of the curb, and with no more than a 2-inch gap between the DWS and the back of the curb measured at the center of the DWS panel. Exception: If the Manufacturer of the selected DWS requires a concrete border around the DWS, a variance of up to 2 inches from the back of the curb is permitted (measured at the leading corners of the DWS panel).

3. The rows of truncated domes shall be aligned to be perpendicular to the grade break at the back of curb.

4. The rows of truncated domes shall be aligned to be parallel to the direction of travel.

5. If curb and gutter are not present, such as a shared-use path connection, the Detectable Warning Surface shall be placed at the pavement edge.


7. If a curb ramp is required, the location of the Detectable Warning Surface must be at the bottom of the ramp and within the required distance from the rail.

8. When the grade break between the curb ramp and the landing is less than or equal to 5 ft. from the back of curb at all points, place the Detectable Warning Surface on the bottom of the curb ramp directly above the grade break.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTES

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


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 Pedestrian Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the pedestrian ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.

7. Beyond limits shown. Pay item does not include driveway. See Contract Plans.

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 1 - PAY LIMITS

CONTRACTION JOINT (TP) - SEE STANDARD PLAN F-30.10
FOR RAMP LENGTHS GREATER THAN 8'-0" PROVIDE
CONTRACTION JOINT EQUALLY SPACED 4'-0" MIN. OC.

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 2 - PAY LIMITS

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

DRIVEWAY ENTRANCE SIDEWALK (TPY)

SECTION C

3/8" (IN) EXPANSION JOINT (TPY) - SEE STANDARD PLAN F-30.10

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT PLANS)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)

DRIVEWAY RAMP

CL 4000 CONCRETE
PER STANDARD SPEC 8-08.3

$-0' (TPY)

2'-0" (TPY)

3/8" (IN) EXPANSION JOINT (TPY) - SEE STANDARD PLAN F-30.10

CEMENT CONCRETE CURB (TPY)

PEDESTRIAN RAMP

3/8" (IN) EXPANSION JOINT (TPY) - SEE STANDARD PLAN F-30.10

CEMENT CONCRETE SIDEWALK (TPY)

PLAN VIEW

SECTION A

BROOLED FINISH (TPY)

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

3" (IN) R (TPY)

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)

PLAN VIEW

SECTION B

BROOLED FINISH (TPY)

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

3" (IN) R (TPY)

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)

PLAN VIEW

SECTION C

BROOLED FINISH (TPY)

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

3" (IN) R (TPY)

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)

PLAN VIEW

SECTION B

BROOLED FINISH (TPY)

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

3" (IN) R (TPY)

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)

PLAN VIEW

SECTION C

BROOLED FINISH (TPY)

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

3" (IN) R (TPY)

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)

PLAN VIEW

SECTION B

BROOLED FINISH (TPY)

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

3" (IN) R (TPY)

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)

PLAN VIEW

SECTION C

BROOLED FINISH (TPY)

CEMENT CONCRETE CURB AND GUTTER (SEE NOTE 3)

3" (IN) R (TPY)

1/2" (IN) LIP BETWEEN ROADWAY GUTTER AND CURB (OR SEE CONTRACT)

DEPRESSED CURB AND GUTTER (SEE NOTE 3)
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.

TYPICAL INSTALLATION FOR SINGLE-FACED SIGNS

TYPICAL INSTALLATION FOR DOUBLE-FACED SIGNS
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.


4. For 6x6 posts and larger, 7" (ft) minimum spacing is required between posts.

5. All materials shall meet the requirements of Standard Specification 9-28.

POST INSTALLATION TABLE

<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>DEPTH</th>
<th>HOLE DIAMETER</th>
<th>NOTCH DEPTH</th>
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<tbody>
<tr>
<td>4x4</td>
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<tr>
<td>6x10</td>
<td>6'</td>
<td>SEE NOTES 2</td>
<td>SEE NOTES 2</td>
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<tr>
<td>8x10</td>
<td>6'</td>
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<td>6x12</td>
<td>7'</td>
<td>SEE NOTES 2</td>
<td>SEE NOTES 2</td>
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Timber Support

Standard Plan G-22.10-0

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

Carpenter, Jeff
Jul 10 2015 7:22 AM
Washington State Department of Transportation
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

**MAJOR AND SECONDARY SIGN INSTALLATION**

- **WIDEST SIGN POST DIMENSION**
- **STEEL OR ALUMINUM ANGLE (TYP.)**
- **SIGN POST**
- **WINDBEAM**
- **SIGN PANEL**

**TOP OF POST**

- **MAJOR SIGN**
- **SECONDARY SIGN**

**TOP OF MAJOR SIGN**

- **WINDBEAM (TYP.)**

**SIGN POST (TYP.)**

- **EDGES OF TRAVELED WAY**

**NOTCH LOCATION (TYP.)**

**TO BE USED WHEN PLACING TIMBER POST IN A PAVED AREA**

**CONCRETE FOUNDATION SLEEVE DETAIL**

- **4' MIN.**
- **2' MAX.**

**TOP OF PAVEMENT**

- **CONCRETE CLASS 3000**

**ISOMETRIC VIEW**

- **DEPTH = SEE POST INSTALLATION TABLE**

**3/8" (IN) TUBULAR STEEL ~ 4" (IN) X 4" (IN) X 4" (IN) X 4" (IN) ~ ASTM A500 Grade B (GALV.) PER AASHTO M 111 OR ASTM A502 (GALV.) PER AASHTO M 111.**

**ISOMETRIC VIEW**

- **SIGN PANEL ATTACHMENT DETAIL**

- **3/16" (IN) ALUM. RIVETS @ 4" (IN) STAGGERED SPACING (TYP.)**

- **TOP OF POST**

- **TOP OF MAJOR SIGN**

**DEPTH = SEE POST INSTALLATION TABLE**

**1/2" (IN) NOTCH IN EACH POST, WHEN REQUIRED = SEE 1. POST INSTALLATION TABLE**

**BOTTOM OF SIGN AND TOP OF NOTCH SHALL BE ALIGNED**

**1/2" (IN) NOTCH IN EACH POST, WHEN REQUIRED = SEE 1. POST INSTALLATION TABLE**

- **NOTCH DEPTH = SEE POST INSTALLATION TABLE**

- **LAG BOLT (TYP.)**

**3/16" (IN) ALUM. RIVET (TYP.)**

- **ALUMINUM POST CLIP = SEE STD. SPEC. 9-28**

- **STEEL OR ALUMINUM ANGLE (TYP.)**

**ALUMINUM WINDBEAM = SEE STD. SPEC. 9-28**

- **ALUMINUM POST CLIP = SEE STD. SPEC. 9-28**

- **TIMBER SIGN POST = SEE STD. SPEC. 9-28**

- **ISOMETRIC VIEW**

**STANDARD PLAN G-22.10-0**

**SHEET 3 OF 3 SHEETS**

**APPROVED FOR PUBLICATION**

Carpenter, Jeff

Jul 10 2015 7:23 AM

Washington State Department of Transportation

Nisbet, John

Jul 7 2015 3:59 PM

**JOHN C. NISBET**

PROFESSIONAL ENGINEER
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.
NOTES
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.
2. For Steel Sign Support Foundations, see Standard Plan G-25.10.
3. For "H1" refer to the Sign Specification Sheet in the Contract.

STEEL SIGN SUPPORT
TYPE AS
INSTALLATION DETAILS
STANDARD PLAN G-24.20-01

Details:
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 shown on this plan only to illustrate how the parts are assembled.

2. Do not tighten any single Slip Plate Bolt to the recommended torque before prelightening 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.

3. Slip Base assembly and all other materials shall meet the requirements of Standard Specifications 9-06 and 9-20.
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.


3. Top of concrete foundation shall be smooth, dense, and uniform to finished ground line.

4. Field drill posts to accept angle and cold galvanized holes.


6. Slip Base assembly and all other materials shall meet the requirements of Standard Specifications 9-06 and 9-28.


EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 shown on this plan only to illustrate how the parts are assembled.

2. Do not tighten any single Slip Plate Bolt to the recommended torque before prelightening 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.

3. Use only Slip Base manufacturer supplied hardware that meets the requirements of Standard Specifications 9-06 and 9-28.

**Type SB-1**

**Steel Sign Support Types SB-1 & SB-3 ~ 10" (IN)**

**Type SB-3**

**Slip Base Assembly**
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

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 shown on this plan only to illustrate how the parts are assembled. Use only base connection manufacturer supplied hardware that meets the requirements of Standard Specification 9-06.

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


4. Maximum of 34 lbs/ft in a 7" (t) wheel path.

5. On fill slopes, the maximum sign height is 9' (t) for posts closest to the edge of traveled way.

NOTE
1. Per TRANSP: 5" to 8" square steel posts are acceptable and require type TP-B foundations.

KEY NOTES
- Foundation depth based on allowable lateral bearing pressure in excess of 2500 PSF.
- Two-post installation.
- Single-post installations require square steel posts. For single-post installations, divide the post MAX. XYZ in half.

STEEL SIGN SUPPORT FOUNDATION DETAILS

STANDARD PLAN G-25.10-04

NOTE

NOTE
1. Per TRANSP: 5" to 8" square steel posts are acceptable and require type TP-B foundations.

KEY NOTES
- Foundation depth based on allowable lateral bearing pressure in excess of 2500 PSF.
- Two-post installation.
- Single-post installations require square steel posts. For single-post installations, divide the post MAX. XYZ in half.
1. Mounting brackets with steel straps shall be stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/4" (in) wide and 0.030" (in) 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" (in) 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' (ft); 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" (in) wide and 0.030" (in) thick.

2. Sign braces are required for sign widths of 48" (in) or greater. For sign widths of 36" (in), the 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 sheeting.

5. Signs 48" (in) or greater can be pinned together, back to back.

6. For signs installed back to back on a single post, no bracing is required.
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>

<table>
<thead>
<tr>
<th>SIGN POST TYPE</th>
<th>4x6 OR 6x6 TIMBER POST</th>
<th>6x8 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>
<td>2 1/2&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

SIGN BRACE PLACEMENT

SIGN BRACING
NOTES

1. Vertical and horizontal clearance requirements shall be as shown on the Contract Plans.

2. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom chord, except as otherwise noted. No chord shop splices permitted in first two-thirds of the span, except as otherwise noted. A maximum of two splices are permitted in the post. For post or chord shop splice details, see Standard Plan G-70.10.

3. The back-up plates or rings for all full penetration welds shall be welded continuously to the joined pieces. This can be done by either a continuous fillet weld on the back side of the piece, or by a continuous weld in the root of the full penetration weld.

4. All bolt holes shall be drilled, and the diameter shall be 1/16" (in) larger than the nominal bolt diameter, except as noted.

5. The design and analysis of the structures has been done in accordance with AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaries and Traffic Signals Dated 2001, using 90 MPH wind velocity and fatigue category - I.

6. Adjust post alignment in plane normal to roadway centerline by means of leveling nuts located below base plate to maintain upward slope in cantilever arm(s). Tighten anchor nuts above base plate in accordance with Standard Specification 6-03.3(33).

7. Variable Message Signs (VMS) exceeding 700 lbs. and/or 200 sq. ft. shall not be installed on cantilever structure.

8. For electrical requirements, see Standard Plan J-75.45.
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>Z</td>
<td>13'-0&quot;</td>
<td>18'-0&quot;</td>
</tr>
<tr>
<td>Z</td>
<td>16'-0&quot;</td>
<td>22'-0&quot;</td>
</tr>
</tbody>
</table>

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" (IN) PLATE (ASTM A 36) (NO GALVANIZING REQUIRED)

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1
STANDARD PLAN G-60.20-02
### Bar List - Types 2 and 3

<table>
<thead>
<tr>
<th>MARK</th>
<th>Location</th>
<th>Total Sign Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>200 SF OR LESS</td>
</tr>
<tr>
<td>①</td>
<td>Pedestal Hoop</td>
<td>QTY.</td>
</tr>
<tr>
<td>②</td>
<td>Foundation Wall Ties</td>
<td>6</td>
</tr>
<tr>
<td>③</td>
<td>Foundation Verticals</td>
<td>14</td>
</tr>
<tr>
<td>④</td>
<td>Pedestal Verticals</td>
<td>18</td>
</tr>
<tr>
<td>⑤</td>
<td>Foundation Wall Horizontals AT SLOPE</td>
<td>2</td>
</tr>
<tr>
<td>⑥</td>
<td>Foundation Wall Horizontals</td>
<td>Varies</td>
</tr>
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</table>

### Bending Diagram

#### Effective: August 1, 2016 to August 6, 2017

### Values of Z

<table>
<thead>
<tr>
<th>Foundation Type</th>
<th>Z</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2</td>
<td>9' - 0&quot;</td>
<td>11' - 0&quot;</td>
</tr>
<tr>
<td>Type 3</td>
<td>11' - 0&quot;</td>
<td>13' - 6&quot;</td>
</tr>
</tbody>
</table>

### Material Specifications

- **Concrete:** Class 4000P
- **Steel Reinforcement Bar:** AASHTO M 31 Grade 60
- **Anchor Rods:** ASTM F 1554 Grade 105
- **Anchor Nuts:** ASTM A 563 Grade DH
- **Anchor Washers:** ASTM F436
- **Anchorage Dallywangs:** AASHTO M 232
- **Anchor Plate:** ASTM A 35
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTES
1. Horizontal and vertical clearance requirements shall be as shown in Contract Plans.
2. Horizontal diagonals must join chords where vertical diagonals connect (panel points).
3. Interior diagonals shall be placed at panel points, 40 (ft) maximum spacing. Locate symmetrically about centerline of span if possible. An interior diagonal is not required at span ends.
4. No post splices permitted in lower third of height, nor closer than 3’-0” to bottom of chord. No chord shop splices permitted in middle third of span. Maximum of one splice in each end post.
5. For electrical requirements See Standard Plan J-75.45.

Y₁ = HEIGHT OF SHALLOWEST SIGN ON STRUCTURE, D = T’-0” MIN.
Y₂ = HEIGHT OF ANY SIGN WITH HEIGHT GREATER THAN Y₁.

ELEVATION

STRUCTURE DIMENSIONS

<table>
<thead>
<tr>
<th>SPAN LENGTH (S)</th>
<th>DIMENSION (D)</th>
<th>TOP AND BOTTOM CHORDS</th>
<th>DIAGONALS</th>
<th>END TRUSS POSTS</th>
<th>END TRUSS STRUTS AND DIAGONALS</th>
<th>TOTAL SIGN AREA (MAX.) (SQ. FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>4'-0&quot;</td>
<td>3&quot; x 216&quot;</td>
<td>1 1/4&quot; x 140&quot;</td>
<td>10&quot; x 279&quot;</td>
<td>2 1/2&quot; x 203&quot;</td>
<td>384</td>
</tr>
<tr>
<td>65' to 90'</td>
<td>6'-0&quot;</td>
<td>4&quot; x 237&quot;</td>
<td>2&quot; x 154&quot;</td>
<td>10&quot; x 279&quot;</td>
<td>2 1/2&quot; x 203&quot;</td>
<td>624</td>
</tr>
<tr>
<td>91' to 120'</td>
<td>8'-0&quot;</td>
<td>5&quot; x 258&quot;</td>
<td>2&quot; x 154&quot;</td>
<td>10&quot; x 307&quot;</td>
<td>3&quot; x 216&quot;</td>
<td>864</td>
</tr>
<tr>
<td>121' to 150'</td>
<td>10'-0&quot;</td>
<td>6&quot; x 286&quot;</td>
<td>2 1/2&quot; x 203&quot;</td>
<td>10&quot; x 366&quot;</td>
<td>3 1/2&quot; x 226&quot;</td>
<td>1104</td>
</tr>
</tbody>
</table>

ALL MEMBERS ARE PIPE. VALUES SHOWN ARE NOMINAL PIPE SIZE AND WALL THICKNESS.

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

ZELDENRUST, Richard
2016.06.11 14:11:02 -07'00'
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

TYPICAL JOINT DETAIL
CORD SHOWN = END POST SIMILAR

1/4" (IN) BACKING PLATE

45° FOR CHORDS OVER 1/4" (IN) THICK (SQUARE FOR 1/4" (IN) OR LESS)

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

CHORD FIELD SPlice DATA

<table>
<thead>
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<th>SPAN LENGTH</th>
<th>F</th>
<th>T</th>
<th>BOLT K DIAMETER</th>
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<tbody>
<tr>
<td>60&quot; OR LESS</td>
<td>6&quot;</td>
<td>3/4&quot;</td>
<td>1/2&quot;</td>
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<tr>
<td>61&quot; TO 90&quot;</td>
<td>7&quot;</td>
<td>7/8&quot;</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>91&quot; TO 120&quot;</td>
<td>8 1/2&quot;</td>
<td>1&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>121&quot; TO 150&quot;</td>
<td>9 1/2&quot;</td>
<td>1 1/4&quot;</td>
<td>7/8&quot;</td>
</tr>
</tbody>
</table>

DEAD LOAD CAMBER

FOR SPAN LENGTHS NOT LISTED, INTERPOLATE VALUES OF

Zeldenrust, Richard
2015.06.11 14:11:39 -07'00'

SIGN BRIDGE
(TRUSS-TYPE)

STANDARD PLAN G-70.10-03

APPROVED FOR PUBLICATION
Jan 18 2015 15:33 AM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Zeldenrust, Richard
2015.06.11 14:11:39 -07'00'
BASE PLATE HOLE = 8" (IN) DIAM.
1'- 0" (IN) DIAM. BOLT CIRCLE
1 1/2" (IN) DIAM. HOLE FOR ANCHOR BOLT (TYP.)

BASE WELD DETAIL

SECTION B

VIEW C

POST BASE DETAILS
CONDUIT OMITTED FOR CLARITY = FOR ELECTRICAL REQUIREMENTS
SEE STANDARD PLAN J-76.45

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

SIGNED / DRAWN BY

STANDARD PLAN G-70.10-03

EXPLOSION ENGINEER

APPROVED FOR PUBLICATION

Jun 15 2015 7:57 AM

Washington State Department of Transportation
**TABLE**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SPAN LENGTH</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
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<tbody>
<tr>
<td>60' OR LESS</td>
<td>61' TO 80'</td>
<td>81' TO 120'</td>
</tr>
<tr>
<td>DIMENSION = D</td>
<td>4' - 0''</td>
<td>5' - 0''</td>
</tr>
<tr>
<td>BAR SPACES = N</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>SHAFT DEPTH = Z</td>
<td>11' - 8''</td>
<td>13' - 6''</td>
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**BAR LIST**

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<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>SPAN LENGTH</th>
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<tr>
<td></td>
<td>60' OR LESS</td>
<td>61' TO 80'</td>
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<tr>
<td></td>
<td>QTY.</td>
<td>SIZE</td>
</tr>
<tr>
<td>①</td>
<td>SHAFT - VERTICAL</td>
<td>11</td>
</tr>
<tr>
<td>②</td>
<td>SHAFT - SPIRAL</td>
<td>1</td>
</tr>
<tr>
<td>③</td>
<td>CAP - TOP AND BOTTOM</td>
<td>8</td>
</tr>
<tr>
<td>④</td>
<td>CAP - SIDES</td>
<td>6</td>
</tr>
<tr>
<td>⑤</td>
<td>CAP - HOOPES</td>
<td>6</td>
</tr>
</tbody>
</table>

**GROUNDING CONDUCTOR**

CONDUCT COUPLING - INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

ANCHOR PLATE (TYPE) - SEE DETAIL

ATTACH GROUNDING CONDUCTOR TO ① - 0' - 0' MIN. BELOW CONSTRUCTION JOINT

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

MATERIAL SPECIFICATIONS

- SHAFT CONCRETE: CLASS 4000P
- ALL OTHER CONCRETE: CLASS 4000
- STEEL REINF. BAR: ASTM F 1554 GRADE 105
- ANCHOR NUTS: AASHTO M 291
- ANCHOR WASHERS: AASHTO M 293
- ANCHORAGE GALVANIZED: AASHTO M 232
- ANCHOR PLATE: ASTM A 36

CASE THE EXCAVATION AND PLACE USING TREVISC METHOD WHEN WATER IS PRESENT

**ANALYSIS**

1 1/4" (IN) RIGID GALV. STEEL CONDUIT TO BE INSTALLED WHERE DIRECTED BY THE ENGINEER

SYM. ABOUT ① EXCEPT CONDUIT

3/4" (IN) CHAMFER

TOP

SHEAR KEY

CONSTRUCTION JOINT W 5 1/2" (IN) x 1 3/4" (IN) x 2' - 0" SHEAR KEY

END

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
# MATERIAL SPECIFICATIONS

**CONCRETE**
- CLASS 4000P

**STEEL, REINF. BAR**
- ASTM M 31
- GRADE 60

**ANCHOR RODS**
- ASTM F 1554
- GRADE 105

**ANCHOR NUTS**
- ASTM M 291

**ANCHOR WASHERS**
- ASTM M 263

**ANCHORAGE GALVANIZING**
- ASTM A 36

---

## EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

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<table>
<thead>
<tr>
<th>TABLE</th>
<th>SPAN LENGTH</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60' OR LESS</td>
<td>61' TO 90'</td>
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<td>5' - 0'</td>
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<tr>
<td>BAR SPACES = N</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>SHAFT DEPTH = Z</td>
<td>TYPE 2</td>
<td>5' - 0'</td>
</tr>
<tr>
<td>SHAFT DEPTH = Z</td>
<td>TYPE 3</td>
<td>7' - 0'</td>
</tr>
</tbody>
</table>

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## BAR LIST

### 2 AND 3

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>MARK</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CAP - TOP</td>
<td>QTY</td>
</tr>
<tr>
<td>2</td>
<td>CAP - SIDES</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>CAP - HOOPS</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>CAP - BOTTOM</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>FNDWALL - VERTICAL</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>FNDWALL - HORIZONTAL</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>FNDWALL - HORIZONTAL</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>FNDWALL - HORIZONTAL</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>FNDWALL - HORIZONTAL</td>
<td>10</td>
</tr>
</tbody>
</table>

---

## BENDING DIAGRAM

Concrete below finished ground line shall be placed directly against undisturbed earth, or alternately, backfill placed around foundation shall be compacted in conformance with Standard Specification 2-09.3(1)e, method 1 or 4. All formwork shall be removed.

**FOUNDATION TYPES 2 & 3**

---

## SIGN BRIDGE (TRUSS-TYPE)

**FOUNDATION TYPES 2 & 3**

---

## STANDARD PLAN G-70.30-0:

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

Carpenter, Jeff  
Feb 29 2016 12:38 PM

Washington State Department of Transportation
NOTES

1. Windbeam and 3" (IN) Z-Bar are aluminum. All nuts, bolts, washers, and other hardware shall be stainless steel per Standard Specification Section 9-28.11, except as noted. Galvanize all non-stainless steel parts.

2. See Standard Plan G-90.20 (Monotube), or G-90.30 (Truss) for additional Overhead Sign Mounting details.

3. For VMS mounting, the Contractor may substitute W6 × 12 steel or W8 × 13 steel sections for the Vertical Brace W4 × 13 steel.
NOTES
1. Install Sign Lighting Luminaires (and Brackets) only when required in the Contract.
2. All nuts, bolts, washers, and other hardware shall be stainless steel per Standard Specification Section 9-28.11, except as noted. Galvanize all non-stainless steel parts.
3. See Standard Plan G-90.20 (Monotube), or G-90.30 (Truss) for additional Overhead Sign Lighting details.

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES
1. U-Bolts, Washers and Nuts shall be stainless steel, except as noted.
4. For VMS mounting, the contractor may substitute W6 x 12 Steel or W6 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.
7. For all sign lighting bracing details not shown, See Standard Plan G-90.11.
NOTES

1. Sign Lighting Luminaire shall include a 3/4" (in) threaded side entry, a gasketed front entry, a door prop, and 4 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.

3. For all sign lighting bracing details not shown, see Standard Plan G-90.11.
**MATERIAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE</td>
<td>ASTM A 36 OR ASTM A 53</td>
</tr>
<tr>
<td></td>
<td>GRADE B, TYPE E OR S,</td>
</tr>
<tr>
<td></td>
<td>OR ASTM A 500 GRADE B</td>
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<tr>
<td>PLATES AND SHAPES</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 500 GRADE B</td>
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<tr>
<td>GALVANIZING FOR PIPE</td>
<td>AASHTO M 111</td>
</tr>
<tr>
<td>PLATES AND SHAPES</td>
<td></td>
</tr>
<tr>
<td>HIGHER STRENGTH BOLTS</td>
<td>STD SPEC. 9-06.9(2)</td>
</tr>
<tr>
<td>MOUNTING BEAM BOLTS</td>
<td></td>
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<tr>
<td>ALL OTHER BOLTS</td>
<td>STD SPEC. 9-06.9(1)</td>
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<tr>
<td>FASTENERS,</td>
<td>AASHTO M 232</td>
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<tr>
<td>GALVANIZING</td>
<td></td>
</tr>
<tr>
<td>STEEL GRATING</td>
<td>ASTM A 36</td>
</tr>
</tbody>
</table>

**NOTES**

1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE SIGN BRIDGE, SEE STANDARD PLAN G-95.20.
3. FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE SIGN BRIDGE, SEE STANDARD PLAN G-95.30.
4. LOCATION OF RAILING SPLICES TO BE DETERMINED BY FABRICATOR. SEE "RAILING SPLICE DETAIL."
GRATING FASTENER
(TYP.) SEE DETAIL

SPAN (DIRECTION OF BEARING BARS)

PANEL SPAN (TYP.)

PLAN
STEEL GRATING DETAIL
(RAILING NOT SHOWN FOR CLARITY)

1/4" TOE PLATE

EVERY FOURTH BEARING BAR AND NEAR ALL TOE PLATE CORNERS

GRATING FASTENER SEE DETAIL

CROSS BAR (TYP.)

W4x13 (TYP.)

SECTION F

1/4" TOE PLATE

1-1/8" MAX.

1" MIN.

3/16" MIN.

3/16" MAX.

W4x13 (TYP.)

BEARING BARS

3/16" CLEARANCE BETWEEN ENDS OF CROSS BARS

SECTION G

1/4" TOE PLATE

1-1/8" MAX.

1" MIN.

3/16" MIN.

3/16" MAX.

W4x13 (TYP.)

BEARING BARS

INSTALLED AND ARRANGED THE GRATING FASTENERS ACCORDING TO THE GRATING MANUFACTURERS RECOMMENDATIONS.

MAINTENANCE WALKWAY FOR SIGN BRIDGES
STANDARD PLAN G-95.10-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

5/16/11

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
**Maintenance Walkway Installed on Monotube Sign Bridge**

(Walkways may be used with other layouts than that shown above)

**Notes**

2. For maintenance walkway, railing, grating, and toe plate details, see standard plan G-96-18.
3. Use two lanyards through intermediate wire rope support.
4. 3/8" dia. wire rope with 14 kips min. breaking strength. The wire rope shall be installed with 450 lbs. of tension, and with 6" of take up adjustment available in the turnbuckle.
5. Handrail fit-up with VMS door opening is the responsibility of the contractor.

---

**Material Specifications**

- **Pipe:**
  - ASTM A 36 or ASTM A 53 Grade B, Type E or E, or ASTM A 500 Grade B

- **Plates and Shapes:**
  - ASTM A 36

- **Structural Tubing:**
  - ASTM A 500 Grade B

- **Galvanizing for Pipe Plates and Shapes:**
  - ASTM M 111

- **High Strength Bolts, Nuts, & Washers (incl. Mounting Beam Bolts):**
  - Std Spec. 9-05.5(3)

- **All Other Bolts:**
  - Std Spec. 9-06.3(1)

- **Fastener Galvanizing:**
  - ASTM M 232

- **Steel Grating:**
  - ASTM A 36

- **Wire Rope:**
  - ASTM A 603 W Class A Weight Zinc Coated Wires Throughout

---

**Allowable Alternate Material:** Federal Standard RR-W-440P Type 6 Class 3 Galvanized
MAINTENANCE WALKWAY
PARTIAL PLAN

ATTACHMENT BRACKET DETAIL

MONOTUBE SIGN BRIDGE
V4+13 MOUNTING BEAM (TYP.)

WALKWAY ENTRANCE
(INSIDE OPENING SWING GATE)

TOE PLATE
(ALL-AROUND)

* = SEE NOTE 6, LOCATED ON SHEET 1

MONOTUBE

W4+13 MOUNTING BEAM

VMS HOUSING

FACE OF VMS

ENTRY PANEL

TOP OF TOE PLATE

TOP OF GRATING

ATTACHMENT BRACKET SEE DETAIL

W4+13 MOUNTING BEAM

VMS HOUSING

ATTACHMENT BRACKET

NOTE 5, LOCATED ON SHEET 1

= SEE NOTE 6, LOCATED ON SHEET 1

MAINTENANCE WALKWAY
MOUNTING FOR
MONOTUBE SIGN BRIDGE
STANDARD PLAN G-95.20-02

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

[Diagram showing maintenance walkway details with annotations and dimensions]
Mulch & compost to specified depth - feather to base of plant

Uppermost root shall be no more than 1" below soil surface

Mound soil to form watering well at outer edge of planting hole:

3 times root spread

The root spread

12" diam.

See note

Existing soil

Break up rootball of container plants, prune circling roots

Equally space bulbs - depth varies by species

Plan

Slope planting detail (includes all plants on slopes)

Plant rhizome with crown / growth points at finished grade

Finished grade

Existing soil

Tuber or rhizome 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

Uppermost root shall be no more than 1" below soil surface

Existing soil

Spread roots out

Planting hole 3 times the root spread

Existing soil

Break up rootball of container plants, including plugs, prune circling roots

NOTE
Backfill with soil removed from hole - See planting area soil preparation detail or Special Provisions.

Street tree planting and staking detail

(Applies to container, ball and burlapped, (B&B) deciduous and conifers)

Uppermost root shall be no more than 1" below soil surface

Mound soil to form watering well at outer edge of planting hole

Existing soil

Using 36" 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

Existing soil

Spread roots out

Break up rootball of container plants, including plugs, prune circling roots

See note

Notes:

- Backfill with soil removed from hole
- See planting area soil preparation detail or Special Provisions.
- Existing soil

Slope planting detail (includes all plants on slopes)

Plant rhizome with crown / growth points at finished grade

Finished grade

Existing soil

Tuber or rhizome 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

Uppermost root shall be no more than 1" below soil surface

Existing soil

Spread roots out

Planting hole 3 times the root spread

Existing soil

Break up rootball of container plants, including plugs, prune circling roots

See note

Notes:

- Backfill with soil removed from hole
- See planting area soil preparation detail or Special Provisions.
- Existing soil

Slope planting detail (includes all plants on slopes)

Plant rhizome with crown / growth points at finished grade

Finished grade

Existing soil

Tuber or rhizome 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

Uppermost root shall be no more than 1" below soil surface

Existing soil

Spread roots out

Planting hole 3 times the root spread

Existing soil

Break up rootball of container plants, including plugs, prune circling roots

See note

Notes:

- Backfill with soil removed from hole
- See planting area soil preparation detail or Special Provisions.
- Existing soil
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.
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.
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
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 1/8" Muffler Clamps spaced 4" apart. Field drill 1/16" 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.
MAILBOX - SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
FOR DIMENSIONS

3/16" = 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
~ 4 SETS MIN.

ADDITIONAL WASHERS
~ AS REQUIRED TO
FILL GAP (TYP.)

SNOW GUARD ~ WHEN REQUIRED
~ SEE DETAIL, SHEET 2

PLATFORM ~ SEE NOTE 3

ASSEMBLY DETAIL

MAILBOX ~ SIZE 1, 1A, OR 2
(SIZE 1A SHOWN) - SEE TABLE,
STANDARD PLAN H-70.10, SHEET 2,
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.
1. Post shall have sufficient strength and durability to support the fence through the life of the project.
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.

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.

SILTED FENCE WITH BACKUP SUPPORT
STANDARD PLAN 1-30.10-02

SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

SEE NOTE 1

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

CERTIFICATE NO. 000860

SANDRA L. SALSBERY
MARCH 9, 2018

PACIFIC PACIFIC

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
BACKFILLED & COMPACTED NATIVE SOIL

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)

FASTEN GEOTEXTILE TO POST EVERY 6” (IN) O.C.

GEOTEXTILE

FLOW

TYPICAL SILT FENCE
WITHOUT BACKUP SUPPORT
ISOMETRIC
(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(16)

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.

SILT FENCE

STANDARD PLAN 1-30.15-02

SPLICE DETAIL
(WOOD 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)

SEE NOTE 1

INSTALL BACKUP SUPPORT FOR THE GEOTEXTILE
- SEE STANDARD SPECIFICATION SECTION 8.01.3(9)A

GEOTEXTILE FOR HIGH VISIBILITY SILT FENCE
COLOR - ORANGE - SEE STANDARD SPECIFICATION SECTION 9.33.2 (1), TABLE 6

BACKUP SUPPORT (TYPICAL)

HIGH VISIBILITY SILT FENCE
WITH BACKUP SUPPORT
STANDARD PLAN 1-30.16-00

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)
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.

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.

**NOTES**

**HIGH VISIBILITY SILT FENCE**

**STANDARD PLAN I-30.17-00**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**STATE OF WASHINGTON**

**LICENSED LANDSCAPE ARCHITECT**

**CERTIFICATE NO. 000860**

**March 11, 2013**

**SPICE DETAIL**

(WOOD POSTS SHOWN)

**GEOTEXTILE FOR HIGH VISIBILITY SILT FENCE**

COLOR - ORANGE - SEE STANDARD SPECIFICATION SECTION 9-33.2(1), TABLE 6

**POST - WOOD OR STEEL (TYPICAL)**

**FASTEN GEOTEXTILE TO POST EVERY 6" (IN) O.C.**

**FABRIC (GEOTEXTILE) (TYPICAL)**

**SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP JOINING SECTIONS SHALL NOT BE PLACED IN LOW SPOTS OR IN SUMP LOCATIONS.**

**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.
PLACE SAND BAGS AS REQUIRED AROUND CULVERT TO PROVIDE SUPPORT FOR SILT FENCE.

SILT FENCE - SEE STD. PLAN 1-30.10

CULVERT, BOX CULVERT, OR PIPE ARCH - END TREATMENT VARIES

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

SILT FENCE DESIGN

COMPOST BERM DESIGN
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(15).

7. Refer to Standard Specification 8-01.3(16) for removal.
ALLOWABLE ALTERNATIVE TIE-DOWN METHOD

ANGLE TERMINAL END UPHILL 24" to 45" TO PREVENT FLOW AROUND SOCK (TYP.)

CONTOUR LINE (TYP.)

SPACING VARY (TYP.)

BIODEGRADABLE
EROSION CONTROL BLANKET - SEE DETAIL

COMPOST SOCK (TYP.) - SEE DETAIL

PROTECTED AREA

DISTURBED AREA

SHEET 1 OF 1 SHEET

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

APPROVED FOR PUBLICATION

COMPOST SOCK

STANDARD PLAN 1-30.40-01

ISOMETRIC VIEW

CATCH BASIN INSTALLATION

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 1-60.10.
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(16).
8. Refer to Standard Specification 8-01.3(16) for removal.
NOTES
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).

**PLAN VIEW**

- Place Coir logs perpendicular to the slope along contour lines.
- Ends shall angle uphill to prevent flow around the Coir log.
- Top of lower Coir log in line with bottom of Coir log above (typ).

**LAND / UPHILL**

- Coir log 2" x 2" x 36" min. untreated wooden stake (typical)
- 1/4" diameter natural fiber rope
- 12" minimum overlap

**WATER / DOWNHILL**

- Soil or wood plug to prevent water from moving between logs.
- Minimum planting distance dependent upon slope.

**PLUG GAPS BETWEEN LOGS WITH EXCAVATED MATERIAL**

- Contour line (typ)
- Coir log (typ)

**ELEVATION VIEW**

- Shoreline - if applicable (see contract plans)
- Ordinary high water mark

**EXCAVATED MATERIAL COMPACTED AND SPREAD EVENLY ON UPHILL SLOPE - COMPACT AGAINST THE UPHILL SIDE OF LOG TO FORM WATER-TIGHT SEAL**

**TOP OF LOGS FLUSH WITH TOP OF STAKES**

- Minimum clearance of 12" at the bottom of the slope.

**SPECIFICATION**

- Standard Specification 9-14.5(7)
- Standard Specification 8-01.3(15)

**STATE OF WASHINGTON**

- REGISTERED LANDSCAPE ARCHITECT
- LANDSCAPE ARCHITECT
- LANDSCAPE ARCHITECT
- LANDSCAPE ARCHITECT
- LANDSCAPE ARCHITECT

**EFFECTIVE**

- AUGUST 1, 2016 TO August 6, 2017
**GEOTEXTILE FOR TEMPORARY SILT FENCE**

**SEE STD. SPEC. 9-33.2(1), TABLE 6**

**COMPACTED NATIVE SOIL**

**BURY GEOTEXTILE IN TRENCH**

**INLET**

**PLAN VIEW**

(CROSS BRACES NOT SHOWN)

**SECTION A**

**fasten cross braces together with screws, nails, nylon ties or wire**

**ATTACH WOOD OR METAL CROSS BRACES TO STABILIZE WOOD**

**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 seamless joint.

3. Ensure that ponding height of water does not cause flooding on adjacent roadways or private property.

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

1. 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.

2. Perform maintenance in accordance with Standard Specification 8-01.3(16).

3. 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).

4. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.

5. 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.
**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. 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 9-14.52).
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.

**EXTEND BLANKET FAR ENOUGH OVER CREST OF SLOPE TO EFFECTIVELY PREVENT UNDERCUTTING AND TO PROVIDE SECURE ANCHORING (TYP.)**

**FASTENER (TYP.) 18" MAX. (TYP.) 36" MAX. (TYP.)**

**SHINGLE SPLICE - SECTION A**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
Tamped native soil from pile anticipated water line

Shingle splice blanket must extend 36" above the anticipated water elevation (typ.)

Channel installation - section

Erosion control blanket

Staple - 18" O.C. max.

Initial anchor - section

Check slot - section

Shingle splice at end of roll

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 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.

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 8-01.2(3) and 9-14.5(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.

Biodegradable erosion control blanket placement for ditches
Standard Plan I-60.20-01

State of Washington
Department of Transportation

Effective: August 1, 2016 to August 6, 2017
TEMPORARY SEDIMENT TRAP

NOTE
PLACE GEOTEXTILE UNDER THE SPALLWAY AND SIDE SLOPES. PROVIDE A CONTINUOUS LAYER BETWEEN THE GRAVEL/ROCK AND THE NATIVE EARTHEN MATERIAL.

LONGITUDINAL SECTION

SECTION A

PARTIAL PLAN VIEW OF BERM
SHOWN LARGER FOR CLARITY

GROUND LINE

OUTFLOW CHANNEL IS CONSTRUCTED BY EXCAVATION

1' (FT) DEPTH OVERFLOW

SEDAENT TRAP BOTTOM

1' (FT) DEPTH OF 3/4" - 1 1/2"
COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE - SEE STANDARD SPECIFICATION SECTION 9-33.14(I)

PROVIDE GEOTEXTILE FOR SEPARATION - SEE STANDARD SPECIFICATION SECTION 9-33.14(D)

QUARRY SPALLS = 1' (FT) DEPTH

COMPACTED NATIVE MATERIAL CONSTRUCTED BY EXCAVATION OR EMBANKMENT

0' - 0' MIN

1

2

OUTFLOW

1

2

3

4

5

6

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10

11

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**NOTES:**

1. 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.

2. The Contractor shall install the conduits in the locations shown. Conduits shall extend 2” (in) min. above the coupling. The grounded end bushing on GR5 conduit and the end bushing on PVC conduit shall extend 3” (in) max. above the coupling. The conduit containing unused utility conductors shall extend into the utility chase.

3. The ground rods, drain tiles, ococistitl, conduits, and #4 rebar (90° with 30° (in) logo), may be omitted if no transformer or service cabinet is to be installed.

4. The cabinets shall be attached to the foundation with 4 each: 1/2” (in) × 10” (in) × 2” (in) × 4” (in) anchor bolts (see Detail on Sheet 4 of 6). Washers, and nuts conforming to Standard Specification 906.05.1 and hot-dip galvanized after fabrication in accordance with AASHO M 232. Locate anchor bolts per cabinet manufacturer. Stainless steel epoxy anchors may be used as an alternative, and shall be 1/2” (in) diameter × 9” (in), or 3/8” (in) diameter × 8” (in). All threaded rod (conforming to ASTM F593), washers (conforming to ASTM A240), and nuts (conforming to ASTM F594), shall be Type 304 stainless steel bolts. Bolts shall extend 1/2” (in) min. to 2” (in) max. above the concrete pad, prior to placing.

5. All reinforcing steel shall be embedded 2” (in) below surface of concrete.

6. Place a 1/2” (in) bead of silicone between cabinets and foundation.

7. Two ground rods are required for foundations with a service cabinet or transformer cabinet. See Standard Plan J-60.05 for details.

8. Concrete shall be class 3000. See Standard Specification 8-20.34.

9. Verify dead front locations from manufacturer prior to placing conduit in foundation.

10. Foundations installed in, or adjacent to, sidewalks shall be constructed with the top flush with the sidewalk surface and grade, not including concrete surrounding other cabinets. Omit chombers where foundation abuts sidewalk.

11. 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 Control 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 riser shall be adjusted to serve environmental needs. Type D Service cabinet shall have no riser. NEMA P44, Type 333SD, and Type B Modified shall have a 9” (in) riser. All other cabinets shall have a 3 1/2” (in) riser. See Contract for alternate height. Adjust length of conduit and rebar accordingly.

14. Use (1) #4 hoop for a 3 1/2” (in) cabinet footing and (2) #4 hoops for a 9” (in) cabinet footing.

15. The Police Panel location is set by industry standards on all Controller Cabinets.

16. See Standard Plan J-10.20 for additional Foundation Construction and Conduit Routing for Type B Modified Service Cabinet with Controller Cabinet.

17. Verify pad size and location with Project Engineer.

18. Field bend #4 rebar around the Generator Anti-Theft Tie-Down Unit when required.

19. See Standard Plans J-10.21 and J-10.22 for additional details for Type D and Type E Service Cabinets.

20. As an alternate, #3 rebar spaced at 5” - 9” O.C. longitudinally and transversely may be used.

---

**TABLE**

<table>
<thead>
<tr>
<th>CABINET TYPE</th>
<th>CONTROLLER OR CABINET BASE</th>
<th>SIZE W × D (IN)</th>
<th>CAPACITY CONDUCTOR DIA. (IN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 332</td>
<td>24” × 30”</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>TYPE 333D</td>
<td>48.5” × 30”</td>
<td>24”</td>
<td></td>
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<tr>
<td>NEMA P44</td>
<td>44” × 26”</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>TYPE 333SD</td>
<td>44” × 26”</td>
<td>48”</td>
<td></td>
</tr>
<tr>
<td>TYPE 334</td>
<td>24” × 30”</td>
<td>12</td>
<td></td>
</tr>
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</table>

**TRANSFORMER**

<table>
<thead>
<tr>
<th>SIZE W × D (IN)</th>
<th>TRANSFORMER SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 TO 12.5 KVA</td>
<td>24” × 20” × 12”</td>
</tr>
<tr>
<td>12.6 TO 35.0 KVA</td>
<td>32” × 30” × 15”</td>
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</table>

**UNINTERRUPTABLE POWER SUPPLY**

<table>
<thead>
<tr>
<th>SIZE W × D (IN)</th>
<th>TRANSFORMER SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>32” × 30”</td>
<td>12”</td>
</tr>
</tbody>
</table>

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**CABINET ORIENTATION**

**CONDUIT LAYOUT AND FOUNDATION DETAIL**

**STANDARD PLAN J-10.10-0:**

**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017

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**NOTE:**

- Only one controller/transformer can be used in each location shown.
- Conduit placement location shown.
- Conduit size shown.
- Conduit orientation shown.
- All conduits shall have a 2” (in) minimum clearance between ground rods and 8” (in) from foundation edge as detailed on Standard Plan J-60.05.
- All PVC conduits penetrating the cabinet shall be terminated with end bell bushings.
- All conduits shall be terminated with end bell bushings shall not be glued to the coupling.
- 4” (in) diam. × 1/2” (in) deep sump. Slope foundation within cabinet footprint toward sump. Drainpipe shall be sized for cabinet, polyethylene or copper tubing.
- The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2” (in) or 9” (in) cabinet footing.
- Cabinet power supply conduit.
- Conduits for service grounding electrodes.
- When detailed in Typical Foundation Plan is greater than 0’ (ft), this conduit end conductor shall be deleted.

---

**CONSTRUCTION NOTES**

- Drive ground before placing concrete. Move rod(s) and drain tiles with cover(s) as required to achieve full ground penetration. Maintain a 6’ (ft) minimum clearance between ground rods and 8” (in) from foundation edge as detailed on Standard Plan J-60.05.
- All PVC conduits penetrating all cabinets shall be terminated with grounding end bushing and bonded to the cabinet grounding bus. All PVC conduits penetrating all cabinets shall be terminated with end bell bushings.
- Install conduits on all conduits. Place coupling tops flush with top of concrete. If PVC conduits are specified, the conduit stub and end bell bushing shall not be glued to the coupling.
- 4” (in) diam. × 1/2” (in) deep sump. Slope foundation within cabinet footprint toward sump. Drainpipe shall be sized for cabinet, polyethylene or copper tubing.
- The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2” (in) or 9” (in) cabinet footing.
- Cabinet power supply conduit.
- Conduits for service grounding electrodes.
- When detailed in Typical Foundation Plan is greater than 0’ (ft), this conduit end conductor shall be deleted.
CONTROLLER CABINET FOUNDATION NOTES

1. Slope conduit reserve area floor 1/4" (in) per 1' (ft) to the sump in the center.
2. All other dimensions shall be approved by the Engineer.
3. Provide 2" (in) clearance between conduit and edge of foundation well for cable slack.
4. For the rest of the foundation, see Standard Plan J-10.20 for details.
NOTES
1. Metering arrangements may vary with different serving utilities. The Contractor shall verify the requirements of the utility prior to installing the service equipment.
2. All service pole conduits shall be secured to the pole with two-hole conduit straps spaced at 5' (1) maximum centers. See Standard Plans J-60.13 and J-60.14 for steel channel support and mounting details. Where required by the Utility, an alternative-use hot-dip galvanized standoff bracket may be used. See Standard Plan J-10.16 for ALTERNATE STANDOFF BRACKET DETAIL.
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 meter socket in a separate rain-tight enclosure.
5. See Standard Plan J-60.05 for grounding details.
6. See Breaker Schedule in Contract for breaker and contactor sizes.
10. Hinges shall have stainless steel or brass pins.
11. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.
13. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:
   - Key Numbers 2, 3, 4, 6, 7, 8, and 9.
   - Key Number 4 name plate shall read as follows: "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF - AUTOMATIC."
   - See service cabinet detail.
14. Metering arrangements vary with serving utilities. The Contractor shall verify the serving utility's requirements prior to fabrication and installation of the service equipment.
15. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
16. All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
17. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.
18. 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 polyethylene wire marking sleeves shall be used.
19. All nuts, bolts, screws, and washers used for mounting the photoelectric control enclosure, conduit body covers, and junction box cover shall be ASTM F693 or A163 Type 304 or Type 316 stainless steel.
20. A 1% tolerance is allowed for all dimensions.
21. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.
22. Install conduit couplings on all conduits.
23. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or soder in place. See Standard Plan J-10.20 for alternate door hinge details.
24. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded metal mesh with welded seams and mounting flanges and shall be hot-dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" (in) x 5/8" (in) expanded metal mesh may be used as an alternative material. See Standard Plan J-10.20 for enclosure mounting details.
25. See Contract for Breaker Schedule.
OTES (200 AMP TYPE 120/240 1e SERVICE CABINET)


Hinges shall have stainless steel or brass pins.

Cabinets shall be rated NEMA 3R and shall include two rain-tight vents.

Metering equipment door shall be pad-lockable. Each door shall be gasketed. Install Best CX Construction Core on right side door. See Door Hinge Detail.

The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:

Key Numbers 2, 3, 4, 6, 7, 8, 9, & 16

Key Number 4 name plate shall read: "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF-AUTOMATIC." See Service Cabinet Detail.

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" (in) shown in the Left Side - Safety Socket Box Mounting Detail. The Contractor shall verify the serving Utility's requirements prior to fabrication and installation of the service equipment.

Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.

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.

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.

All nuts, bolts, and washers used for mounting the photocell enclosure shall be stainless steel.

A 1% tolerance is allowed for all dimensions.

Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dipped galvanized steel or stainless steel.

The meter base portion of this service was designed to meet metering portion of EUSERC 309 requirements.

When using alternate door hinge:

Remove hinge pin prior to welding hinge to cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with brass pin and solder in place.

Verify the service utility stand-off dimension. Adjust the removable panel to the measurement provided by the Utility Company. After adjustment, cut off all-thread bolts so that no less than two and no more than three full threads extend past the face of the nuts.

As an alternate to the bolted or field welded strut mount supports, 1 5/8" (in) x 3 1/4" (in) 12-gage continuous slotted steel channel or factory welded 1 5/8" (in) x 1 5/8" (in) 12-gage back to back continuous slotted steel channel may be used. Three pairs required.

DRAWN BY: COLBY FLETCHER
POST MOUNTED SERVICE CABINET WITHIN RIGHT-OF-WAY FENCE
FOR CONDUITS NOT SHOWN, DRAIN TILE FOR GROUNDING, DRAIN TUBES, REINFORCING STEEL, ETC. Omitted for Clarity, See Sheet 4 for Additional Details.

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

1. Metering Arrangements vary with different servicing utilities. The utility may require meter base mounting in the enclosure, on the side, or on the base 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 utility’s 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.

6. Metering equipment doors shall be padlockable. 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 lift 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.

7. 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, 8, 9, 10, 21 and 24. Key number 4 name plate shall read: "Photocell Bypass Test On" and "Photocell Test Off/Automatic." See Service Cabinet detail.

8. The dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

9. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.

10. 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.

11. 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.

12. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.

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 Euseco Drawing 309 requirements.

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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. 3/8" (IN) GALVANIZED THIMBLE EYE BOLT (SINGLE OR DOUBLE) WITH WASHERS AND NUTS OR EYENU
6. BONDING JUMPER
7. POLE AND BRACKET CABLE
8. EQUIPMENT GROUNDING CONDUCTOR – SEE STANDARD PLAN J-60.05
FROM GROUND LINE TO 17' (FT) ABOVE GROUND, ENCLOSE EQUIPMENT GROUNDING CONDUCTOR IN GALVANIZED STEEL, CONDUIT, CODE SIZED – ABOVE 17' (FT) FROM GROUND, STAPLE EQUIPMENT GROUNDING CONDUCTOR TO POLE – CONNECT TO SUPPLEMENTAL GROUND, PER STANDARD PLAN J-40.05
9. SERVICE HEDGE CLAMP
10. ACSR TRIPLEX OR FOURPLEX CONDUCTORS – SEE CONTRACT
11. CABLE JUAR SPILT BOLT CONNECTOR
12. MESSANGER CABLE
13. INSULATING TAPE FOR WATERPROOF CONNECTION
14. FUSED QUICK DISCONNECT, PER STANDARD SPECIFICATION 9-29.7(2) – USE 30 AMP FUSES FOR HIGH MAST SUPPORTS
15. WEATHERHEAD – SIZE AS REQUIRED
16. STEEL CONDUIT – STRAPS SPACED MAXIMUM 3' (FT) APART AND NEAR ALL CONDUIT ENDS
17. 8" (IN) X 6" (IN) X 6" (IN) NEMA 3R JUNCTION BOX WITH RAIN-TIGHT HUBS AND REMOVABLE COVER
18. GROUNDING LUG
19. 12-POLE TERMINAL BLOCK
20. DIRECT BURIAL CONDUCTORS OR GALVANIZED STEEL OR PVC CONDUCTS WITH CONDUCTORS – SEE CONTRACT
21. GROUNDING END BUSHING
22. SUPPLEMENTAL GROUND – SEE STANDARD PLAN J-60.05
23. CLASS 5 TIMBER POLE – LENGTH SUFFICIENT FOR MOUNTING HEIGHT AND BURIAL DEPTH
24. CLASS 2 TIMBER POLE – LENGTH SUFFICIENT FOR MOUNTING HEIGHT AND BURIAL DEPTH
25. 14" (IN) X 10" (IN) PLATE COLLAR BENT TO FIT POLE DIAMETER (8" (IN) - 10" (IN))
26. 3/8" (IN) X 4" (IN) MACHINE BOLTS (FOUR REQUIRED) WITH WASHERS AND NUTS
27. 1/2" (IN) LAG BOLTS ( six REQUIRED) – DRILL 9/16" (IN) HOLE IN PLATE
28. 2" (IN) PIPE
29. 3/4" (IN) WIRE HOLE 2" (IN) FROM GUSSET PLATE, SMOOTH HOLE EDGES
30. NONMETALLIC CONDUIT WITH 1" (IN) STRAPS SPACED MAXIMUM 6' (FT) APART AND NEAR ALL CONDUIT ENDS
31. DISTANCE VARIES, 35' (FT) MIN. TO 50' (FT) MAX. DEPENDING ON LINE CLEARANCE REQUIREMENTS
32. 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.

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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.


3. Secure conductor in adjacent Junction Box per detail in Standard Plan J-28.70

4. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.

5. Mounting distances vary between manufacturers. See manufacturer's recommendations for mounting information.

6. 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-20.15-0

NOTE: 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. See Standard Plan J-20.26 for Accessible Pedestrian Pushbutton details.

Secure conductor in adjacent Junction Box per detail in Standard Plan J-28.70.

Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.

Mounting distances vary between manufacturers. See manufacturer's recommendations for mounting information.

Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
1/4" WEEP HOLE
THREE (3) SEE NOTE 3
FOR SIGNAL HEAD MOUNTING
DETAILS; SEE STANDARD
PLAN J-20.16
1/4" WEEP HOLE
SLIPFITTER-OFFSET TOP MOUNT,
PLACE OFFSET TO FRONT OF POLE,
DRILL TO SEAT SET SCREWS
IMSA 20-1 SC #14 CABLE
BRONZE COLLAR
AND TERMINAL COMPARTMENT
IMSA 20-1 7C #14 CABLE
FROM CONTROLLER
ACCESSIBLE PEDESTRIAN
PUSHBUTTON DETAILS—SEE STANDARD
PLAN J-20.26
PEDESTRIAN SIGNAL WIRING DETAIL
(TYPE D MOUNTING SHOWN)
IMSA 20-1 7C OR SC #14 CABLE
TO SIGNAL DISPLAY (SEE CONTRACT
PLANS FOR WIRE SIZE AND QUANTITIES)
2C (SH) CONDUCTOR—TO PUSHBUTTON
(SEE CONTRACT PLANS FOR QUANTITIES)
1/4" DIAMETER X 1" LONG STAINLESS STEEL STUD
GROUNDING CONNECTION
EQUIPMENT GROUNDING CONDUCTOR—SEE NOTE 
STAINLESS STEEL WASHERS (TYP.)
FULL CIRCLE CRIMP-ON CONNECTOR (TYP.)
GROUNDED CONNECTION DETAIL
CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS
(SHOWN EXPLODED FOR CLARITY)
POLE WALL
STAINLESS STEEL NUT
SUPPLEMENTAL GROUNDING CONDUCTOR—SEE NOTE 4
EQUIPMENT GROUNDING CONDUCTOR—SEE NOTE 5
GROUNDING CONNECTION
HAND HOLE
EQUIPMENT GROUNDING CONDUCTOR—SEE NOTE 5
LEVELING NUT (TYP.)
3/8" DRAIN TUBE
STEEL REINFORCING BAR (TYP.)
CONDUIT COUPLING—INSTALL
FLUSH WITH TOP OF FOUNDATION
(DO NOT GROUT PVC STUBOUT)
ELECTRICAL CONDUIT—SEE CONTRACT PLAN FOR DIAMETER
FOUNDATION WIRING DETAIL
NOTES
   and Slip Base details.
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 grounding 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).

PEDESTRIAN SIGNAL STANDARD (TYPE PS)
ELECTRICAL DETAIL
STANDARD PLAN J-20.20-02

<table>
<thead>
<tr>
<th>5C PEDESTRIAN HEAD TERMINATIONS</th>
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<tr>
<td>TERMINAL NUMBER</td>
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<tr>
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<table>
<thead>
<tr>
<th>7C PEDESTRIAN HEAD TERMINATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERMINAL NUMBER</td>
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<td>5</td>
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</table>

ASSOCIATED PHASE NUMBER

S-15-2015

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Approved for Publication 9/26/17

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
METAL POLE INSTALLATION
PPB-M

KEY
1. FACE PLATE
2. 1/4-20 × 3/8" LONG STAINLESS STEEL SCREW
3. 1/4-20 STAINLESS STEEL SCREWS
4. PUSH-BUTTON FRAME ADAPTER
5. 1/4-20 STAINLESS STEEL BOLT WITH WASHER AND LOCK WASHER
6. PUSH-BUTTON STATION
7. DRILL AND TAP SHAFT FOR 1/4" DIAM. BOLT
8. DRILL AND TAP SHAFT FOR 5/8" WIRE GUIDE HOLE - ADD INSULINER

PEDESTRIAN PUSHBUTTON INSTRUCTIONAL SIGN

ATTACH SIGN TO ADAPTER - 1/4-20 × 3/8" STAINLESS STEEL SCREWS (TYP.)
ATTACH ADAPTER TO PUSH-BUTTON STATION - 1/8" DIAM. COUNTERSUNK HOLE, 3/8" LONG FLAT HEAD SCREWS (TYP.)

PEDESTRIAN PUSHBUTTON FRAME ADAPTER

ATTACH SIGN TO ADAPTER - 1/4-20 × 3/8" STAINLESS STEEL SCREWS (TYP.)
WOOD POLE INSTALLATION
ALTERNATIVE 1
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

INSTALL FITTING WITH NYLON WASHER ON OUTSIDE OF HOUSING
- SEAL WITH SILICONE AFTER UNIT IS FULLY ASSEMBLED

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
WOOD POLE INSTALLATION
ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

TEMPORARY TIMBER POLE

KEY
① FACE PLATE
② 1/4-20 x 3/8" LONG STAINLESS STEEL SCREW
③ 1/4-20 STAINLESS STEEL SCREWS
④ PUSHBUTTON FRAME ADAPTER
⑤ LAG BOLT WITH WASHER
⑥ PUSHBUTTON STATION
⑦ CONDUIT DIAMETER + 1/8" HOLE THRU POLE
⑧ CONDUIT
⑨ 3/4" CONDUIT
⑩ LIQUID-TITE FLEX CONDUIT
⑪ ONE PIECE TWO HOLE CLAMP
⑫ LAG BOLT
⑬ INSULINER SLEEVE

PRE-DRILL (3) 1/4" WEEP HOLES IN BOTTOM RADIUS OF CONDUIT
Drip Loop - Ream Holes With Drill Bit To Eliminate Burrs

WOOD POLE INSTALLATION
ALTERNATIVE 3
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER POLE)

WOOD POST
COUNTERBORE = DIAMETER TO FIT CONDUIT

4 x 4 POST
NOTES
1. Clamping bolts shall be tightened to 50 ft-lbs max. torque. After state inspection, burr threads to prevent nut rotation. DO NOT OVERTIGHTEN.
2. The final height of the Anchor Bolts shall be below the top of the slip plate assembly to ensure proper function of the slip base.
3. 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 pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper only)
4. Junction box serving the Standard shall preferably be located 5'-0" (10'-0" Max) from the Standard.
5. Provide cable tie at wiring entering the junction box (for slip base installations only) – See Detail A, Standard Plan J-28.70.
6. Keeper Plate shall not extend beyond the edges of the pole base plate.

2. Steel shaft shall be tapered either round or dodecagon (12 sided), 11 gauge, 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°, 160°, 195°, 225°, 260°, 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.
FLAShING BEACON, PLACE BEAD OF SILICONE ON TOP OF SERRATED AREA.

8" POLYCARBONATE - FULL CIRCLE VISOR (SEE NOTE 5)

SLIPFITIER - OFFSET TOP MOUNT PLACE OFFSET TO BACK OF POLE

TOP OF POLE

INP.IE - 1 1/2" DIAM.

HEX LOCKNUT = 1 1/2" DIAM.

REAMED TEE WITH SET SCREW

TOP OF POLE

SERRATED OR FLANGED ELBOW

TAPERED STEEL SHAFT

NEOPRENE GASKET

STEEL WASHER

HEX LOCKNUT = 1 1/2" DIAM.

CONDUIT LOCKNUT = 1 1/2" DIAM.

PLACE BEAD OF SILICONE ON TOP OF SERRATED AREA

FLASHING WARNING BEACON

NEOPRENE GASKET

STEEL WASHER

HEX LOCKNUT = 1 1/2" DIAM.

CONDUIT LOCKNUT = 1 1/2" DIAM.

TAPERED STEEL SHAFT

MOUNTING BRACKET AND STEEL STRAP (TYP.) - SEE STANDARD PLAN G-24.10

SIGN BRACE - SEE STANDARD PLAN G-50.10

SIGN PANEL

A

MATCHLINE

DETAIL A

SINGLE FLASHING BEACON DETAIL.

USE DETAILS BELOW MATCHLINE ON RAMP METER WITH DOUBLE FLASHING BEACON


det ail b

ALTERNATING FLASHING BEACON DETAIL

( SHOWN WITHOUT HINGE DOOR FOR CLARITY)

ALTERNATING FLASHING BEACON

MATCHLINE

SINGLE FLASHING BEACON

TOP OF POLE

CONCRETE FOUNDATION - SEE NOTE 1

TOP OF POLE

FLAShING BEACON

TYPE 1 SIGNAL

STANDARD DETAILS

STANDARD PLAN J-21.16-01

SHEET 1 OF 1 SHEET

Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTES


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

3. 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.

4. Visor shall be 8" Polycarbonate, fully enclosed circle at bottom to reduce glare on sign. Display shall be of appropriate color needed.


6. Junction Box serving the Standard shall preferably be located 5' - 0" (10'-0" Max.) from the Standard.
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 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.

COLOR CODE USE
B POWER
W NEUTRAL
R FLASHER 1
Bu FLASHER 2

INSTALL SIZE REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-30.20 FOR GROUND CONNECTION DETAILS
EQUIPMENT GROUNDING CONDUCTOR LEVELING NUT (TYP.)
STEEL REINFORCING BAR (TYP.)
CONDUIT COUPLING - INSTALL FLASH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

PERSPECTIVE VIEW
FLASHING BEACON TYPE 1
SINGLE FLASH BEACON SHOWN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

SEAL OF THE STATE ENGINEER
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 shall be tapered either round or dodecagon (12-sided), 11-gage, 4 1/2" (in) O.D. at slipfit. Taper shall be 0.14" (in) 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 be located no more than 10'-0" (5'-0" preferred) from the Standard.
7. A backplate shall be installed on the Upper Traffic Signal Head. Install a backplate on the Lower Traffic Signal Head only when required by the contract. Do not install retro-reflective tape on backplates.
10. For Signal Head Mounting Details, see Standard Plan J-75.10.
11. Standard shall use slip base if installed closer than 4' (ft) from the face of guardrail.
12. Treat surrounding pole with galvanizing repair paint meeting the requirements of Standard Specification 9-08.1(2). Apply two coats. Paint shall be dry before applying second coat.
13. Hand hole shall face toward roadway for Elbow Mount Barrier installations. For all other installations, hand hole shall face the opposite direction from the Upper Traffic Signal Head. Hand hole face shall remain accessible after pole and sign installation is complete.

RAMP METER SIGNAL STANDARD
SLIP BASE SHOWN
### Foundation Depth "D" Table

**Alternate # 1 Drilled Shaft-Type Construction**

<table>
<thead>
<tr>
<th>GROUND SLOPE = 3H: 1V OR FLATTER</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUNDATION TYPE</td>
<td>XYZ (FT)</td>
</tr>
<tr>
<td>1000 PSF</td>
<td></td>
</tr>
<tr>
<td>3'-0&quot; ROUND</td>
<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot; SQUARE</td>
<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
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<tr>
<td>4'-0&quot; ROUND</td>
<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
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</tr>
<tr>
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</tr>
<tr>
<td>4'-0&quot; SQUARE</td>
<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
</tr>
<tr>
<td>2500 PSF or GREATER</td>
<td></td>
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<tr>
<td>3'-0&quot; ROUND</td>
<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot; SQUARE</td>
<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
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<tr>
<td>4'-0&quot; SQUARE</td>
<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
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**Alternate # 2 Corrugated Metal Pipe Type Construction**

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<th>GROUND SLOPE = 3H: 1V OR FLATTER</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
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<tr>
<td>FOUNDATION TYPE</td>
<td>XYZ (FT)</td>
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<td>1000 PSF</td>
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<td>3'-0&quot; ROUND</td>
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<td>3'-0&quot; SQUARE</td>
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<td>90'-0&quot; 150'-0&quot; 190'-0&quot; 2300'-0&quot; 2600'-0&quot;</td>
</tr>
</tbody>
</table>

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 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 AASHTO Standard Specifications for Structural Supports for Highway Bridges, 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 62".
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 other 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 through the Engineer for Special Foundation Designs.
5. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.
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.
1. All material and workmanship shall be in accordance with the requirements of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.

2. The analysis and design for Adaptors 1 and 2 have been done in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals - Fifth Edition - Dated 2009, and Interims, using basic wind speed of 90 MPH and 50 years of design life.

3. Adaptors' parameters are based on field data and existing signal standard anchor bolts and bolt circles. Adaptor 1 shall be used for 15' (ft) thru 45' (ft) mast arm signal standards and Adaptor 2 for 46' (ft) thru 65' (ft).

4. Adaptors shall only be used for temporary installation of knocked down signal standards.

5. Materials specifications:
- All structural steel, except as otherwise noted
- Pipes: ASTM A572 GR. 50 OR ASTM A588
- Connecting/clamping bolts: AASHTO M 164 (ASTM A325) GRADE DH
- Nuts: AASHTO M 291 (ASTM A263) GRADE DH
- Washers: AASHTO M 293 (ASTM F436)

6. All bolts, rods, and related hardware shall be galvanized after fabrication per ASTM F2329.

7. Steel surfaces shall be galvanized after fabrication in accordance with AASHTO M 111.

8. Install and secure adaptor to existing support anchor bolts. Then install signal standard on adaptor top plate. Rake to be plumb after all load has been placed.

9. All holes in top and bottom plates of Adaptor 1 and Adaptor 2 are thru holes. See engraved or stamped text for bolt hole diameter.
ADAPTOR

TOP VIEW

ADAPTOR

SEE NOTE B (TYP.)

2-1/4" (IN) THICK PLATE

14" (IN) DIA. CLEAR OPENING

12" (IN) DIA. X STRONG PIPE - 1/2" (IN) WALL THICKNESS

ADAPTOR BOTTOM - 2-1/4" (IN) THICK PLATE

2" (IN) DIA. CLEAR OPENING

HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT

EXISTING ANCHOR BOLT (TO REMAIN)

TYPICAL SECTION

S - 3/16" (IN) MAX. GAP BEFORE WELDING

125

0 .126 "

1/4 " (IN) X 1 1/2 " (IN) WIDE PIPE - 1/8 " (IN) WALL THICKNESS

BOLT CIRCLE (B.C.) CENTERLINE (TYP.)

TOP OF FOUNDATION

BOLT WITH 2 WASHERS

0.125 "

1/4 " (IN) X 2 " (IN) MIDE CONTINUOUS BACKUP RING (TYP.)

SEAL (TYP.)

12" (IN) DIA.

100% MT (TYP.)

316L BOLT (TYP.)

REPLACE INCORRECT

ADAPTOR 2 BOTTOM PLATE

TOP VIEW

ADAPTOR

1/2 " (IN) WALL THICKNESS

ADAPTOR

TOP VIEW

ADAPTOR

SEE NOTE B (TYP.)
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

FOUNDATION REINFORCEMENT DETAIL
CONCRETE CAST DIRECTLY AGAINST UNDISTURBED EARTH, DRILLED SHAFT

ALTERNATIVE #1
- CONDUIT SIZE AND QUANTITY AS SHOWN IN THE CONTRACT; CAP BOTH ENDS.
- CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE.
- PAPER OR CARDBOARD FORM SHALL NOT STAY IN-PLACE
- SEE NOTE 4

ALTERNATIVE #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" (in) 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 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.

- Shoring or Extra Excavation as required.
- Excavated area shall be backfilled with Controlled-Density Fill (CDF), or with soil in accordance with Standard Specification Section 5-20.3(2) and Compaction Method 1 of Standard Specification Section 2-09.3(1).

TYPE IV AND V STRAIN POLE TRAFFIC SIGN FOUNDATION
STANDARD PLAN J-27.10-0

SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION: Washington, D.C.
Jul 21 2016 6:17 AM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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 place­
ment 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

LIGHT STANDARD
WITH TYPE 1 (DAVIT) MAST ARM
(SLIP BASE SHOWN)

LIGHT STANDARD
WITH TYPE 2 (ELBOW) MAST ARM
(SLIP BASE SHOWN)

STEEL LIGHT STANDARD FOUNDATION
- SEE STANDARD PLAN J-28.30

DATE
Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES
1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer.

TAPER NOTE
End Taper (on approach from opposing traffic):

20' (longitudinal) = use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.

BASIS ON FIELD CONDITIONS, STEEL LIGHT STANDARD PLACEMENT CAN BE ADJUSTED ± 4.0', WHEN APPROVED BY THE PROJECT ENGINEER.

STEEL LIGHT STANDARD PLACEMENT (SLIP BASE)
STANDARD PLAN J-28.22-00
SHEET 1 OF 2 SHEETS

EXPRESS AUGUST 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
**Section View**

**Case A**
- Slopes 3H:1V THRU 2H:1V (MAX.)

**Embankments**

**Case C**
- Fore slopes 4H:1V or flatter

**Ditch Sections**

**Case D**
- Fore slopes steeper than 4H:1V (2H:1V Max.)
**Effect:** August 1, 2016 to August 6, 2017

**MAXIMUM CONCRETE EXPOSURE TABLE (CASE F ONLY)**

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>HEIGHT (SEE NOTE 3)</th>
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<td>1.75H : 1V</td>
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<td>1.50H : 1V</td>
<td>2' - 0&quot;</td>
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<tr>
<td>1.25H : 1V</td>
<td>2' - 4 3/4&quot;</td>
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- **NOTE:**
  3. Values listed in the table were determined using a 3' - 0" diameter foundation. For design parameters between the values listed, exposure requirements may be interpolated between the values provided.
  4. Fill material for Maintenance Pad shall be granular material. Alternately, Crushed Surfacing (Base Course or Top Course) per Standard Specification 9-03.3(3) may be used.

**EMBANKMENTS**

**CASE E**

- **Slopes 2H : 1V or Flatter Behind Traffic Barrier**
- **Maintenance Pad**

- **Perspective View**
- **Section View**

**CASE F**

- **Slopes Steeper Than 2H : 1V Behind Traffic Barrier (Special Design Foundation)**

- **Perspective View**
- **Section View**

**CASE G**

- **Roadside Ditch With Fore Slope Steeper Than 4H : 1V (2H : 1V Max.)**
- **Maintenance Pad**

- **Perspective View**
- **Section View**

**CASE H**

- **Cut Section With Back Slope Steeper Than 3H : 1V (2H : 1V Max.)**

- **Perspective View**
- **Section View**

**STANDARD PLAN J-28.24-0**

**Sheet 1 of 1 Sheet**

**Approved For Publication:**
Washington State Department of Transportation

**Date:**

- E:
- EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

- E:
- EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

- E:
- EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES


STEEL LIGHT STANDARD PLACEMENT
MISCELLANEOUS
STANDARD PLAN J-28.26-01
SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW
CASE I
POSTED SPEED LIMIT LESS THAN 35 MPH

SECTION VIEW
CASE J
POSTED SPEED LIMIT LESS THAN 35 MPH

SECTION VIEW
CASE K
ROADWAYS WITH 10H:1V OR FLATTER SIDE SLOPES

SECTION VIEW
CASE L
PARKING LOTS

EDGE OF TRAVELED WAY
SHOULDER
10' MIN.
SHOULDER
3' MIN.
HAND HOLE
FIXED BASE
VARIATES (1.5' MAX.)
NOT STEEPER THAN 2H:1V
STEEL LIGHT STANDARD FOUNDATION

EDGE OF SHOULDER
FACE OF CURB
10' MIN.
SIDEWALK
HAND HOLE
FIXED BASE
VARIATES - DEPENDS ON JURISDICTION (SEE CONTRACT)
STEEL LIGHT STANDARD FOUNDATION

VARIATES WITH OFFSET DISTANCE
3' MIN.
EDGE OF SHOULDER
HAND HOLE
10' MIN.
10H:1V SLOPE OR FLATTER
SLOPE Rounding
NOT STEEPER THAN 4H:1V
STEEL LIGHT STANDARD FOUNDATION
FILL MATERIAL

2" PAVEMENT

STEEL LIGHT STANDARD FOUNDATION

TYP A: 4'-8"
TYP B: 6'-0"

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
**CONSTRUCTION METHODS**

**METHOD 1**
**NO SUBSURFACE FORM**

This option is used only 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 a paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation. After concrete has cured, remove the paper or cardboard form portion. Construct the embankment widening (if required).

**METHOD 2**
**METAL (SUBSURFACE) FORM REQUIRED**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal form. The corrugated metal form shall not extend more than 5" (in) +/- 1" (in) below any portion of the foundation that will remain exposed upon final grading. 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 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).
**NOTES**

1. 50' (ft) (H) 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-85, C-85.15, and J-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.

4. See Standard Specification Sections 6-03.3(33) and 8-20.3 (4) for the torque requirements for all of the anchor bolt installations. Install 1" (in) diameter clamping bolts in all slip bases to a torque of 95 Foot-Pounds - See Standard Specification Section 8-20.3 (13A). DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.


---

**EXPLODED VIEW**

- 3/8" (IN) I.D. DRAIN TUBE IN GROUT PAD
- 3/4" (IN) LONG STEEL BAR WITH SMOOTH CHAMFERED EDGES
- 1/2" (IN) THICK X 2" (IN) WIDE X 2 3/4" (IN) LONG STEEL BAR
- 1/8" (IN) DIAM. - SIZE TO MATCH ANCHOR BOLT

---

**PLAN VIEW**

- 3/8" (IN) I.D. DRAIN TUBE IN GROUT PAD
- 3" (IN) DIAM. X 3/4" (IN) GROUT WELL (TYP.)
- 2" (IN) DIAM. X 3/4" (IN) GROUT WELL (TYP.)

---

**ELEVATION VIEW**

- LUMINAIRE POLE
- HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT
- POLE BASE PLATE
- ANCHOR/SLIP BASE ASSEMBLY

---

**SECTION A**

- ASSEMBLED ISOMETRIC VIEW SLIP BASE
- LEAVE 6" (IN) HOLLOW IN THE CENTER OF THE GROUT PAD
- TOP OF ANCHOR BOLT 3 7/8" MAX
- LEAVE 6" (IN) HOLLOW IN THE CENTER OF THE GROUT PAD

---

**PLAN VIEW**

- ASSEMBLED ISOMETRIC VIEW SLIP BASE
- LEAVE 6" (IN) HOLLOW IN THE CENTER OF THE GROUT PAD
- TOP OF ANCHOR BOLT 3 7/8" MAX

---

**EXPLODED VIEW**

- ASSEMBLED ISOMETRIC VIEW SLIP BASE

---

**ELEVATION VIEW**

- LUMINAIRE POLE
- HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT
- POLE BASE PLATE
- ANCHOR/SLIP BASE ASSEMBLY

---

**PLAN VIEW**

- 2" (IN) DIAM. X 3/4" (IN) GROUT WELL (TYP.)
- SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30
- CAPPED CONDUIT
- SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30

---

**EXPLODED VIEW**

- LUMINAIRE POLE
- HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT
- POLE BASE PLATE
- ANCHOR/SLIP BASE ASSEMBLY

---

**ELEVATION VIEW**

- LUMINAIRE POLE
- HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT
- POLE BASE PLATE
- ANCHOR/SLIP BASE ASSEMBLY

---

**PLAN VIEW**

- 2" (IN) DIAM. X 3/4" (IN) GROUT WELL (TYP.)
- SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30
- CAPPED CONDUIT
- SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30
**NOTES**

1. 50' (5H) 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 M 164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M 232.


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. For 1" (in) clamping bolts, tighten to 95 ft-lbs. For 1 1/4" (in) clamping bolts, tighten to 104 ft-lbs. DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.
**Construction Notes:**

1. Wire brush existing threads.
2. Apply two coats of galvanizing paint (per Standard Specification 9-08.1(2B)).
3. Tighten bolt by "Turn of Nut" method (per Standard Specification 6-03.3(32)).

**Plate Washer Detail:**

- **A-5**: 1 1/8" 14 1/8" 2-PC. ALUM. CLAMP 40
- **A-3**: 1 3/4" STEEL TRANSFORMER
- **A-2**: 1 1/4" CAST ALUMINUM
- **A-1**: 1 WELDED PLATE

**Base Table:**

<table>
<thead>
<tr>
<th>ADAPTER TYPE</th>
<th>ANCHOR BOLT DIAMETER (IN)</th>
<th>BOLT CIRCLE DIAMETER (IN)</th>
<th>EXISTING BASE TYPE</th>
<th>LUMINAIRE HEIGHT (&quot; x 2&quot;)</th>
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<tr>
<td>A-1</td>
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<td>11&quot;</td>
<td>WELDED PLATE</td>
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<td>12 3/4&quot;</td>
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<tr>
<td>A-4</td>
<td>1 1/8&quot;</td>
<td>14 1/8&quot;</td>
<td>ALUM. CLAMP 40</td>
<td>1 1/2&quot; x 8&quot;</td>
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</table>

**Diagram Notes:**

1. The purpose of this plan is to provide the details for retrofit of a 4-bolt frangible base with a slip base assembly.
2. Existing anchor bolts shall be inspected for corrosion, thread damage, and galvanizing. To minimize galvanic corrosion between dissimilar metals, ensure galvanizing remains intact while installing aluminum luminaire.
3. Grade around the foundation to ensure the stub height does not exceed 3 7/8" (in). For grading requirements, see Standard Plan J-28.22.
4. Removal of the frangible base from the existing base plate is required.
5. Misaligned anchor bolts shall be removed and replaced.
6. This adapter shall be used only on luminaire poles that contain a handhole. Replace standards and foundations when the handhole is located in the frangible base.
7. Galvanize the anchor plate, bottom slip plate, and top slip plate after fabrication according to ASTM A123.
8. Galvanize all hardware according to ASTM F2329.

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

**SILP BASE ADAPTOR FOR 4-BOLT LIGHT STANDARD BASE STANDARD PLAN J-28.43-00 SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
STEEL LIGHT STANDARD ELBOW DETAIL

FOR LUMINARE POLES WITH SINGLE MAST ARM 12'-0" OR LESS AND DOUBLE MAST ARMS 8'-0" OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.

NOTES
1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111. All bolts, rods and related hardware shall be galvanized after fabrication per ASTM F2329.
3. The presence of pedestrian railing shall be verified prior to light standard fabrication. When pedestrian railing is present or to be installed, locate hand hole as detailed in the Bridge Pedestrian Barrier details.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTES

1. Pole Base Plate for a Slip Base design shall be 1 1/4" (in) steel manufactured from ASTM A572 GR.50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" (in) steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" (in) 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.


(COVER NOT SHOWN FOR CLARITY)

ELEVATION VIEW

CONFIGURATION AND LOCATION OF THE HAND HOLE VARIES AMONG MANUFACTURERS. MINIMUM SIZE OPENING SHOWN.

FOR DETAILS NOT SHOWN, SEE VIEW A ABOVE ORIENTATION FOR INSTALLATION ON BRIDGE OR RETAINING WALL - SEE STANDARD PLAN J-28.45

3/16"

POLE BASE PLATE

GROUNDING BOLT

LUMINAIRE POLE

HAND HOLE

VIEW A

TYPICAL HAND HOLE ORIENTATION

THE CONDUCTOR ATTACHMENT CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS. CONDUCTOR ATTACHMENTS ARE REQUIRED ON ALL POLES, FIXED OR SLIP BASE.

T = RIM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR.

3/16"

POLE BASE PLATE

GROUNDING BOLT

LUMINAIRE POLE

CONSTANT BACK-UP RING

1" MIN.

1/4" (IN) THICK OR NO THINNER THAN POLE WALL THICKNESS. TACK WELD IN ROOT OR CONTINUOUS SEAL WELD TO BASE PLATE OR POLE WALL.

t = SIZE OF FILLET WELD BY LUMINAIRE POLE FABRICATOR.

VIEW D

SECTION D

FOR PLATE THICKNESS, REFER TO NOTE 1

6" DIAM HOLE

1/4" BACK-UP RING

LUMINAIRE POLE

VIEW C

ISOMETRIC VIEW

STANDARD PLAN J-28.50-0

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Shekel, Richard

Jul 21 2016 9:29 AM

State Design Engineer

Washington State Department of Transportation

SHEAT PLAN J-28.46

FABRICATOR, Richard

Jul 20 2016 8:29 AM

State Design Engineer

Washington State Department of Transportation

STEEL LIGHT STANDARD POLE BASE AND HAND HOLE DETAILS
2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.
4. Install grout after plumbing the pole.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

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.

DESIGN CRITERIA:
This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Basic wind velocity is 90 MPH. Design Life/Reurrence Interval 50 years.

WIND VELOCITY:
90 MPH

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' - 8" from pole top, installed 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

CAMERA POLE DATA

<table>
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<tr>
<th>CAMERA MOUNT TYPE</th>
<th>POLE TOP DIAM.</th>
<th>POLE MOUNT DIAM.</th>
<th>POLE TUBE</th>
<th>POLE WALL</th>
<th>ANCHOR BOLT DIA.</th>
<th>CONNECTION BOLT DIA.</th>
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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 x 4" high (ASTM A36) on all four sides, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.

CAMERA POLE ELBOW MOUNT ~ 25" SQUARE

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTES:
1. All material and workmanship shall be in accordance with the Standard Specifications.
2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
3. Concrete for 12" (in) thick maintenance pad shall be class 4000.
4. Concrete for 4" (in) thick maintenance pad shall be class 3000.
5. Height of wall varies to match slope of finished grade. Contractor shall field-determine wall height at each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.
6. All exposed corners shall have 3/4" (in) chamfers.
7. Where concrete cover (clear) thickness is not shown, the clear distance from the face of the concrete to the face of any reinforcing steel shall be as follows: 3" (in) for bottom of maintenance pad, 2" (in) for top of maintenance pad, and 1 1/2" (in) at all other locations.
8. Falsework shall be carefully released to prevent impact or undue stress on the structure.
9. See Contract Plans for number, type, and location of conduits and conductors.
10. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Engineer's approval of maintenance pad slope and orientation required prior to proceeding with construction.
11. Use 4" (in) Maintenance Pad on level ground or slopes not exceeding 10%: 1V. Use 12" (in) Maintenance Pad on slopes steeper than 10%: 1V. Slopes steeper than 2H: 1V shall require a special design.

HIGH MAST LUMINARIA
MAINTENANCE PAD

STANDARD PLAN J-30.10-00

RICHARD P. ZELDENRUST
HIGHWAY ENGINEER

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

DIRECTION OF NATURAL GRADE

LEGEND
★ FRACTURED FIN FINISH
β EXTEND BAR 8" (IN) INTO FOOTING
α ADJACENT TO SOIL

0.25" PER FT

REINFORCING STEEL TYPICAL BENDING DIAGRAM

SEE STD. SPEC. 8-071(2) FOR BENDING DIAM. ALL DIMENSIONS ARE OUT TO OUT

VARIABLES

CONCRETE MAINTENANCE PAD

CONCRETE MAINTENANCE PAD

NOTE
WHEN THE MAINTENANCE PAD ABUTS ASPHALT OR CONCRETE THE CONTRACTOR SHALL MODIFY THE FINISHED GRADE 1" (in) MINIMUM TO 2" (IN) MAXIMUM

WELDED WIRE FABRIC (WWF) 2" CLR (TYP.)

MINIMUM LIMITS OF CONCRETE PAD AND GRAVEL BASE

DIRECTION OF NATURAL GRADE

KEYNOTE

1. LIMITS OF PIGMENTED SEALER, ALL RETAINING WALLS.

SEE CONTRACT PLANS FOR DRILLED SHAFT

CONCRETE MAINTENANCE PAD

CONCRETE MAINTENANCE PAD

NOTE
CONCRETE FOR 4" (IN) THICK PAD SHALL BE CLASS 3000

GROUND RING

MINIMUM LIMITS OF CONCRETE PAD AND GRAVEL BASE

CONCRETE MAINTENANCE PAD

NOTICE
CONCRETE FOR 4" (IN) THICK PAD SHALL BE CLASS 3000

CONCRETE MAINTENANCE PAD

CONCRETE MAINTENANCE PAD

NOTE
CONCRETE FOR 4" (IN) THICK PAD SHALL BE CLASS 3000

CONCRETE MAINTENANCE PAD

CONCRETE MAINTENANCE PAD

NOTE
CONCRETE FOR 4" (IN) THICK PAD SHALL BE CLASS 3000

CONCRETE MAINTENANCE PAD
1. **Effective:** August 1, 2016 to August 6, 2017

**DIAGRAM:**

**PLAN:****

- **LID SUPPORT DEPTH:**
  - 2" to 3"

- **LID SUPPORT FRAME:**
  - Stainless Steel Flange
  - W/ Anti-Seize Compound

- **FRAME BONDING STUD:**
  - 1/4" x 1" Stainless Steel
  - Welded to Frame Bonding Plate

- **LID BONDING STUD:**
  - 1/4" x 1" Stainless Steel
  - Welded to Lid Support Frame

- **FRAME BONDING BOLT:**
  - 1/4" x 1"

**KEY:**

1. **BONDING JUMPER**
2. **EQUIPMENT GROUNDING CONDUCTOR**
3. **BONDING JUMPER ATTACHED TO BOX WALL COUPLING NUT**
4. **BONDING JUMPER ATTACHED TO BOX LID(S) GROUND STUD. #8 AWG (MIN) x 4' (FT) TINNED BRAIDED COPPER.**

**ELEVATION:**

- **PVC:**
  - Equipment Grounding Conductor
- **GRS:**
  - Grounding Conductor

**FRAME BONDING DETAIL A:**

- **FRAME BONDING STUD:**
  - 1/4" x 1" Stainless Steel
  - Welded to Frame Bonding Plate
- **LID TO FRAME BONDING JUMPER:**
  - Copper Solderless Crimp Connector

**LID BONDING DETAIL B:**

- **STAINLESS STEEL FLAT WASHER:**
  - W/ FENDER
- **BOND TINNED BRAIDED COPPER BONDING JUMPER:**
  - #8 MINIMUM
  - + 4' TO FRAME BONDING STUD LOCATION

- **ATTACH TO FRAME BONDING BOLT:**
- **STAINLESS STEEL NUT:**
  - 2 EACH

**EXISTING JUNCTION BOX RETROFIT GROUNDING DETAILS**

**STANDARD PLAN J-40.05-00**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**DESIGNER:**

- **Joe Bailey, Ted**
  - Jul 13 2016 2:28 PM

**REVISION HISTORY:**

- **Jul 13 2016 5:52 AM**

**STATE DESIGN ENGINEER:**

- **Corporation, Sţ**
  - Jul 12 2016 8:20 PM
1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. Minimum lid thickness shown. 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" line thickness formed with a mild steel weld bead and shall be placed prior to hot-dip galvanizing.

3. Lid support members shall be 3/16" minimum thick steel C, L, or T shape, welded to the frame of the lid. See Schedule 2 for materials.

4. A 1/4-20 NC x 3/4" (inch) stainless steel ground stud shall be welded to the bottom of the lid, including (2) stainless steel nuts and (2) stainless steel flat washers.

5. Bolts and nuts shall be liberally coated with anti-seize compound.

6. Equipment Bonding Jumper shall be #8 AWG min. x 4" (ft) of tinned braided copper.


8. When required in the Contract, provide a 10" (in) x 27 1/2" (in), 10 gauge dewater plate, complete, with fasteners, in each Type 2 Junction Box where specified.

9. When required in Contract, provide a 12" (in) deep extension for each Type 2 Junction Box where specified.

10. See the Standard Specifications for alternative reinforcement and class of concrete.

11. Headed Anchor Shear Studs must be welded to the Steel Cover Lip Plate and wire tied in two places to the vertical Welded Wire Fabric when in contact with each other. Wire to be all other headed Anchor Shear Studs to the horizontal Welded Wire Fabric.

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 drawings 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 sidewalks, walkways, shared use paths, traveled ways 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" (in) min. to 8" (in) max. for final grade of new construction only. See Standard Specification 8-20.3(6). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" (in) min. to 10" (in) max. See Standard Specification 8-20.3(6).
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

JUNCTION BOX DIMENSION TABLE

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NOTES
1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. All lid thicknesses are minimum.
3. Lid perimeter shall bear on frame. Mill to bearing seat and lid perimeter 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 on the contact surfaces.
5. A 1/4-20 NC × 1 ("m) S. S. ground stud shall be welded to the bottom of each lid: include (2) each S. S. nuts and (3) each S. S. flat washers.
6. The hinges shall allow the lids to open 180°. When lid assembly is Ductile Iron (Alternative) and equipped with Safety Bars, lids shall open 110°.
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 × 1 ("m) S. S. bolt, (2) each S. S. nuts, and (3) each S. S. flat washers. Equipment bonding jumper shall be #6 AWG min. 1/4" (4") of threaded brassed 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" ("m) min. to 8" ("m) max., for final grade of new construction only. See Standard Specification 8-20.3(6). 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" ("m) max. See Standard Specification 8-20.3(6).
13. Junction Box Types 4, 5, or 6 may be equipped with Ductile Iron (Alternative) Lid(s) and a Cast Iron (Alternative) Frame. Junction box shall meet the requirements of Standard Specification 9-29.2 and shall be in accordance with approved shop drawings.

Bailey, Ted
Apr 25 2016 5:08 PM

HEAVY-DUTY JUNCTION BOX TYPES 4, 5, & 6

STANDARD PLAN J-40.20-0:

Sheet 1 of 2 SHEETS
APPROVED FOR PUBLICATION
Michael, Jef
Apr 28 2016 3:15 PM

Washington State Department of Transportation
**PLAN**

1. **CONCRETE FOUNDATION**
   - Post-Mounted Junction Box - See Contract or Standard Plan J-48.15

2. **STEEL SIGN SUPPORT (TYP.)**
   - 1" PVC Conduit
   - Conduit Body or Flasher Cabinet - See Contract
   - Conduit Clamp Support - Slotted Stainless Steel Channel, Bracket, and Stainless Steel Strap (TYP.)

3. **STEEL SIGN SUPPORT**
   - Std. Support Hinge
   - Standard Plan G-24.60
   - J-Box
   - Stainless Steel Strap

4. **BREAKAWAY SIGN BASE (TYP.)**
   - 1" Rigid Metallic Conduit
   - 1" Diameter PVC Schedule 40 Conduit
   - 2" Chamfer - See Standard Plan G-25.10
   - Ground Line
   - Sign Support Concrete Foundation - See Standard Plan G-35.15, Detail "A"

5. **VIEW D**
   - Junction Box Attachment to Steel Sign Support
   - Nearest Alternate Location
   - Steel Sign Support (TYP.)
   - Breakaway Sign Base (TYP.)

6. **VIEW E**
   - Concrete Foundation
   - Breakaway Sign Base (Show)
   - Post-Mounted (NEMA 3) J-Box
   - Stainless Steel Channel, Bracket - Length + 36" Sign Support Width
   - Stainless Steel Channel, Bracket - Width + 36" Sign Support Width

7. **SECTION F**
   - Slotted Stainless Steel Channel, Bracket
   - Stainless Steel Strap (TYP.)
   - Conduit Clamp Support (TYP.)
   - Stainless Steel Strap (TYP.)
   - Stainless Steel Strap (TYP.)
   - Stainless Steel Strap (TYP.)

8. **STANDARD PLAN J-40.35-01**
   - Sheet 2 of 3 sheets
   - Approved for Publication

**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017
FLASING BEACON ATTACHMENT
(STEEL SIGN SUPPORT SHOWN)
NOTES
1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction. Mounting Tab shall be constructed of 12-gage, Type 304 stainless steel. Cover shall be constructed of ASTM A 36 steel with slip-resistant surfacing.
2. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box connection. Use an insulated, grounding and bushing on the inside for Rigid Metal Conduit.
3. Equipment Bonding Jumper shall be # 8 AWG (min.) x 3 feet minimum of tinned, braided copper.
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 B times multiplier for length and width dimension:
   - Maximum Height = Sidewalk Depth
   - Maximum Interior Length = 29" (in)
   - Maximum Interior Width = 16" (in)
7. Field drill 1/2" (in) diameter hole for Drain Tube from the inside to the outside of Junction Box. One place, on the lowest side only. Seal with bead of silicone. See Standard Specification 9-20.23(4). For drain tube routing, see Standard Plan J-50.16.
8. Condut capacity is 1/2" (in) x 4" (in) per side.
9. Conducts shall enter through the sides as shown. Conducts shall not enter through the bottom of Junction Box.
10. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.
SEE ENTRANCE SAWCUT DETAIL THIS SHEET (TYP.)

SEE CORNER SAWCUT DETAIL (TYP.)

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT (TYP.)

LOOP SAWCUT

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT

LEAD-IN SAWCUT

CENTER OF LOOP AND VEHICLE LANE

CENTER OF LOOP AND VEHICLE LANE

TYPE 1 STOP LINE LOOPS

(40' LONG OR AS SHOWN IN THE CONTRACT)

STOP LINE

LOOP SERIES START OR FINISH MARKING SLEEVE

S = START
F = FINISH

LOOP NUMBER MARKING DETAIL

NOTES
1. For Installation Notes and Details see Standard Plan J-50.15.

TYPE 1 INDUCTION LOOP

STANDARD PLAN J-50.10-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

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EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

1. For Installation Notes and Details see Standard Plan J-50.15.
2. For Sections A, B, C, and D, see Standard Plan J-50.16.
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-50.16.

5. For Loop numbering Layout Details, see sheet 3.

6. For additional Induction Loop Details, see Standard Plan J-50.15.

**TYPE 3 INDUCTION LOOP**

**STANDARD PLAN J-50.12-00**

**EFFECTIVE:** AUGUST 1, 2016 TO August 6, 2017
TYPE 3 STOP LINE LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

TYPE 3 ADVANCE LOOP WIRING DIAGRAM

TYPE 3 SAMPLING LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

NOTES
Loop numbering layout will be similar to Loop Numbering Layout Detail, Sheet 3

TYPE 3 INDUCTION LOOP
STANDARD PLAN J-50.12-00
SHEET 2 OF 3 SHEETS

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 16" 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 the 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(14)D 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

SHEET 2 OF 3 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

6/5/11

6/3/11

Pierce Budde & Sons

Washington State Department of Transportation
SIDEWALK

CEMENT CONCRETE CURB OR GUTTER
SEE STANDARD PLAN F-10.12

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

GUARDRAIL WITH POST AND BLOCK

CEMENT CONCRETE CURB OR GUTTER
SEE STANDARD PLAN F-10.12

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

LEAD-IN CONDUIT SHALL EXTEND A
MINIMUM OF 3/4" INTO PAVEMENT
(PAVEMENT DEPTH VARIES)

CONDUIT SECURED INTO
ROAD SURFACE (TYP.)

INDUCTION LOOP DETAILS

STANDARD PLAN J-50.15-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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 Detail, per Standard Plan J-50.15.

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 8-20.3(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.

SELF-LOCKING TIE - NYLON 6/6 (MIN. GRADE) 120# MIN. TENSILE STRENGTH, UV STABILIZED (TYPICAL)

TOP OF BRIDGE DECK OR APPROACH SLAB

LOOP LEAD-IN BETWEEN TOP AND BOTTOM REBAR MATS

LONGITUDINAL REBAR

SECURE PREFORMED INDUCTION LOOP TO THE REBAR AT APPROXIMATELY 2' (FT) INTERVALS (TYP)
NEMA JUNCTION BOX IN SIDEWALK WITH SLIP RESISTANT LID - SEE STANDARD PLAN J-40.40
SEE CONTRACT DOCUMENTS FOR SIZE 2" CONDUIT IN SIDEWALK CURB
2-2" CONDUITS IN BARRIER
8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER - SEE STANDARD PLAN J-40.36
2-2" CONDUITS IN BARRIER

PLAN VIEW

SECTION
PEDESTRIAN BARRIER

2" CONDUIT IN BARRIER
DRAIN TUBE
LOOP LEAD-IN
(2 MAX PER 1" CONDUIT)
TOP OF BRIDGE DECK

SECTION
SINGLE SLOPE TRAFFIC BARRIER

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER
2" CONDUIT IN BARRIER
DRAIN TUBE
LOOP LEAD-IN
(2 MAX PER 1" CONDUIT)

SECTION
PEDESTRIAN BARRIER

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER
2" CONDUIT IN BARRIER
DRAIN TUBE
LOOP LEAD-IN
(2 MAX PER 1" CONDUIT)

ELEVATION VIEW

TOP OF BRIDGE DECK
1" CONDUIT
BOTTOM OF BRIDGE DECK

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

3/11/2013
PREFORMED LOOP INSTALLATION DETAILS FOR NEW BRIDGE DECKS
STANDARD PLAN J-50.16-01
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

PLAN VIEW
TYPICAL 2 LANE PTR LAYOUT

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 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 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).
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 Detail 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.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PERMANENT TRAFFIC RECORDER INSTALLATIONS
STANDARD PLAN J-50.20-00
SHEET 1 OF 3 SHEETS
Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 4 - (pass lane) - Loop L3, Piezo P2, Loop L4

INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

PLAN VIEW
TYPICAL 4 LANE PTR LAYOUT WITH MEDIAN
PLAN VIEW
TYPICAL 6 LANE PTR LAYOUT WITH MEDIAN

Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L6
Lane 2 - (center lane) - Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 4 - (center lane) - Loop L3, Piezo P2, Loop L4
Lane 5 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 6 - (center lane) - Loop L3, Piezo P2, Loop L4

INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

SHOULDER NOTCH - SEE NOTES 6 AND 7 FOR CONDUIT SIZE - SEE NOTE 8

INCREASING MILEPOST DIRECTION

HOME RUN CONDUIT (TYP.)
LOOPS CENTERED IN LANE
HOME RUN CONDUIT UNDER THE ROADWAY (TYP.)
OFFSET LANE LINE (TYP.)
LEAD-IN SAWCUT (TYP.)
EDGE OF SHOULDER
EDGE OF LANE
EDGE OF SHOULDER
EDGE OF LANE
EDGE OF SHOULDER
EDGE OF LANE
EDGE OF LANE
EDGE OF SHOULDER
EDGE OF LANE
EDGE OF SHOULDER
EDGE OF LANE

SECTION A

PERMANENT TRAFFIC RECORDER INSTALLATIONS
STANDARD PLAN J-50.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO AUGUST 6, 2017
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

TYPICAL 2 - LANE WIM LAYOUT

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. Class WIM piezo capacitance shall be 6nf to 20nf.

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 @ 10' 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".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notches 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 or more 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 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. For Wire Code Color 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 milepost 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.
WEIGHT-IN-MOTION
SITE INSTALLATION
DETAILS
STANDARD PLAN J-50.25-00

PLAN VIEW
TYPICAL 4 - LANE WIM LAYOUT WITH MEDIAN

INCREASING DIRECTION
INDUCTION LOOP / PIEZOElastic AXLE SENSOR NUMBER IDENTIFICATION
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 PIEZOElastic AXLE SPACING

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**SAWCUT LAYOUT FOR PERMANENT TRAFFIC RECORDER SITE**

**SECTION A**
- Home run conduit under the roadway (Typ.)
- Shoulder notch
- Sensor slot

**SECTION B**
- Junction box
- Sawcut
- Top of existing pavement or leveling course of new pavement

**SECTION C**
- Junction box
- 2C(36) cable
- Splice (Typ.)

**MODIFIED TYPE 2 ADVANCE LOOP WIRING DIAGRAM**
- 1/4" wide sawcut
- Loop wire (#14 AWG)
- Polypropylene high-temp rope or backer rod
- 1 1/4" wide sawcut
- Depth of asphalt or cement concrete
- Depth of asphalt or cement concrete
- Sensor slot
- Home run slot

**PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS**

**STANDARD PLAN J-50.30-00**

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 1/2" to a maximum of 1 1/2".

3. Lead-in cuts for the piezo coax should be 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 slot. Blow out loose debris.

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. The 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 into the sensor. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor. 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.

10. Use a putty knife with a notched center to spread the epoxy smooth along 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. Coordination between WSDOT and Contractor is needed to determine method to be used prior to installation.

14. Place the Installation Brackets on the sensor every 12" for class 2 sensor, and every 5" for class 1 sensor, for the length of the sensor. Use the 3/4" brackets.

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

** APPROVED FOR PUBLICATION **

**JUNE 12, 2015**

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

**JUNE 12, 2015**
**SECTION D**

**SECTION E**

**SECTION**

**SIDE VIEW**

**BRACKET AND PIEZO LAYOUT**

**NOTE:**

- FILL SENSOR SLOT WITH GROUT — SEE NOTE 9
- LEVEL
- INSTALLATION BRACKET (TYP.)

**NOTE:**

- SENSOR LEAD ATTACHMENT END
- SENSOR COAX WIRE
- POLYPROPYLENE HIGH-TEMP ROPE OR BACKER ROD

**NOTE:**

- LOOP SEALANT
- E
- D

**NOTE:**

- 8" - SEE NOTE 7
- PEIZO AXLE SENSOR CLASS 1 OR 2
- FILL SENSOR SLOT WITH GROUT — SEE NOTE 9
- INSTALLATION BRACKETS (TYP.) — SEE NOTE 14
- EDGE OF LANE
- HOME RUN SLOT

**NOTE:**

- 3/8" - SEE NOTE 17
- PEIZO AXLE SENSOR CLASS 1 OR 2
- INSTALLATION BRACKET (TYP.)

**NOTE:**

- 4" TO 6" 3"
- HOME RUN SLOT

**NOTE:**

- PLAIN VIEW
- SECTION E

**NOTE:**

- 3" 4" TO 6" 3"
- HOME RUN SLOT

**NOTE:**

- LOOP SEALANT
- PEIZO COAX WIRE
- POLYPROPYLENE HIGH-TEMP ROPE OR BACKER ROD
COLOR CODE IDENTIFICATION

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</tbody>
</table>

WHITE IS ALSO USED FOR DESIGNATING INCREASING MILE POSTS

COLOR CODE WIRE DETAIL

NOTES

1. The Loop and Piezo leads in all Junction Boxes and Cabinets are to be color-coded. Use colored tape on each specific wire, see table. Wrap the tape on the wires approximately 6" beyond conduit in all Junction Boxes.

2. The maximum load in the cabinet is 5 Amps.

3. The cabinet may be pedestal or pad mount. See Standard Plan J-10.10 for details.


5. For Grounding Details, See Standard Plan J-60.06. See Standard Specification 8-20.3(9) for other requirements.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTES

1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". PVC Conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adapter.

   - 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

- Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 1/8" recessed). Use NEMA 4X Junction Box with stationary-forms – See Standard Plan J-40.36. Use NEMA 3R Junction Box with slip-forms – See Standard Plan J-40.37.
- Type DX Deflection (DX) Fitting with Internal Bonding Jumper.
- Wrap Conduit Pipe from Conduit Deflection Fitting to 1" - 0" beyond (Inside) t-bar surface.

- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1" - 0" on each side of the joint.
- 1" - 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 1, 2016 TO August 6, 2017

**CONDUIT DEFORMATION FITTING “B” DETAIL**

- **CONDUIT FITTING - TYPE DX** - PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE
- **CONDUIT FITTING - TYPE CX** - FOR DEFLECTION OF 30° AND 3/4” MOVEMENT

**CONDUIT PIPE**

- **3” MIN. - 6” MAX.** - CONDUIT AND THREADS - CAST OUTSIDE STRUCTURE

- **PLACED THROUGH RETAINING WALL TRAFFIC BARRIER. SHALL BE FITTED WITH DEFORMATION FITTINGS AT MAXIMUM SPACINGS OF 120°. THE DEFORMATION FITTINGS SHALL BE PLACED AT THE TRAFFIC BARRIER OPEN JoIN. THAT COINCIDES WITH THE RETAINING WALL STEM EXPANSION JOINT NEAREST TO THE TRANSVERSE CONSTRUCTION JOINT IN THE WALL FOOTING.**

**SCHEMATIC**

- **SHOWN FOR DUAL-CONDUIT INSTALLATION**
- **CIRCUIT TYPES MAY VARY**

**CONCRETE CONCRETE**

**PREMOLDED JOINT FILLER**

**CONDUIT FITTING - TYPE DX - FOR DEFLECTION OF 30° AND 3/4” MOVEMENT**

- **PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE**

**CONDUIT DEFORMATION FITTING “A” DETAIL**

- **CONDUIT FITTING - TYPE DX** - PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE
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 RMC 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.
5. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

KEY NOTES
1. Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 1/8" recessed). Use NEMA 4X Junction Box with stationary-forms. See Standard Plan J-40.36. Use NEMA 3R Junction Box with slip-forms. See Standard Plan J-40.37.
2. Where conduit in a structure is routed across a cold joint with continuous reinforcing steel, install premolded joint fitting 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.
CONCRETE SLAB BRIDGE
(AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONstrained)

HORIZONTAL CHANNEL MOUNT
(F-SHAPE BARRIER SHOWN APPLy TO ALL BARRIER TYPES)

PLUMB LINE - SEE NOTE 4

STAINLESS STEEL CHANNEL SUPPORT
(TYP.)

STAINLESS STEEL CHANNEL SUPPORT DETAIL
(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.)

CONDUIT DIAMETERS REFLECT THE DIMENSIONS FOR RIGID GALVANIZED STEEL, SCHEDULE 40 PVC AND SCHEDULE 80 PVC (3 1/2" SCHEDULE 80 PVC IS NOT AVAILABLE)

NOTES
1. Drilling through reinforcing steel is not allowed. If it is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 2-82.2(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.

STRAP THICKNESS CHART

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STAINLESS STEEL CHANNEL SUPPORT DETAIL
(STAINLESS STEEL CHANNEL SUPPORT DETAIL FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONstrained)

CHANGE SUPPORT MOUNT ON SOFFIT

STAINLESS STEEL CHANNEL TO BE plUMB TO FACE OF STRUCTURE. SIZE SPACER TO MAINTAIN plUMB LInE.

CONDUIT DIMENSIONS

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</table>

STAINLESS STEEL CHANNEL SUPPORT DETAIL (VERTICAL MOUNT SHOWN)

HOT DIP GALVANIZED STEEL OR STAINLESS STEEL SPACERS, 1/4" MIN. (TYP.) - INSTALL AND SIZE AS REQUIRED

ATTACHMENT BOLT (TYP.) - SEE NOTE 3

CHANNEL STOP ASSEMBLY - 5/8" Diam. + 2 1/4" LONG, BOLT WITH LOCK WASHER, FLAT WASHER AND NUT (TYP.)

CONNECTOR BOLT WITH LOCK WASHER AND FLAT WASHER (TYP.)

STAINLESS STEEL CHANNEL SUPPORT DETAIL
(STAINLESS STEEL CHANNEL SUPPORT DETAIL FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONstrained)

STAINLESS STEEL CHANNEL SUPPORT DETAIL
(STAINLESS STEEL CHANNEL SUPPORT DETAIL FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONstrained)

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(STAINLESS STEEL CHANNEL SUPPORT DETAIL FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONstrained)

STAINLESS STEEL CHANNEL SUPPORT DETAIL
(STAINLESS STEEL CHANNEL SUPPORT DETAIL FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONstrained)

STAINLESS STEEL CHANNEL SUPPORT DETAIL
(STAINLESS STEEL CHANNEL SUPPORT DETAIL FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONstrained)
NOTES
1. Type M mounting shall have "O" ring groove and seal on top and bottom of signal attachment.
2. Type M mounting for conventional heads shall have a 2" (in) diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2" (in) diameter opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 14" (in) 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.
7. See Standard Specification S-29.16 for backplate requirements. Where required, prismatic sheeting shall be applied in accordance with the manufacturer's recommendations. The application surface of the backplate shall be cleaned, degreased with isopropyl alcohol, and dried prior to application of the sheeting.
8. Drill a 1/4" (in) drain hole in the bottom of each signal assembly. When signal display assembly is mounted horizontally, drill a 1/4" (in) drain hole at the lowest point of each section of the signal assembly.

NOTE: BACKPLATES NOT SHOWN FOR CLARITY
NOTES
1. Sign bridge, sign support structure and signal bridge foundation shall be designed by the Engineer of Record for all installations (at grade, mounted on a bridge structure or on a wall structure).
2. Typical view shown. See Contract Plans for quantities and locations of signal heads. EVP detectors, cameras, and signs.
3. Route signal cable(s) from terminal cabinet along inside bottom of the Signal Bridge to the Tenon(s) connector(s) at hand holes. Provide sufficient slack wire to allow the conduits or cable to be pulled a minimum of 18" (460mm) outside the Signal Bridge at the nearest hand hole to the equipment connection point.
4. All conduits shall be labeled in accordance with Standard Specification 8-20.3(0). Labels shall be provided at the terminal cabinet (at the terminal board and conduits), equipment terminals, and at the hand hole nearest equipment connection point.
5. All RMC conduits embedded in foundation shall be terminated with a grounding end bushing and bonded to the structure grounding terminal. All PVC conduits embedded in foundations shall be terminated with end bell bushing.
6. Hand hole shall be designed by the Engineer of Record and installed at the time of fabrication.
7. Install hand hole on outside of the post at beam level when foundation is cast at grade. Install hand hole on traffic side of post when signal bridge is mounted on bridge, retaining wall or other structure.
8. Equipment grounding conductor shall be non-insulated #4 AWG copper with 3/8" minimum slack. Clamp to horizontal steel reinforcing with a listed connector suitable for use embedded in concrete. For details, see Elevation View Signal Bridge Hand Hole Placement on Standard, Sheet 2. Or see Foundation Details in Bridge Deck or Bridge Deck Island, Sheet 2.
9. Equipment grounding conductor shall be non-insulated #4 AWG copper with 3/8" minimum slack. Clamp to vertical steel reinforcing with a listed connector suitable for use embedded in concrete. For Detail, see Partial Foundation Detail, Sheet 2.
10. Variable Message Signs (VMS) shall not be installed on signal bridge.
11. No sign larger than 12’ (3.6m) long x 4’ (1.2m) tall shall be installed on signal bridge.
EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

**MULTI-SIDED (ROUND) TERMINAL CABINET MOUNTING DETAIL**

- **6” (IN) x 11” (IN) HAND HOLE W/ GASKET & REINF RING CENTERED OPPOSITE NEMA TERMINAL CABINET (TYPE) SEE NOTE 6**
- **PULLING GRIP - SIZE TO SECURE CONDUCTORS**

**SECTION A TERMINAL CABINET SQUARE MONOTUBE CABINET MOUNTING DETAIL**

- **1” REINFORCEMENT RING**
- **1/8” (IN) MIN. TO INSTALL HAND HOLES ON TOP OF BEAM ONLY**
- **1/8” (IN) THICK x 5/8” (IN) NEOPRENE HAND HOLE GASKET (TYPE) EXCEPT AT BOTTOM OF BEAM**

**SIGNAL BRIDGE STANDARD ELECTRICAL DETAILS**

**STANDARD PLAN J-75.41-0**

**KEY NOTES**

1. **6” X 8.2 LB/FT CHANNEL - HOT-DIP GALVANIZED**
2. **TWO EACH:**
   - 1/2-13 NC x 2 1/2” (IN) HEX HEAD BOLT
   - LOCK WASHERS (DRILL AND TAP POLE TO ACCEPT)
3. **WIREFAY (SEE DETAIL THIS SHEET)**
4. **METAL POST**
5. **CABINET**
6. **END BUSHING (TYPE)**
7. **SEALING LOCKNUT (TYPE)**
8. **POLE WALL DRILLED SO BUSHING WILL PASS THROUGH**
9. **CABINET WITH BACK WALL DRILLED 1/8” (IN) OVERSIZE OF NIPPLE**
10. **CHANNEL DRILLED 1/8” (IN) OVERSIZE OF NIPPLE**
11. **2” (IN) DIAM. X 4” (IN) NIPPLE (UNLESS OTHERWISE NOTED)**

**BOLTS, NUTS, AND WASHERS**
- ASTM F593 OR A193 TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)

**PLAN VIEW**

- **TERMINAL CABINET MOUNTING - 3/8” (IN) DIAM. X 1 1/2” (IN) BOLT WITH WASHERS DRILL AND TAP POLE TO ACCEPT**
- **1/4” (IN) CAP WITH 1/4” (IN) THICK NYLON BUSHING WASHER FOR SPACER - FOUR LOCATIONS**
- **2” (IN) DIAM. NIPPLE WITH THREADED CONDUIT AND LOCK NUT (TYP.)**

**PLANE VIEW**

- **J-HOOK**
- **PULLING GRIP - SIZE TO SECURE CONDUCTORS**
- **6” (IN) x 11” (IN) HAND HOLE W/ GASKET & REINF RING CENTERED OPPOSITE NEMA TERMINAL CABINET (TYPE) SEE NOTE 6**
- **NEMA 3R STAINLESS STEEL TERMINAL CABINET - SEE STANDARD SPEC. 9-29.25 - SEE CABINET MOUNTING DETAIL AND WIREFAY DETAIL, THIS SHEET**

**WIREWAY DETAIL ISOMETRIC VIEW**

**SECTION @ TERMINAL CABINET SQUARE MONOTUBE**

- **11” (IN) FOR 6” (IN) x 11” (IN) HAND HOLE - 6” (IN) FOR 6” (IN) DIAM. HAND HOLE**
- **POST OR BEAM**
- **2” (IN) REINFORCEMENT RING**

**SQUARE MONOTUBE MOUNTING DETAIL EXAMPLE HAND HOLE DETAIL**

- **(OPENING DIMENSIONS ALSO APPLY TO MULTI-SIDED ROUND STRUCTURES)**

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**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
NOTES

1. Typical view shown. Verify power source location, quantities, and location of signs and sign structure fixtures in Contract Plans.

2. Route separate IMSA 20-1 3C #14 cables from load side of terminal strip to each additional Sign-Lighting Luminaire (where applicable) and provide sufficient slack wire per Standard Specification 8-20.3(B).

3. Label all conductors with sign light and circuit number at isolation switch, hand hole, and ballast enclosure. Label shall be a PVC or Polyolefin wire marking sleeve per Standard Specification 9-29.

4. Install quick-disconnect fuse kits between the power supply wires and pole and bracket cable per Standard Specification 9-29.7. Pull down tight to fuse. Fuse size shall be 200% larger than load size. ( Disconnects shown left up for clarity.)

5. The conductors in the IMSA 20-1 3C #14 cable shall be black, red, and white. The white conductor shall be permanently identified as an equipment grounding conductor per the NEC.

6. All RMC conduits embedded in foundation shall be terminated with grounding end bushing and bonded to the ground terminal in the base of pole. All PVC conduits embedded in foundations shall be terminated with end bell bushing. See Standard Plan J-10.10 note (3).

7. Hand holes shall be installed at the time of fabrication. Hand Hole may be installed in field only when additional conduits for lighting accommodations to previously non-illuminated structures is needed, and as long as the proper repairs are made to structure. Contact Bridge and Structures office through PE for installation/repair procedures.

8. For details not shown, see Standard Plan G-90.40.

9. All holes shall be drilled and tapped.

10. Use the Retrofit details only when the following conditions apply:

A. Existing W4 × 13 Steel Beam sign brackets are to be reused for a new Sign-Lighting Luminaire.

B. The span between the existing Luminaire Brackets is too wide to attach the new Sign-Lighting Luminaire and Luminaire Mounting Plate.

11. If the sign structure includes a maintenance walkway, the Luminaire Mounting Plate shall be bolted to the walkway grating.
NOTES
1. The Small Cable Vault shall not be used within the traveled way or paved shoulder. The Small Cable Vault may be installed in walkways, sidewalks, and shared use paths.
2. The diamond pattern shall be a minimum of 3/32" (in) thick.
3. Small 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" (in) line thickness formed with a weld bead and shall be placed prior to hot-dip galvanizing.
4. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and two flat washers shall be welded to each lid and coated with anti-seize compound. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and four washers shall be welded to the frame and coated with anti-seize compound.
5. Connect a bonding jumper to the grounded end bushing for RMC conduit and connect the RMC conduit bushing jumper to the equipment grounding conductor at the hex coupling nut welded to the stainless steel channel. Connect the equipment grounding conductors in the PVC and/or HDPE conduits to the hex coupling nut. The bonding jumper shall be #8 min. x 1/4 (in) of tinned bared copper between the lid and the frame and shall be #8 AWG min. from the frame to the hex coupling nut. See Contract Plans and Standard Plan J-60.05 for bonding jumper requirements.
6. The system identification letters shall be 1/8" (in) line thickness formed with a mild steel weld bead. See COVER MARKING DETAIL, Standard Specification 8-29.24.4.
7. Cement concrete shall be Class 4000.
8. Capacity - conduit diameter = 40" (in).
9. Vault shall be installed on 6" (in) crushed surfacing pad in accordance with Standard Specification 8-20.3(6).
10. Typical Small Cable Vault features and arrangement shown. Reinforcing not shown. Dimensions and arrangements will vary slightly by manufacturer. See Approved shop drawings.
11. Small Cable Vaults for WSDOT Projects shall only be installed with the lid frame bearing on the concrete portion of cable vault.
INTERNAL ISOMETRIC VIEW

ROUTE EQUIPMENT BONDING JUMPER TO GROUND STUD ON FRAME
CABLE BUFFER (TYP) - SEE PIPE HANGER DETAIL

TIE WRAP (TYP)

SPlice CASE MOUNTING AT SPLICE LOCATION - WHEN REQUIRED - SEE CONTRACT PLANS

AT NO TIME SHALL THE CABLES MINIMUM BENDING RADIUS LIMITATIONS BE COMPROMISED

3/4" (IN) Diam. Threaded Insert
With 5/16" (IN) Hex Bolt and Flat Washer (Typ Four Places)

6" (IN) PIPE HANGER - SEE DETAIL

8.1/4" (10" PIPE HANGER - SEE DETAIL

ROUTE EQUIPMENT BONDING JUMPER TO GROUND STUD ON FRAME
CABLE BUFFER (TYP) - SEE PIPE HANGER DETAIL

Hinge Pin - Stainless Steel (Typ) Four Places

Concrete Vault

Steel Drop Handle

Concrete Vault

Penta Head Bolt

Angle Frame - 1 1/4" (IN) x 1 1/4" (IN) x 3/16" (IN)

Metal Lids - With Frame

Penta Head Bolt (Typ) Two Places

1 1/2" (IN) Diam. Bridle Ring - S. S. 1/4" (IN) Diam Wire Size (Fabricate if Not Available Commercially)

Crushed Surfacing (Base Course or Top Course) - Per Std. Spec. 8-33.9.3) (See Note 9)

Section A

1" Min. to 3" Max.

Top of Soil Surface

Top of Paved Surface

Steel Drop Handle

Full 180° Open

Top View

Bridle Ring Detail

Detail 1

Type 304 Stainless Steel

1 1/8" (IN) x 1 1/8" (IN) x 4" - 0"

Type 304 S.S. Channel (Typ)

Pipes Two Places - Center Channel in Vault

FULL LENGTH X 10" (IN)

WIDE BOTTOM KNOCKOUT

Pipe Hanger - Type 304 Stainless Steel

12 Gauge, 1/" (IN) Wide

HEX Head Bolt - 1/4-13 UNC x 1 1/8" (IN) and Flat Washer

1/2" (IN) x 16 UNC x 0" (IN)

HEX Bolt

3/8" (IN) - 16 UNC x 0" (IN)

NUT

CABLE BUFFER - Flexible Plastic Pipe

6" (IN) Diam., 1/" (IN) - 0" Long, Split

Fabricate if Not Available Commercially

SEE ISOMETRIC CUTAWAY ASSEMBLY - SHEET 1, FOR DIMENSIONS NOT SHOWN

SMALL CABLE VAULT

STANDARD PLAN J-90.21-0'

Sheet 2 of 2 Sheets

Approved for Publication

Joseph T. Bailey, P.E.
April 25, 2016 5:12 PM

Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTE

1. For Hot Mix Asphalt Paving projects ~ "DO NOT PASS" and "PASS WITH CARE" signs shall be included for passing zones.
NOTES

1. For sign installation details, see Standard Plan G - series

2. Where it is impractical to locate a sign with the lateral offset, a minimum of 2\(\text{ft}\) offset may be used. A 1\(\text{ft}\) lateral offset may be used in business, commercial or residential areas.

3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

<table>
<thead>
<tr>
<th>HEIGHT V</th>
<th>TO BOTTOM OF SIGN</th>
<th>TO BOTTOM OF SUPPLEMENTAL PLAQUE</th>
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<tr>
<td></td>
<td>(NO SUPPLEMENTAL PLAQUE)</td>
<td>(WHEN REQUIRED)</td>
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<tr>
<td>RURAL</td>
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<td>4' MINIMUM</td>
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<tr>
<td>URBAN</td>
<td>7' MINIMUM</td>
<td>6' MINIMUM</td>
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WARNING LIGHT ATTACHMENT DETAIL

USE ATTACHMENT DETAIL A OR ATTACHMENT DETAIL B

TOP OF BARRICADE SUPPORT ANGLE

DRILL TWO 1/2" DIAM. HOLES THROUGH BARRICADE SUPPORT ANGLE

(1) 3/8"-16 X 1 3/4" STEEL HEX BOLT
(2) 1" FLAT WASHERS
(1) 3/8"-16 STEEL HEX NUT

3/4" ACX PLYWOOD PANEL

SANDBAGS AS REQUIRED TO STABILIZE BASE - ALL LEGS

TYPE 3 BARRICADE

ELEVATION

SIDE

ATTACHMENT DETAIL A

WARNING LIGHT ATTACHMENT

6" X 1 1/2" X 1 1/2" X 1/8" STEEL ANGLE

TOP OF BARRICADE SUPPORT ANGLE

DRILL THREE 1/2" DIAM. HOLES

ATTACHMENT DETAIL B

WARNING LIGHT ATTACHMENT

6" X 2" X 2" X 1/8" TUBULAR STEEL WITH PRE-DRILLED HOLES

TOP OF BARRICADE SUPPORT ANGLE

DRILL TWO 1/2" DIAM. HOLES THROUGH BARRICADE SUPPORT ANGLE

(1) 3/8"-16 X 3" STEEL HEX BOLT
(2) 1" FLAT WASHERS
(1) 3/8"-16 STEEL HEX NUT

SANDBAGS AS REQUIRED TO STABILIZE BASE - ALL LEGS

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.

ORANGE AND WHITE REFLECTIVE SHEETING ASTM D4956 - TYPE I-II (SEE NOTE 2)

1 1/2" X 1 1/2" X 1/8" STEEL ANGLE

4'-0" MIN. - 8'-0" MAX.

ELEVATION

SIDE

TOP OF BARRICADE SUPPORT ANGLE

DRILL TWO 1/2" DIAM. HOLES THROUGH BARRICADE SUPPORT ANGLE

(1) 3/8"-16 X 3" STEEL HEX BOLT
(2) 1" FLAT WASHERS
(1) 3/8"-16 STEEL HEX NUT

3/4" ACX PLYWOOD PANEL

SANDBAGS AS REQUIRED TO STABILIZE BASE - ALL LEGS

TYPE 3 BARRICADE

STANDARD PLAN K-80.20-00

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
Useable traffic lane 2 MIN  Area closed to traffic

Type 3L Barricade

Stripes 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

Road closure at other locations

Barricade placement

Effective: August 1, 2016 to August 6, 2017
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.
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.
NOTES

1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker, use Class 2 when it is 6" or thicker.

3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

4. Use shims to properly fit the anchors to the barrier and roadway surfaces.

5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

Traffic Side

Protected Work Area or Edge of Deck

Narrow Base, Alternative Temporary Concrete Barrier Segment

SECTION VIEW

Type 2 Anchor: Class 1 & 2 Attachment Locations

Plan View

Type 2 Anchor: Class 1 Attachment Locations

Type 2 Anchor: Class 2 Attachment Locations

Temporary Conc. Barrier Anchoring ~ Narrow

Standard Plan K-80.37-00

Sheet 1 of 1 Sheet

Approved for Publication

Washington State Department of Transportation

 Expires July 24, 2008

Effective: August 1, 2016 to August 6, 2017
### Wire Fence Types 1 & 2

**WIRE FENCE TYPES 1 & 2 AND WIRE GATES**

**STANDARD PLAN L-10.10-02**

**Sheet 1 of 2 Sheets**

- **Effective:** August 1, 2016 to August 6, 2017

**PIPE ROLL FORMED T-POST**

<table>
<thead>
<tr>
<th>POST</th>
<th>PIPE</th>
<th>ROLL FORMED</th>
<th>T-POST</th>
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<tr>
<td>END, CORNER, OR PULL POST</td>
<td>2&quot; DIAM.</td>
<td>Y</td>
<td>5.10</td>
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<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIAM.</td>
<td>Z</td>
<td>1.85</td>
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</table>

**Grade Depression (Sag) Detail**

- **Steel Posts and Braces**
  - **Fence Line**
  - **Fabric Loop**
  - **Deadman**

**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.

**Diagram**

- **Wire Fence Type 1**
- **Wire Fence Type 2**
- **Corner Bracing**
- **Intermediate Bracing/Pull Post**
- **Grade Depression (Sag) Detail**
- **Additional Fasteners**

**Drawn By:** USA Cyford

**Approved by:** Washington State Department of Transportation
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 9-16.3(2).

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

GLARE SCREEN TYPE 2
(CHAIN LINK WITH SLATS)
STANDARD PLAN L-40.20-02
SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPT. OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

END OR CORNER (BRACE) POST
GLARE SCREEN FABRIC (TYP.)
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE (TYP.)
LINE POST - SPACED @ 10' MAX.
10' MAX.
6' MAX.
150' MAX.
PULL POST - SPACED @ 150' MAX.
HOG RINGS (TYP.) - SPACED @ 24" MAX.
EYE BOLT
TURNBUCKET
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE
HOG RINGS (TYP.) - SPACED @ 24" MAX.
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP - 48" x 12" (TYP.)

SEE MOUNTING DETAIL

TOP POST (TYP.)

PADLOCK - AGENCY PROVIDED

TOPE OF ROADWAY

5/8' DIA. WIRE ROPE

YELLOW REFLECTIVE TAPE - 3" (TYP.)

ELEVATION

WOOD SPACER - 3" x 2 1/2" x 13"

TIMBER POST - 4 x 6 (NOM.)

PLASTIC PIPE - 12" (NOM.) x 2 - 7" LONG

COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

TOP VIEW (CAP NOT SHOWN)

END POST

8" 16" 8" 16"

SIDE OPPOSITE STRIPES

PLASTIC PIPE - 12" (NOM.) x 2 - 7" LONG

COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

5/8" S.S. EYE STRAP - FASTENED TO THE SIGN PANEL WITH 2 1/8" DIAM. SCREWS AND 2 HEX NUTS (TYP.)

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M222.

ACCESS CONTROL GATE

STANDARD PLAN L-70.10-01

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

Washington State Department of Transportation

EXPIRES JUNE 30, 2018
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP
~ 48" x 12" (TYP.)

5/8" DIAM. WIRE ROPE

MIDDLE POST
REMOVABLE

YELLOW REFLECTIVE TAPE - 3" (TYP.)

END POST

PADLOCK (TYP.) - AGENCY PROVIDED

SEE MOUNTING DETAIL

TOP OF ROADWAY

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.)

GALV. LAG SCREW - 3/16" DIA. WITH FLAT WASHER (TYP.) (2 SETS REQ.)

GALV. STEEL TUBE

TOP OF STEEL TUBE

COMMERCIAL CONCRETE

5/8" S.S. EYE STRAP - FASTENED TO THE SIGN PANEL WITH 2 1/8" DIAM. SCREWS AND 2 HEX NUTS (TYP.)

SIDE OPPOSITE STRIPES

NOTE
Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

SHEET 1 OF 1 SHEET

ACCESS CONTROL DOUBLE GATE

STANDARD PLAN L-70.20-01

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

NOTE
Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.
NOTES

1. Where shown on the Plans or specified in the Special Provisions, raised pavement markers shall be used 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.
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 roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

RAMP CHANNELIZATION
TWO LANE

STANDARD PLAN M-1.40-02

TWO-LANE OFF-CONNECTION
**LEGEND**

- **C-D R** = Collector-Distributor Ramp Lane Width
- **C-D L** = Collector-Distributor Lane Width
- **R** = Ramp Lane Width
- **L** = Lane Width

**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.
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

**TABLE**

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**RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION**

**STANDARD PLAN M-1.50-03**

**Effective:** August 1, 2016 to August 6, 2017

**Drawn by:** Lisa C. Todd

**Approved by:** State Director

**Washington State Department of Transportation**
1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' (ft) spacing is standard; however, for gore areas shorter than 150' (ft), use a 25' (ft) spacing, and for gore areas greater than 400' (ft), a spacing of 100' (ft) may be used.
NOTE

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50’ (ft) spacing is standard; however, for gore areas shorter than 150’ (ft), use a 25’ (ft) spacing, and for gore areas greater than 400’ (ft), a spacing of 100’ (ft) may be used.
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

\[ L = \text{ Typical Lane Width. See Contract for specified lane width.} \]

\[ \quad \text{Type 2L (SL) Traffic Arrow} \]

<table>
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<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER A</th>
<th>APPROACH TAPER B</th>
<th>APPROACH TAPER C</th>
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<td>20'</td>
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LEFT-TURN CHANNELIZATION

STANDARD PLAN M-3.10-03

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - SYMMETRICAL WIDENING
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING RIGHT OF CENTER LINE
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING LEFT OF CENTER LINE
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

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 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.

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER G</th>
<th>DIMENSION</th>
<th>APPROACH TAPER H</th>
<th>DIMENSION</th>
</tr>
</thead>
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<tr>
<td>40 MPH</td>
<td>16'</td>
<td>27'</td>
<td>32'</td>
<td>53'</td>
</tr>
<tr>
<td>35 MPH</td>
<td>12'</td>
<td>27'</td>
<td>24'</td>
<td>4'</td>
</tr>
<tr>
<td>30 MPH</td>
<td>9'</td>
<td>17'</td>
<td>18'</td>
<td>30'</td>
</tr>
<tr>
<td>25 MPH</td>
<td>6'</td>
<td>17'</td>
<td>12'</td>
<td>21'</td>
</tr>
<tr>
<td>20 MPH</td>
<td>4'</td>
<td>7'</td>
<td>8'</td>
<td>13'</td>
</tr>
</tbody>
</table>

OPTIONAL MARKED DECELERATION TAPER
(STANDARD PLAN M-3.20-02)

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
LEFT-TURN CHANNELIZATION

TIE INTERSECTION
WITH ACCELERATION 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.

NOTE: The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

NOTE: 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.

NOTE: 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.

NOTE: Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

NOTE: Centerline striping on four-lane undivided highways shall be a double centerline.

NOTE: 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.
**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 38-10. 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**

- The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
- 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.
- Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-10. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
- Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
- Centerline striping on four-lane undivided highways shall be a double centerline.
- 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.

**LEGAL**

L = 12 Typical Lane Width. See Contract for specified lane widths.

- Type 2L (SL) Traffic Arrow

**TWO-WAY LEFT-TURN AND MEDIAN CHANNELIZATION STANDARD PLAN M-3.40-03**

**LEGEND**

- **POSTED SPEED**
- **DIMENSION (E)**
- **APPROACH SLOPE (F)**

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>DIMENSION (E)</th>
<th>APPROACH SLOPE (F)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>162</td>
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<td>55 MPH</td>
<td>156</td>
<td>33'</td>
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<tr>
<td>50 MPH</td>
<td>150</td>
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<tr>
<td>45 MPH</td>
<td>147</td>
<td>30'</td>
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<td>40 MPH</td>
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<td>24'</td>
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<tr>
<td>35 MPH</td>
<td>120</td>
<td>21'</td>
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<tr>
<td>30 MPH</td>
<td>120</td>
<td>18'</td>
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<tr>
<td>25 MPH</td>
<td>120</td>
<td>15'</td>
</tr>
<tr>
<td>20 MPH</td>
<td>120</td>
<td>12'</td>
</tr>
</tbody>
</table>

- Can be reduced to a minimum of 50' to increase storage capacity.

**TAPER F**

- Can be reduced to a minimum of 50' to increase storage capacity.

- **YELLOW CROSSHATCH**
- **YELLOW EDGE LINE**
- **PAINTED OR PLASTIC MEDIAN**
- **COMPOSED OF LONGITUDINAL MARKINGS**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**

**EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017**
NOTES
1. The channelization shown on this plan assures 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.
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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

NOTE:

1. The channelization shown on this plan assures optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
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LEGEND

NOTE:

1. The channelization shown on this plan assures 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.
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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

NOTE:

1. The channelization shown on this plan assures optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
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NOTES
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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. 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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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' (ft) x 6' (ft) White Bike Lane Arrow.

**GENERAL NOTE**

See Contract for location and material requirements.

**STANDARD PLAN M-9.50-02**

**STATE OF WASHINGTON**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**
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.

GRID IS 1" SQUARE
"R" DETAIL

KEY NOTES
1. Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" white transverse lines.
2. 24" white transverse line
3. W10-1 Advance Warning Sign (not included in RR Crossing Symbol Bid Item)
4. Place Stop Line 15' from the nearest rail or approximately 8 feet from RR gate, if present.

STOP LINE
LANE LINE OR ROADWAY CENTERLINE

SYMBOL DETAIL

LAYOUT

STEP LINE
LANE LINE OR ROADWAY CENTERLINE

LAYOUT

TOTAL MARKING AREA (PER 12' WIDE LANE) = 101.75 SQ FT.

TOTAL MARKING AREA (PER 12' WIDE LANE) = 111.59 SQ FT.

MPH
25 50 Ft.
30 100 Ft.
35 150 Ft.
40 225 Ft.
45 300 Ft.
50 375 Ft.
55 450 Ft.
60 525 Ft.
65 600 Ft.

DIMENSIONS SHOWN ARE APPROXIMATE. SEE CONTRACT.

STOP LINE
LANE LINE OR ROADWAY CENTERLINE

SYMBOL DETAIL

LAYOUT

TOTAL MARKING AREA (PER 12' WIDE LANE) = 111.59 SQ FT.

ALTERNATIVE SYMBOL

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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.
PARKING SPACE LAYOUTS

STANDARD PLAN M-17.10-02

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 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 plaque, if indicated
- Access Parking Space Symbol
- Manufactured Wheel Stop
- Detectable Warning Pattern

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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:
CENTERLINE & LANE LINE - W = 4'
NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE - W = 4'
REVERSIBLE LANE LINE - W = 4'
WIDE BROKEN LANE LINE - W = 8'

EMBOSSVED PLASTIC
(SOLID OR BROKEN LINE)
FOR:
CENTERLINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE
REVERSIBLE LANE LINE
DOUBLE CENTERLINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

PROFILED PLASTIC
(SOLID LINE)
FOR:
NO-PASS LINE - W = 4'
TWO-WAY LEFT-TURN CENTERLINE - W = 4'
DOUBLE CENTERLINE & DOUBLE LANE LINE - W = 4'
EDGE LINE & SOLID LANE LINE - W = 4'
WIDE LANE LINE & WIDE LINE - W = 8'
DOUBLE WIDE LANE LINE - W = 16'
BARRIER CENTERLINE - W = 20'

SECTION 1

DETAIL A

CENEBRLE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE
REVERSIBLE LANE LINE
DOUBLE CENTERLINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

23'

TOP VIEW

SIDE VIEW

W

DOTTED EXTENSION LINE
WIDE DOTTED LANE LINE - W = 8'

DOTTED LANE LINE - W = 4'

100 TO 300 MILS
15 TO 30 MILS

100 MILS MIN.
15 TO 30 MILS

160 MILS MIN.
15 TO 30 MILS

100 TO 300 MILS
15 TO 30 MILS

160 MILS MIN.
15 TO 30 MILS

100 TO 300 MILS
15 TO 30 MILS

500 MILS MIN.
50 MILS MIN.

W (W - 1/2')

1/4'

10'

4'

4'

10'

10'

0 TO 2'

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NOTES

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80 (ft) intervals on tangents and on horizontal curves having radii of less than 1500 (ft) or more, and at 40 (ft) intervals on horizontal curves having radii of less than 1500 (ft). Center the RPMs in the gaps between the pavement marking lines.

2. Type 2 RPMs, when specified, shall be placed outside the left Edge Line at 80 (ft) intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL."

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPMs on multilane one-way roadways, and Type 2YY RPMs on two-lane two-way roadways.

4. The Type 2W RPMs placed on multilane one-way roadways and all RPMs set in recesses shall have an abrasion-resistant coating.

5. Do not recess side-to-side RPMs on Wide Dotted Lane Lines.

---

TYPE 2 RPM RAISED FACE COLORS

<table>
<thead>
<tr>
<th>Type 2W</th>
<th>White – One Side Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2Y</td>
<td>Yellow – One Side Only</td>
</tr>
</tbody>
</table>

---

WIDE DOTTED LANE LINE DETAIL

(SEE NOTE 5)

White

TYPE 2W RPM (TYP.)

(SEE NOTE 4)
SECTION A

TWO-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT

SECTION B

ONE-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT
NOTES
1. Raised pavement markers shall be installed only when specified in the Contract Plans.
2. See the Standard Plans for marker designation.
3. The portion labeled "OPTIONAL" is used only when the Optional Marked Deceleration Tape (see Standard Plans M-3.10 and M-3.20) is specified in the Contract Plans.

~ Type 2L (SL) Traffic Arrow

LONGITUDINAL MARKING SUPPLEMENT WITH RPMs

TURN LANES

STANDARD PLAN M-20.40-0

APPROVED FOR PUBLICATION

Washington State Department of Transportation
LONGITUDINAL MARKING SUPPLEMENT WITH RPMs TUR L LNES
STANDARD PLAN M-20.40-0

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
NOTE

1. The NO PASS LINE (when required) is applied parallel to the CENTERLINE, 4" away, with the Type 2Y RPM's aligned (similar to TWO-WAY LEFT-TURN LANE).

LONGITUDINAL MARKING
SUBSTITUTION W/RAISED
PAVEMENT MARKERS
STANDARD PLAN M-20.50-02

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher and on all on-ramps and off-ramps.
TYPE 6R (RIGHT) TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6L (MIRRORED ABOUT LANE CENTERLINE) (SHOWN AT REDUCED SCALE)

SYMBOL MARKINGS ~ TRAFFIC ARROWS FOR HIGH-SPEED ROADWAYS
STANDARD PLAN M-24.20-2
Sheet 3 of 3 sheets
APPROVED FOR PUBLICATION
April 20 2015 10:10 AM
Washington State Department of Transportation
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
REVERSE CURVE ELLIPSES ARE SYMMETRICAL ABOUT

GRIDS ARE 4" SQUARE
ASSUME POINTS NOT DIMENSIONED TO BE CONCIDENT WITH GRID LINES

DETAIL

GRID LINES NEED FOR EACH TYPE OF ROUNDABOUT TRAFFIC ARROW.

FOR EXAMPLE: THE ROUNDABOUT TRAFFIC ARROW TYPE TRC
REQUIRES THE "COMMON", "T", "R", AND "C" AREAS.

ROUNDABOUT TRAFFIC ARROW TYPE TRC
CENTER THE ARROW ON THE LANE CENTERLINE BETWEEN THE LATERAL EXTREMITIES OF THAT ARROW TYPE.

COMPONENT KEY

THE LABELED AREAS ABOVE CORRESPOND TO THE PORTIONS NEEDED FOR EACH TYPE OF ROUNDABOUT TRAFFIC ARROW.
STOP LINE

WHITE OR YELLOW - SEE CONTRACT
CROSSHATCH MARKING

W = 6" (IN) FOR POSTED SPEED LIMIT OF 40 MPH OR LOWER
W = 12" (IN) FOR POSTED SPEED LIMIT OF 45 MPH OR HIGHER

MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

MARKING AREA = 1.06 SQ.FT.
DRAINAGE STRUCTURE INLET

AERIAL SURVEILLANCE MARKERS

MARKING AREA = 6.00 SQ.FT.
JUNCTION BOX, PULL BOX, OR CABLE VAULT MARKINGS

MARKING AREA = 0.56 SQ.FT.
CROSS CULVERT

PAVED SHOULDER

NOTE
1. If Rumble Strips are present, install marking outside of the Rumble Strip.
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:

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Specific Intensity (cd/ft-c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>0°</td>
<td>128</td>
</tr>
<tr>
<td>0°</td>
<td>20°</td>
<td>56</td>
</tr>
</tbody>
</table>

NOTES

1. When the Contract Plans requires a guide post with concurrent guardrail runs, the Contractor shall either:
   A. Drive the flexible guide post in line with the guardrail posts, or
   B. Mount the shorter flexible guide post onto the guardrail post.
2. Guide posts shall be fastened to the 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 guard post manufacturer.
3. Guide posts shall be fastened to the steel guardrail posts using two galvanized 2" x 3/8" (in) 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 5-11.3(1)B. Also acceptable is any approved attachment method submitted by the guard post manufacturer.
4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delineators where guide posts are required.

GUIDE POST TYPE DEFINITIONS – REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>Type W</th>
<th>Type WW</th>
<th>Type Y</th>
<th>Type YY</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACING</td>
<td>FACING</td>
<td>BACK</td>
<td>FACING</td>
</tr>
<tr>
<td>TRAFFIC</td>
<td>TRAFFIC</td>
<td>SIDE</td>
<td>TRAFFIC</td>
</tr>
<tr>
<td>3&quot;</td>
<td>3&quot;</td>
<td>3&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>WHITE</td>
<td>WHITE</td>
<td>WHITE</td>
<td>WHITE</td>
</tr>
<tr>
<td>WHITE</td>
<td>WHITE</td>
<td>WHITE</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

GUIDE POSTS AND BARRIER DELINEATORS

STANDARD PLAN M-40.10-0

Sheet 1 of 1 Sheet

Appointed for Publication

Washington State Department of Transportation

Effective: August 1, 2016 to August 6, 2017
NOTES


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

3. "S" dimension shown on Standard Plan M-40.40 or 100', whichever is smaller.

4. One half of "S" dimension shown on Standard Plan M-40.40 or 50', whichever is smaller.

5. Two spaces at 100'.

6. Three equal spaces when R < 75', four equal spaces when R ≥ 75'.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet maximum.

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10
THREE EQUAL SPACES WHEN $R < 75'$

FOUR EQUAL SPACES WHEN $R \geq 75'$

100' DECELERATION TAPER

100' (TYP.)

200' 500'

DIVIDED HIGHWAY

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

NOTE

REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>TYPE G1</th>
<th>TYPE G2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACING TRAFFIC</td>
<td>BACK SIDE</td>
</tr>
<tr>
<td>FACING TRAFFIC</td>
<td>BACK SIDE</td>
</tr>
</tbody>
</table>

- $G1$: WHITE
- $G2$: WHITE

- $G2$: WHITE
- $G1$: WHITE

GREEN

UNDIVIDED HIGHWAY
WITHOUT ILLUMINATION

GUIDE POST PLACEMENT
GRADE INTERSECTIONS

STANDARD PLAN M-40.30-00

EXPIRES AUGUST 6, 2023

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
GUIDE POST SPACING (FEET)

<table>
<thead>
<tr>
<th>RADIUS (FEET)</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>115</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
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<tr>
<td>200</td>
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<tr>
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<td>700</td>
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</tr>
<tr>
<td>900</td>
<td>85</td>
</tr>
<tr>
<td>1,000</td>
<td>90</td>
</tr>
<tr>
<td>1,200</td>
<td>100</td>
</tr>
<tr>
<td>1,700</td>
<td>120</td>
</tr>
<tr>
<td>2,000</td>
<td>140</td>
</tr>
<tr>
<td>2,300</td>
<td>160</td>
</tr>
<tr>
<td>2,500</td>
<td>180</td>
</tr>
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<td>4,500</td>
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<tr>
<td>5,000</td>
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</tr>
<tr>
<td>8,000</td>
<td>280</td>
</tr>
<tr>
<td>10,000</td>
<td>300</td>
</tr>
<tr>
<td>10,000-10,000</td>
<td>300</td>
</tr>
</tbody>
</table>

INTERPOLATE FROM THE TABLE FOR RADII NOT SHOWN

NOTES
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
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

GUIDE POST PLACEMENT
MISCELLANEOUS
STANDARD PLAN M-40.60-00

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
ISOMETRIC VIEW

TYPICAL SHOULDER INSTALLATION

SECTION A

1/2" MIN.
5/8" MAX.

7" ± 1/2"

SECTION B

1/2" MIN.
5/8" MAX.

MEDIAN SHOULDER

EDGE LINE

SHOULDER RUMBLE STRIP

OUTSIDE SHOULDER

SHOULDER RUMBLE STRIP

EDGE LINE

PERSPECTIVE VIEW

MULTI-LANE DIVIDED HIGHWAY

SHOULDER RUMBLE STRIP

TYPE 1

FOR DIVIDED HIGHWAYS

STANDARD PLAN M-60.10-01

SHEET 1 OF 4 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO AUGUST 6, 2017
IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

TERMINATE THE RUMBLE STRIP AT THE END OF THE TAPER.

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

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.
ISOMETRIC VIEW

TYPICAL SHOULDER INSTALLATION

UNIT SECTION A

UNIT SECTION B

UNDIVIDED HIGHWAY

SHOULDER RUMBLE STRIP

TYPES 2, 3, AND 4 FOR UNDIVIDED HIGHWAYS

STANDARD PLAN M-60.20-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
TYPE 2 - 12" GAP AND 12" WIDE STRIP

TYPE 3 - 16" GAP AND 16" WIDE STRIP

TYPE 4 - 12" WIDE STRIP

SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4 FOR UNDIVIDED HIGHWAYS

STANDARD PLAN M-60.20-02

SHOULDER RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGE APPROACH SLABS

SHOULDER TAPER DETAIL

NOT LESS THAN 4' - PROVIDE 5' WHEN BARRIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER.

TERMINATE SHOULDER RUMBLE STRIPS 42' MINIMUM FROM THE BEGINNING OR END OF EACH RIGHT TURN RADIUS.

SHOULDER EDGE LINE

MAJOR ROAD

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

SHOULDER \ RUMBLE STRIPS (TYP.)

60' MIN.

100' MIN.

RADIUS OF CURVE (TYP.)

60' MIN.

100' MIN.

STRUCTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH

SHOULDER EDGE LINE

48 MILLED UNITS

12 OR 16 GAP

48 MILLED UNITS

EDGE OF PAVED SHOULDER - EPS

EDGE LINE

SHOULDER RUMBLE STRIPS

28 MILLED UNITS

12 GAP

28 MILLED UNITS

12 GAP

28 MILLED UNITS

EDGE OF PAVED SHOULDER - EPS

EDGE LINE

SHOULDER RUMBLE STRIPS

EDGE LINE

SHOULDER RUMBLE STRIPS

EDGE LINE

SHOULDER RUMBLE STRIPS

EDGE LINE

SHOULDER RUMBLE STRIPS

40' MIN.

40' MIN.

RADIUS OF CURVE (TYP.)

50' MIN.

100' MIN.

RADIUS OF CURVE (TYP.)

50' MIN.

100' MIN.

RADIUS OF CURVE (TYP.)

50' MIN.

100' MIN.

RADIUS OF CURVE (TYP.)

50' MIN.

100' MIN.

RADIUS OF CURVE (TYP.)
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.

CENTERLINE RUMBLE STRIP

STANDARD PLAN M-65.10-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
RUMBLE STRIP OPTIONAL - SEE NOTE 2

INSTALL RUMBLE STRIP

TERMINATE AT END OF LEFT TURN
CHANNELIZATION STRIPING

INTERSECTION WITH LEFT TURN CHANNELIZATION

Omit centerline rumble strips in this area

25' 25'

REFER TO STANDARD PLAN M-20.30 FOR
RECESSED PAVEMENT MARKER DETAIL

RECESSED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

LONGITUDINAL MARKING (TYP.)

RUMBLE STRIP (TYP.)

BRIDGE APPROACH SLAB

BRIDGE

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP

STANDARD PLAN M-65.10-02

SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
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

TRAFFIC LETTERS AND NUMERALS (HIGH SPEED ROADWAYS) STANDARD PLAN M-80.20-00 SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017

EXPRESS AUGUST 5, 2009

APPROVED FOR PUBLICATION WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STANDARD PLAN M-80.20-00 SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017
SIX FOOT HIGH LETTERS AND NUMERALS SHOWN ON A THREE-INCH SQUARE GRID

TEN FOOT HIGH LETTERS SHOWN ON A FIVE-INCH SQUARE GRID

FOR USE ON ROADWAYS WITH A POSTED SPEED OF 40 MPH OR LESS

EFFECTIVE: AUGUST 1, 2016 TO August 6, 2017