Standard Plans

M 21-01
August 4, 2014

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
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:

(360) 705-7256

designstandards@wsdot.wa.gov

Download the current electronic WSDOT Standard Plans for Road, Bridge, and Municipal Construction, the latest revision package, and separate plans at:

www.wsdot.wa.gov/publications/manuals/m22-01.htm

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

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

Design Standards
Transportation Building
Olympia, WA 98504-7329

/s/ Pasco Bakotich III

Pasco Bakotich III, P.E.
Director & State Design Engineer,
Development Division
Comment:

☐ See attached
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<td>6/3/11</td>
</tr>
<tr>
<td>M-3.30-03</td>
<td>Left Turn Channelization: Tee Intersection and Back-to-back Turn Lanes</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-3.40-03</td>
<td>Two-way Left-Turn and Median Channelization</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-3.50-02</td>
<td>Double Left Turn Channelization</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-5.10-02</td>
<td>Right-Turn Channelization</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-7.50-01</td>
<td>High Occupancy Vehicle (HOV) Lane Symbol Layout</td>
<td>1/30/07</td>
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<tr>
<td>M-9.50-02</td>
<td>Bicycle Lane Symbol Layout</td>
<td>6/24/14</td>
</tr>
<tr>
<td>M-9.60-00</td>
<td>Shared - Use Path Markings</td>
<td>2/10/09</td>
</tr>
<tr>
<td>M-11.10-01</td>
<td>Railroad Crossing Layout</td>
<td>10/14/09</td>
</tr>
<tr>
<td>M-15.10-01</td>
<td>Crosswalk Layout</td>
<td>2/6/07</td>
</tr>
<tr>
<td>M-17.10-02</td>
<td>Parking Space Layout</td>
<td>7/3/08</td>
</tr>
<tr>
<td>M-20.10-02</td>
<td>Longitudinal Marking Patterns</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-20.20-01</td>
<td>Profiled and Embossed Plastic Lines</td>
<td>10/14/09</td>
</tr>
<tr>
<td>M-20.30-02</td>
<td>Longitudinal Marking Supplement with Raised Pavement Markers</td>
<td>10/14/09</td>
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<tr>
<td>M-20.40-03</td>
<td>Longitudinal Marking Supplement with RPM's ~ Turn Lanes</td>
<td>6/24/14</td>
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<tr>
<td>M-20.50-02</td>
<td>Longitudinal Marking Substitution with RPM's</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-24.20-01</td>
<td>Symbol Markings Traffic Arrows for High Speed Roadways</td>
<td>5/31/06</td>
</tr>
<tr>
<td>M-24.40-01</td>
<td>Symbol Markings Traffic Arrows for Low Speed Roadways</td>
<td>5/31/06</td>
</tr>
<tr>
<td>M-24.50-00</td>
<td>Roundabout Traffic Arrows</td>
<td>6/16/11</td>
</tr>
<tr>
<td>M-24.60-04</td>
<td>Symbol Markings Miscellaneous</td>
<td>6/24/14</td>
</tr>
<tr>
<td>M-40.10-03</td>
<td>Guide Posts and Barrier Delineators</td>
<td>6/24/14</td>
</tr>
<tr>
<td>M-40.20-00</td>
<td>Guide Post Placement Interchanges</td>
<td>10/12/07</td>
</tr>
<tr>
<td>M-40.30-00</td>
<td>Guide Post Placement Grade Intersections</td>
<td>9/20/07</td>
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<tr>
<td>M-40.40-00</td>
<td>Guide Post Placement Horizontal Curves</td>
<td>9/20/07</td>
</tr>
<tr>
<td>M-40.50-00</td>
<td>Guide Post Placement Bridges</td>
<td>10/20/07</td>
</tr>
<tr>
<td>M-40.60-00</td>
<td>Guide Post Placement Miscellaneous</td>
<td>10/20/07</td>
</tr>
<tr>
<td>M-60.10-01</td>
<td>Shoulder Rumble Strip Type 1 for Divided Highways</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-60.20-02</td>
<td>Shoulder Rumble Strip, Types 2, 3, and 4, for Undivided Highways</td>
<td>6/27/11</td>
</tr>
<tr>
<td>M-65.10-02</td>
<td>Centerline Rumble Strip</td>
<td>5/11/11</td>
</tr>
<tr>
<td>M-80.10-01</td>
<td>Traffic Letter and Numeral Applications</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-80.20-00</td>
<td>Traffic Letters and Numerals (High Speed Roadways)</td>
<td>6/10/08</td>
</tr>
<tr>
<td>M-80.30-00</td>
<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
</tr>
</tbody>
</table>

**Page 12**

*Standard Plans for Road, Bridge, and Municipal Construction*

*Effective August 4, 2014*
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 (10 FEET)
FILL AT RP STAKE (1.2 FEET)
CUT AT CATCH POINT (BACK OF DITCH)
DISTANCE FROM C TO CATCH POINT (27.6 FEET)
SIDE SLOPE RATIO (4H:1V)
BACK OF DITCH
LATH FOR SLOPE REFERENCES

OFFSET FROM SLOPE STAKE (7 FEET)
CUT AT ST STAKE (2.9 FEET)
DISTANCE FROM C TO CATCH (BACK OF DITCH) (23.5 FEET)
SIDE SLOPE RATIO (3H:1V)
LINE STATIONING
HUNDRED FOOT INCREMENTS
SLOPE TREATMENT (ST) STAKE FOR CUT SECTIONS

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

DISTANCE FROM C TO RP STAKE (16.2 FEET)
SIDE SLOPE TO A 2% ROADWAY SLOPE (50H:1V)
FILL (0.1 FEET)
DAYLIGHT CATCH (CUT 0.0 FEET)
DITCH)
SIDE SLOPE STAKE (2.2 FEET)
CUT AT CATCH POINT (2.2 FEET)
DISTANCE FROM C TO CATCH (BACK OF DITCH) (23.5 FEET)
SIDE SLOPE RATIO (3H:1V)
LINE STATIONING
HUNDRED FOOT INCREMENTS
DAYLIGHT (D/L) STAKE

SURVEY STAKES
STANDARD PLAN A-10.10-00
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
APPROVED FOR PUBLICATION
Fill from Catch Point to Beginning of Second Slope (3.8 Feet)

Slope Ratio (2H:1V)

Fill to Subgrade Shoulder (2.25 Feet)

Slope Ratio (4H:1V)

Distance from C to Catch Point (28.7 Feet)

Compound Slope Lath

Fill to Subgrade (0.35 Feet)

Fill to Finish Grade (Curb Elevation) (0.73 Feet)

Distance from C (14.3 Feet)

Slope Ratio (2H:1V)

Stake for Ditch Construction

Ditch Cut to Bottom of Ditch (0.60 Feet)

Distance from Catch Point to Bottom of Ditch (2.4 Feet)

Side Slope Ratio (4H:1V)

Stake for Ditch Construction

Structure Note Reference

Plan Sheet Number (4)

Structure Note Number (15)

Ditch Section Alignment Stationing

Offset to Center of Base (10 Feet)

Fill to Top of Concrete Base (1.1 Feet to Top of Foundation)

Stake for Ditch Construction

Stake for Foundation of Luminares, Signals or Sign Structures

Luminaire Number (23)

Compound Slope Lath

Offset (3 Feet)

Fill to Top and Back Edge of Curb (0.90 Feet)

Line Designation

Line Stationing

Hundred Foot Increments

Survey Stakes

Standard Plan A-10.10-00

Sheet 2 of 2 Sheets

Approved For Publication

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

INSTALL FERROUS MATERIAL SEGMENT - I.E., IRON ROD OR EQUIVALENT, 6" LONG MIN.

GROUND LINE

LEDGE ROCK, CONCRETE, OR ASPHALT INSTALLATION

SECTION VIEW

SECTION OF GROOVE FOR 1/4" LETTERS

SECTION OF GROOVE FOR 3/16" LETTERS

SECTION VIEW

GENERAL INSTALLATION

SECTION VIEW

SURVEY MONUMENT TYPES 1 AND 2

STANDARD PLAN A-10.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
CONCRETE BASE

PLAN VIEW

SECTION

RISER RING DIMENSIONS

<table>
<thead>
<tr>
<th>A (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>9 1/2&quot; Diam</td>
<td>8&quot; Diam</td>
<td>6&quot; Diam</td>
</tr>
</tbody>
</table>

SECTION

COVER

SECTION OF LETTER

NOTE

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

MONUMENT CASE AND COVER

STANDARD PLAN A-10.30-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
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: Slope Treatment

<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></td>
<td>L = 10.0'</td>
<td>L = 5.0'</td>
</tr>
<tr>
<td>+2 : 1</td>
<td>D</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>+3 : 1</td>
<td>D</td>
<td>1.0'</td>
<td>D</td>
</tr>
<tr>
<td>+4 : 1</td>
<td>D</td>
<td>1.5'</td>
<td>D</td>
</tr>
<tr>
<td>+6 : 1</td>
<td>D</td>
<td>2.0'</td>
<td>D</td>
</tr>
<tr>
<td>+8 : 1</td>
<td>D</td>
<td>2.5'</td>
<td>D</td>
</tr>
<tr>
<td>+10 : 1</td>
<td>D</td>
<td>3.0'</td>
<td>D</td>
</tr>
<tr>
<td>+15 : 1</td>
<td>D</td>
<td>3.5'</td>
<td>D</td>
</tr>
<tr>
<td>+20 : 1</td>
<td>D</td>
<td>4.0'</td>
<td>D</td>
</tr>
<tr>
<td>+25 : 1</td>
<td>D</td>
<td>4.5'</td>
<td>D</td>
</tr>
<tr>
<td>+30 : 1</td>
<td>D</td>
<td>5.0'</td>
<td>D</td>
</tr>
</tbody>
</table>

### Legend:

- Slope treatment not required
CONCRETE SLOPE PROTECTION
STANDARD PLAN A-30.10-00

TYPICAL SECTION
(SHOWN ON LOWER ROADWAY)
1. The design and shape of the semi-open concrete masonry unit shown is only one example of the products that may be used.

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

NOTES
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.

### Table: Maximum Anchor Spacing (A)

<table>
<thead>
<tr>
<th>H (ft)</th>
<th>A (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0' - 100'</td>
<td>15'</td>
</tr>
<tr>
<td>100' - 200'</td>
<td>30'</td>
</tr>
<tr>
<td>200' - 300'</td>
<td>45'</td>
</tr>
</tbody>
</table>

### Table: Maximum Length of Top Horizontal Support Rope (B)

<table>
<thead>
<tr>
<th>H (ft)</th>
<th>B (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50'</td>
<td>200'</td>
</tr>
<tr>
<td>100'</td>
<td>400'</td>
</tr>
<tr>
<td>200'</td>
<td>750'</td>
</tr>
</tbody>
</table>

### Notes
1. 3/4" diam. 6x19 IWRC galvanized wire rope
2. 8x10 type double twisted hexagonal wire mesh fabric
3. Wire rope clip (Typ.) dead end
4. Thimble (see Note 4)

### Diagrams
- Elevation: Seams and anchor spacing
- Section View: Wire mesh slope protection
- Wire Rope Detail: Winding and torquing requirements

---

**WIRE MESH SLOPE PROTECTION**

**STANDARD PLAN A-30.30-01**

**Washington State Department of Transportation**
NOTES

- SUGGESTED MINIMUM DEPTH
- MINIMUM ALLOWABLE ANCHOR CAPACITY SHALL BE 20,000 LBS.

SLOPE PROTECTION ANCHORS

STANDARD PLAN A-30.35-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
DOWEL BARS SPACED 1'-0" ON CENTER, AT TRANSVERSE JOINT

WIRE LEG (TYP.) ~ SEE NOTE 1

DOWEL BAR (TYP.)

SPREADER WIRES (TYP.) = 0.117" DIAM.
3 PER ASSEMBLY (WELD TO TOP SPACER BARS)

TOP SPACER BAR (TYP.) = 0.362" DIAM.
2 PER ASSEMBLY (WELD TO LEG CHAIRS)

BOTTOM SPACER BAR (TYP.) = 0.362" DIAM.
2 PER ASSEMBLY (WELD TO LEG CHAIRS)

DOWEL BAR BASKET

PLAN VIEW

"U" SHAPE ASSEMBLY SHOWN

SECTION A

ELEVATION VIEW

"U" SHAPE ASSEMBLY SHOWN

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. Dowels and Tie Bars shall be held firmly in the above welded assembly.
5. Do not clip Spreader Wires.

DOWEL BAR BASKET

ISOMETRIC VIEW

"U" SHAPE ASSEMBLY SHOWN

STANDARD PLAN A-40.00-00

SECTION B

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

July 7, 2009

DOWEL BAR BASKETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
FINISH OUTER EDGE OF PCCP SHOULDER WITH 1/2" RADIUS

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

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

#5 TIE BAR - 30" LONG ON 36" CENTERS TYPICAL ALL LANES

DOWEL BARS - 1 1/2" Diam. x 18" Long ON 12" CENTERS TYPICAL ALL LANES UNLESS NOTED IN THE PLANS

HMA SHOULDER IF REQUIRED

LONGITUDINAL JOINT (SEE SECTION VIEW)

PCCP TO PCCP
LONGITUDINAL CONSTRUCTION JOINT

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX. OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-06.3(8)B

PCCP TO HMA
LONGITUDINAL JOINT

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX. OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-06.3(8)B

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" Max. OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-06.3(8)B

ELEVATION VIEW

HMA TRANSITION DETAIL

NO DOWEL BARS REQUIRED

USE ON GRANULAR BASES ONLY
NO TAPER REQUIRED ON ASPHALT BASES

EXISTING APPROACH SLAB TRANSITION DETAIL

THE LAST PCCP PANEL

EXISTING BRIDGE APPROACH SLAB

ELEVATION VIEW

LONGITUDINAL JOINT

CONSTRUCTION JOINT

3" TO 4" WIDE

#5 BAR - 18" LONG @ 12" SPACING

DEPTH OF PCCP (D) A

12" 15" D 0.5 ± 0

PLAN VIEW

FINISH OUTER EDGE OF PCCP SHOULDER WITH 1/2" RADIUS

LONGITUDINAL JOINT

TIE BAR - #5 BAR = 30" LONG ON 36" CENTERS

SECTION VIEW

LONGITUDINAL CONTRACTION JOINT

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-06.3(8)B

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-06.3(8)B

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-06.3(8)B

SECTION VIEW

TRANSVERSE CONTRACTION JOINT

TIE BAR - #5 BAR = 30" LONG ON 36" CENTERS

SECTION VIEW

TRANSVERSE CONSTRUCTION JOINT

DOWEL BAR - 1 1/2" Diam. x 18" Long ON 12" CENTERS

SECTION VIEW

EXISTING PCCP

ELEVATION VIEW

PCCP TO HMA
LONGITUDINAL JOINT

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-04.3(12)B

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-04.3(12)B

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-04.3(12)B

SECTION VIEW

ELEVATION VIEW

PCCP TO PCCP
LONGITUDINAL CONSTRUCTION JOINT

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-04.3(12)B

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-04.3(12)B

SAWED GROOVE - WIDTH 3/16" MIN., 5/16" MAX.
OVER MIDPOINT OF BAR
SEE STD. SPEC. 5-04.3(12)B

SECTION VIEW

ELEVATION VIEW

HMA SHOULDER IF REQUIRED

LONGITUDINAL JOINT (SEE SECTION VIEW)

PCCP SHOULDER IF REQUIRED

FINISH OUTER EDGE OF PCCP SHOULDER WITH 1/2" RADIUS

TRANSVERSE CONSTRUCTION JOINT (TYP.)
(SEE SECTION VIEWS)
NOTE

ALL CONDITIONS ARE SHOWN IN PLAN VIEW.
**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

---

**TYPICAL APPLICATIONS**

- **ISOLATION JOINT** - 3/4" PREMOLDED JOINT FILLER
- **EDGES, FLANGES OR LIPS IN PAVEMENT SECTION**
- **CONTINUOUS VERTICAL FACE THROUGH THE PAVED SECTION**
- **DISTANCE FROM NEAREST TRANSVERSE JOINT**
NOTES

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

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

3. The contractor shall avoid sawing out concrete at all locations. For details 1 and 2, the construction tolerance to locate the saw cut is 1/4" (0 min. to 1/2" max.) from the concrete.
NOTES

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

2. Longitudinal joints shall be placed on lane lines and shall be constructed and sealed in accordance with Standard Specification Section 5-05.3(8). Joints may be either a sawcut crack control joint or a construction joint. Sawcut joints shall terminate 1' - 0" before reaching edge of slab and must be sawed as soon as possible after placement of concrete.
   (A) Approach slabs less than 40' wide – no joint is required.
   (B) Approach slabs wider than 40' – one or more joints are required to divide the slab into approximately 24' wide sections.

3. The minimum lap splice of #5 is 2' - 0". The #6 is 3' - 0". And #8 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 #6.

TOP OF GRADE APPROACH SLAB

SAWCUT JOINT

3" SAWCUT DEPTH

TOP OF HMA ROADWAY

SUBGRADE

SAWCUT SHALL BE FILLED WITH HOT-POURED COMPONENT IN ACCORDANCE WITH STANDARD SPECIFICATION SECTION 9-04.2(1) AND SEALED IN ACCORDANCE WITH STANDARD SPECIFICATION SECTION 5-05.3(8)

HMA ROADWAY JOINT DETAIL

SLEEVE WITH POLYSTYRENE OR PVC PIPE

1/2" PREMOLDED JOINT FILLER

INSERT DOWELS PARALLEL TO CENTER LINE ALONG TRANSVERSE CONSTRUCTION JOINT

DOWEL BAR DETAIL FOR CEMENT CONCRETE PAVEMENT

FOR LOCAL AGENCY USE ONLY

BRIDGE APPROACH SLAB

STANDARD PLAN A-40.50-01

SH 1 OF 2 SHEETS

APPROVED FOR PUBLICATION 04/16/13

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTE

PAINT THE METAL COMPONENTS OF THE APPROACH EXPANSION ANCHOR WITH ONE COAT OF INORGANIC ZINC PAINT CONFORMING TO EITHER STANDARD SPECIFICATION SECTION 9-08.1(2)F OR GALVANIZED IN ACCORDANCE WITH AASHTO M 232.

EXPANSION JOINT (SEE PLANS) SEE APPROACH EXPANSION ANCHOR DETAILS EXPANSION JOINT (SEE PLANS)

EXPANDED POLYSTYRENE FULL LENGTH OF JOINT ABOVE COMPRESSION SEAL

NOTE

PAINT THE METAL COMPONENTS OF THE APPROACH EXPANSION ANCHOR WITH ONE COAT OF INORGANIC ZINC PAINT CONFORMING TO EITHER STANDARD SPECIFICATION SECTION 9-08.1(2)F OR GALVANIZED IN ACCORDANCE WITH AASHTO M 232.

EXPANSION JOINT (SEE PLANS) SEE APPROACH EXPANSION ANCHOR DETAILS EXPANSION JOINT (SEE PLANS)

EXPANDED POLYSTYRENE FULL LENGTH OF JOINT ABOVE COMPRESSION SEAL

NOTE

PAINT THE METAL COMPONENTS OF THE APPROACH EXPANSION ANCHOR WITH ONE COAT OF INORGANIC ZINC PAINT CONFORMING TO EITHER STANDARD SPECIFICATION SECTION 9-08.1(2)F OR GALVANIZED IN ACCORDANCE WITH AASHTO M 232.

EXPANSION JOINT (SEE PLANS) SEE APPROACH EXPANSION ANCHOR DETAILS EXPANSION JOINT (SEE PLANS)

EXPANDED POLYSTYRENE FULL LENGTH OF JOINT ABOVE COMPRESSION SEAL

NOTE

PAINT THE METAL COMPONENTS OF THE APPROACH EXPANSION ANCHOR WITH ONE COAT OF INORGANIC ZINC PAINT CONFORMING TO EITHER STANDARD SPECIFICATION SECTION 9-08.1(2)F OR GALVANIZED IN ACCORDANCE WITH AASHTO M 232.
EMBANKMENT WIDENING
AT BRIDGE END
WITH WING WALL
STANDARD PLAN A-50.10-00

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER
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

PLAN
WITH TYPE 2 UNRESTRAINED BARRIER

PRECAST CONCRETE BARRIER
TYPE 2 (UNRESTRAINED)
CONCRETE BARRIER TRANSITION TYPE 2
TO BRIDGE F-SHAPE - SEE STD. PLAN C-6
VARIABLES - SEE CONTRACT

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

PLAN
WITH ANCHORED BARRIER

1 1/4" PVC CONDUIT
SLEEVE
EDGE OF SHOULDER
(CURB LINE)
SEE NOTE
BACK OF PAVEMENT
SEAT
OMIT TAPERED
BARRIER TOE
BRIDGE TRAFFIC BARRIER

PLAN
WITH SINGLE SLOPE BARRIER

SINGLE SLOPE CONCRETE BARRIER
(DUAL FACE)
VARIABLES - SEE CONTRACT

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

CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER
EMBANKMENT WIDENING AT BRIDGE END WITH "L" SHAPED ABUTMENT
STANDARD PLAN A-50.30-00

BEAM GUARDRAIL TYPE 31
TRANSITION SECTION TYPE 21
- SEE STANDARD PLAN C-25.20

EDGE OF SHOULDER (CURB LINE)

PLAN

EDGE OF SHOULDER (CURB LINE)

PLAN

EDGE OF SHOULDER (CURB LINE)

PLAN

EDGE OF SHOULDER (CURB LINE)

ELEVATION

PRECAST GIRDER

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

RETAINING WALL OR CURTAIN WALL
(OR ACCORDING TO PLANS)

END WALL

EMBANKMENT WIDENING

ISOMETRIC VIEW

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

Washington State Department of Transportation
APPROACH SLAB
CEMENT CONCRETE Curb and Gutter
CEMENT CONCRETE SIDEWALK

PLAN
CEMENT CONCRETE CURB AND GUTTER
CEMENT CONCRETE SIDEWALK
WITH RAISED EDGE - SHOWN

PLAN
WITH PEDESTRIAN RAILING

SIDEWALK CONNECTION TO BRIDGE PEDESTRIAN TRAFFIC BARRIER
NOTES

1. Install tie bars across longitudinal joints between new panels (complete and partial) and existing cement concrete pavement lane or shoulder when three 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)

1/2 CONCRETE PAVEMENT DEPTH

SAWED GROOVE - SEE STD. PLAN A-40.10

NEW DOWEL BAR - 1 1/2" (IN) DIAM. X 18" (IN)
PLAN VIEW
Dowel Bar Retrofit
For two lane divided highway (one way traffic)
For each lane in undivided highway (two way traffic)

SECTION B

SECTION A

PLAN VIEW
Dowel Bar Retrofit for one lane
Divided highway (one way traffic)

SECTION C

Dowel Bar Retrofit
For cement concrete pavement
Standard Plan A-60.20-02
Sheet 1 of 2 sheets
Dowel Bar Retrofit for Cement Concrete Pavement

**Standard Plan A-60.20-02**

**Plan View**
- Top of existing cement concrete pavement
- Center of saw
- Top of pavement after grinding (not included in bid item)
- Radius varies depending on saw blade diam.
- 3/8" foam core board - drill 1 1/2" diam. hole for dowel bar
- 3 1/8" min. to 5/16" max. saw cut after concrete patch material has set
- 1 1/2" saw cut depth
- 1/8" min. to 1/4" max. depth of concrete patch material above existing concrete surface

**Section D**
- Transverse contraction joint
- Dowel bar expansion cap - both ends
- Length needed for dowel bar placement
- Dowel bar placement detail
- Chair detail

**Section E**
- Chair to rest parallel to pavement surface
- Dowel bar
- Chair
- Concrrete patch material

**Notes:**
- 1 1/2" (typ.)
- 1/4" (typ.)
- Chair (typ.) - prefabricated

**Details:**
- 3/8" foam core board
- 1/2" drill
- 1 1/2" diam. hole
- For dowel bar
- 2.5" dowel bar
- 2.5" chair

**Specifications:**
- 5" existing cement concrete pavement
- Concrete patch material
- Dowel bar
- Chair
- Transverse contraction joint

**Dimensions:**
- 1/8" min. to 1/4" max. depth
- 3/8" foam core board filler material to maintain joint
- 1/8" min. to 1/4" max. depth of concrete patch material
- 2.5" dowel bar
- 2.5" chair

**Drawn by:** Fern Luedell

**Effective:** August 4, 2014 to August 2, 2015

**Washington State Department of Transportation**
NOTES

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

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

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

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

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

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

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

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

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

PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR plain concrete</td>
<td>12&quot;</td>
</tr>
<tr>
<td>all metal pipe</td>
<td>15&quot;</td>
</tr>
<tr>
<td>CPSSP * (STD. SPEC. 9-05.20)</td>
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</tr>
<tr>
<td>SOLID WALL PVC (STD. SPEC. 9-05-101)</td>
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<tr>
<td>PROFILE WALL PVC (STD. SPEC. 9-05-192)</td>
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<tr>
<td>* corrugated polyethylene</td>
<td></td>
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<tr>
<td>storm sewer pipe</td>
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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 26", in any direction. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.

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

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

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

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

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

---

**PIPE ALLOWANCES**

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<tr>
<th>PIPE MATERIAL</th>
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<tr>
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<td>18&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>21&quot;</td>
</tr>
<tr>
<td>CPSSP *(STD. SPEC. 9-05.20)</td>
<td>18&quot;</td>
</tr>
<tr>
<td>SOLID WALL PVC *(STD. SPEC. 9-05.191)</td>
<td>21&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC *(STD. SPEC. 9-05.192)</td>
<td>21&quot;</td>
</tr>
</tbody>
</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

---

**FRAME AND VANED GRATE**

**RECTANGULAR ADJUSTMENT SECTION**

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

**REDUCING SECTION**

TWO #3 BAR HOOPS

#3 BAR EACH CORNER 18" MIN.

#3 BAR EACH WAY

#3 BAR EACH SIDE

#3 BAR EACH CORNER

**CATCH BASIN TYPE 1L**

**STANDARD PLAN B-5.40-01**

(SHEET 1 OF 1 SHEET)

APPROVED FOR PUBLICATION

**WASHINGTON DISTRICT DEPARTMENT OF TRANSPORTATION**

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 FRAME AND VANED GRATE OR MANHOLE RING AND COVER

RECTANGULAR ADJUSTMENT SECTION OR CIRCULAR ADJUSTMENT SECTION

FLAT SLAB TOP

MORTAR (TYP.)

STEPS OR LADDER

REINFORCING STEEL (TYP.)

GRAVEL BACKFILL FOR PIPE ZONE BEDDING

SEPARATE BASE PRECAST

INTEGRAL BASE PRECAST WITH RISER (48" - 72" ONLY)

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.

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>48&quot;</td>
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</table>

PIECE ALLOWANCES

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE DIA. PROFILE WALL PVC</th>
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<tbody>
<tr>
<td>48&quot;</td>
<td>Corrugated Polyethylene Storm Sewer Pipe (Standard Specification 9-05.20)</td>
</tr>
<tr>
<td>54&quot;</td>
<td>(Standard Specification 9-05.12(1))</td>
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<tr>
<td>60&quot;</td>
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</tbody>
</table>

CATCH BASIN TYPE 2

STANDARD PLAN B-10.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
NOTES

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

2. The vertical riser stem of the flow restrictor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8”.

3. The flow restrictor shall be fabricated from one of the following materials:
   - 0.060” Corrugated Aluminum Alloy Drain Pipe
   - 0.064” Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.064” Corrugated Aluminized Steel Drain Pipe
   - 0.060” Aluminum alloy flat sheet, in accordance with ASTM B 209, 5052 H32 or EPS High Density Polyethylene Storm Sewer Pipe

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

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

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

7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 26 and ASTM B 275, designation ZG32A; or cast iron in accordance with ASTM A 48, Class 308.

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

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

The vertical riser stem of the flow restrictor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8”.

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.

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

The shear gate shall be made of aluminum alloy in accordance with ASTM B 26 and ASTM B 275, designation ZG32A; or cast iron in accordance with ASTM A 48, Class 308.

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

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

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

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

All shear gate bolts shall be stainless steel.

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

Alternative shear gate designs are acceptable if material specifications are met and flange bolt pattern matches.
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.
GRANVIL BACKFILL FOR PIPE ZONE BEDDING

STEPS OR LADDER

24:1 SLOPE

MANHOLE RING AND COVER

CIRCULAR ADJUSTMENT SECTION (TYP.)

ECCENTRIC CONE SECTION

PRECAST RISER SECTIONS

CHANNEL AND SHELF

REINFORCING STEEL (TYP.)

SEPARATE BASE PRECAST

INTEGRAL BASE PRECAST WITH RISER

GRANVIL BACKFILL FOR PIPE ZONE BEDDING

NOTES

1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
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<td>48&quot;</td>
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</tbody>
</table>

MANHOLE TYPE 1

STANDARD PLAN B-15.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

PAMELA BATTEN

STATE HIGHWAY DESIGNER

DATE: 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.

MANHOLE DIMENSION TABLE

<table>
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</tbody>
</table>
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.
3. No steps are required when height is 4' or less.

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
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<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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<td>108&quot;</td>
<td>12&quot;</td>
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MANHOLE TYPE 3

STANDARD PLAN B-15.60-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

1-5-12

DRAWN BY: LISA CYFORD

MANHOLE DIMENSION TABLE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

MANHOLE DIMENSION TABLE
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.

CUTAWAY ELEVATION VIEW
INTEGRAL BASE DETAIL

DARKYELL TYPE 1
(FOR SWALE)
STANDARD PLAN B-20.20-02
SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE
3/4/12
APPROVED FOR PUBLICATION
3/4/12

Washington State Department of Transportation
NOTES

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

1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. For depths over 16’ - 2” use 72” 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” DAM GRAIN HOLES (TYP.)
POSITIONED NOT TO INTERFERE WITH REINFORCING BARS

INTEGRAL BASE DETAIL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PRECAST CONTROL NUMBER: 3/14/12

INTEGRAL BASE DETAIL

ALTERNATIVE PRECAST FOOTING DETAIL

INTEGRAL BASE PRECAST WITH RISER

CUTAWAY ELEVATION VIEW

ALTERNATIVE FOOTING PRECAST

GRAVEL BACKFILL FOR DRYWELL

SEE PAGE PORT - SEE NOTE 2

UNDERGROUND DRAINAGE SEDIMENT MODERATE SURVIVABILITY CLASS A

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

FLOOR DRAINAGE HOLE BASE COURSE

FINISHED SURFACE

VARIABLES

72"

12"

12"

I.D. 48"

VARIES

VARIES

4" CONCRETE SLAB - COMMERCIAL CONCRETE

CRUSHED SURFACING BASE COURSE

ADJUSTMENT SECTION (TYP.)

CONE SECTION

CIRCULAR FRAME (RING) — SEE STANDARD PLAN B-20.70

CIRCULAR GRATE — SEE STANDARD PLAN B-20.69

FINISHED SURFACE
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.
PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
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</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
<td>12&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
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<tr>
<td>CPSSP * (STD. SPEC. 9-05.20)</td>
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<tr>
<td>SOLID WALL PVC (STD. SPEC. 9-05.12(1))</td>
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</tr>
<tr>
<td>PROFILE WALL PVC (STD. SPEC. 9-05.12(2))</td>
<td>15&quot;</td>
</tr>
</tbody>
</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

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

2. The knockout diameter shall not be greater than 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.

CONCRETE INLET

STANDARD PLAN B-25.60-00

SEE NOTE 1

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

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

3. Refer to Standard Specification 9-05.15(2) for additional requirements.
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 1 1/2" 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 9-04 (§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.

BOLT-DOWN CAPABILITY 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.

FOR FRAME DETAILS, SEE STANDARD PLAN B-30.10.

REFER TO STANDARD SPECIFICATION 9-05.15(2) FOR ADDITIONAL REQUIREMENTS.
NOTES

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

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

3. For frame details, see Standard Plan B-30.10.
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."
1. The gasket and groove may be in the seat (frame) or in the underside of the cover. The gasket may be "T" shaped in section. The groove may be cast or machined.

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

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

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

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

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

7. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1.5 times the horizontal scale (1H: 1.5V).
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.
#6 BARS @ 7" SPACING

20" x 24", 24" DIA. 48" DIA. OR 54" DIA. HOLE

84" or 96" FLAT SLAB TOP

TYPICAL ORIENTATION FOR ACCESS AND STEPS

#6 BARS @ 6" SPACING

20" x 24", 24" DIA. 48" DIA. OR 54" DIA. HOLE

72" FLAT SLAB TOP

ECCENTRIC CONE SECTION

#4 BARS @ 6" SPACING

20" x 24" OR 24" DIA. HOLE

48", 54", or 60" FLAT SLAB TOP

RECTANGULAR ADJUSTMENT SECTION

As an acceptable alternative to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used for adjustment sections.

CIRCULAR ADJUSTMENT SECTION

NOTE

Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 189.

PREFACTRICATED LADDER

ONE #3 BAR HOOP FOR 6"
TWO #3 BAR HOOPS FOR 12"

MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES

STANDARD PLAN B-30.90-01

SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION 9/29/07

EXPIRES JUL 1 2007
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. 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.

Section C UNIT "J"

UNIT "H"

Section C UNIT "K"

Bar List

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Bending Diagram

Grate Inlet Type 2

Standard Plan B-35.40-00

Sheet 2 of 2 Sheets

Grate - See Note 9

1/4" X 5 1/2" X 1 1/2" STEEL ANGLES (3 BOTH ENDS)
ELEVEN EQUAL SPACES

TOP

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

SIDE

GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

3 1/2" X 3/8" STEEL PLATE (TYP.)

END

3 1/2" X 3/8" STEEL PLATES

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)

3 1/2" + 3/4" STEEL PLATE (BOTH SIDES)

SIDE

WELDED GRATES FOR GRATE INLET

STANDARD PLAN B-40.20-00

EXPIRES JULY 1, 2007

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: MARK SLIKA

DATE: 6/1/06

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015

46 3/4"
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.
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.
3 1/2" x 1/2" x 1/2" STEEL PLATE (TYP.)

OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING

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

5 1/4"

34 1/2"

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

3 1/2" x 1/2" x 33 1/4" STEEL PLATE (TYP.)

 Sections A, B, C

GRATES FOR DROP INLET

STANDARD PLAN B-50.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

6/1/06
NOTES
1. See Standard Specifications Section 7-08.3(3) for Pipe Zone Backfill.
2. See Standard Specifications Section 9-03.12(3) for Gravel Backfill for Pipe Zone Bedding.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.

CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS

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<tr>
<th>PIPE</th>
<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
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<td>30&quot; to 96&quot;</td>
<td>DIAM. /2</td>
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<td>102&quot; to 180&quot;</td>
<td>48&quot;</td>
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<tr>
<td>PIPE ARCH (SPAN)</td>
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<td>METAL ONLY</td>
<td>43&quot; to 142&quot;</td>
<td>SPAN /3</td>
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<tr>
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<td>148&quot; to 200&quot;</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>
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 a flat Type K Coupling Band. Type K Coupling Bands with dimples are not allowed for the installation detail shown. The Coupling Band option shall only be used for extending existing pipes that have an inside diameter of 36" or less.

CONNECTION DETAILS FOR DISSIMILAR CULVERT PIPE
STANDARD PLAN B-60.20-00
SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EXPRES JULY 1, 2007
HARVEY J. RYAN
STATE DESIGN ENGINEER
# Coupling Band Dimension Table

<table>
<thead>
<tr>
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<th>Corrugation Pitch + Depth</th>
<th>Pipe Dia. Min. Width</th>
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<td>12 - 84</td>
<td>Sleeve</td>
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<td>12 - 84</td>
<td>O-Ring</td>
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<td>2 2/3 x 1/2</td>
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<td>Butyl</td>
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<tr>
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<td>3 x 1</td>
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</tr>
<tr>
<td>K</td>
<td>3 x 1</td>
<td>54 - 84</td>
<td>Sleeve</td>
</tr>
</tbody>
</table>

* Pipe Arch Only

---

**Note:** All dimensions are in inches.
NOTES

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

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

3. Unless indicated otherwise a 10" depth (over the inside crests of corrugations) of earth shall be placed in the invert of the Structural Plate Underpass, Design 1, for its full width and length. The earth shall consist of naturally occurring materials available in the vicinity of the structural plate underpass installation. See Standard Specification 7-03.3.4.

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

Allowable Heights of Cover

<table>
<thead>
<tr>
<th>SPAN</th>
<th>RISE</th>
<th>12 GAGE THICK CORRUGATED METAL COVER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>MIN.</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>7'-1&quot;</td>
<td>4</td>
</tr>
<tr>
<td>6'-10&quot;</td>
<td>8'-2&quot;</td>
<td>5</td>
</tr>
</tbody>
</table>

ANIMAL UNDERPASS
STANDARD PLAN 8-65.20-01
SHEET 1 OF 1 SHEET
Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.
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.
### Table of Pipe Arch Dimensions

<table>
<thead>
<tr>
<th>PIPE ARCH DIMENSION (INCHES)</th>
<th>THICKNESS (INCHES)</th>
<th>A</th>
<th>B</th>
<th>H</th>
<th>L</th>
<th>W</th>
<th>T</th>
<th>PIPE DIMENSION (INCHES)</th>
<th>THICKNESS (INCHES)</th>
<th>A</th>
<th>B</th>
<th>H</th>
<th>L</th>
<th>W</th>
<th>T</th>
<th>END SECTION SLOPE (IN/ft)</th>
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<td>1/2</td>
<td>0.060</td>
<td>6</td>
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</tr>
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<td>1/2</td>
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<td>16</td>
<td>24</td>
<td>36</td>
<td>48</td>
<td>2/1</td>
</tr>
</tbody>
</table>

### Notes

1. The diameter of the end section of Design B shall match the inside diameter of the concrete pipe.
2. Skirt sections shall be made in one piece for round pipe with a diameter of 12” to 24” inclusive and for pipe arches with a rise of 13” to 20” inclusive. Skirt sections for larger sizes of pipes may be multiple pieces in conformance with the tabulated values shown.
3. Design A end sections for 42” thru 84” diameter and 49” x 33” thru 63” x 57” arch with annular corrugations and all helically corrugated pipe arch include one foot of pipe length as a connector section. The connector section shall be attached to the end section by welds, rivets or bolts and shall be the same thickness as the end section.
4. Design C may be used in lieu of Design A for all metal pipe sizes except as noted. Coupling bands may be any acceptable type for the pipe specified.

### Design

- **Design A**: Connection to Metal Pipe
- **Design B**: Connection to Concrete Pipe
- **Design C**: Connection to Metal or Concrete Pipe

### Flared End Sections

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection to Metal Pipe</td>
</tr>
<tr>
<td>2</td>
<td>Connection to Concrete Pipe</td>
</tr>
<tr>
<td>3</td>
<td>Connection to Metal or Concrete Pipe</td>
</tr>
</tbody>
</table>

### Constructions

- **FLARED END SECTIONS**: STANDARD PLAN B-70.60-00
- **SECTION A**: Elevation View
- **SECTION B**: Plan View

### Diagrams

- Detailed diagrams showing connections and tolerances for various pipe arch and skirt dimensions.

### Specifications

- Steel or aluminum skirts, 16 gage galvanized steel fastened with a 1 1/4 wide strap, 16 gage galvanized steel fastened with a 1/4 wide strap, 16 gage galvanized steel fastened with a 1/4 wide strap.

### Additional Notes

- Reinforced edges of the following size End Sections shall be supplemented with galvanized steel stiffeners:
  - 60” thru 72” diameter pipe: 2 x 2 x 1/4 angle
  - 78” and 84” diameter pipe, and 77” x 52” & 83” x 57” pipe arch: 2 1/2 x 2 1/2 x 1/4 angle

- Steel angle reinforcement shall be attached by 3/8” galvanized nuts and bolts.

- Helically corrugated pipe shall be used as required.

### Summary

- Detailed specifications and notes for various pipe arch and skirt designs, including dimensions, tolerances, and construction details.

---

*Effective: August 4, 2014 to August 2, 2015*
**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".

---

**Pipes and Structural Plate Pipes**

**Fill Slope - Variable**

4# Bars Equally Spaced

16" Max. Center to Center

Commercial Concrete

**Anchor Bolts - Equally Spaced, 24" Max. Center to Center**

(See Note 3)

**Structural Plate Pipe Arches and Underpasses**

**Step Mitered Pipe**

**Fill Slope - Variable**

4# Bars Equally Spaced

16" Max. Center to Center

Commercial Concrete

**Anchor Bolts - Equally Spaced, 24" Max. Center to Center**

(See Note 3)

**Full Mitered Pipe**

---

**Headwalls for Culvert Pipe and Underpass**

**Standard Plan B-75.20-01**

**Anchor Bolt Detail**

3/4" Bolt

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

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

3. Bevel culvert pipe to match side slope.

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

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

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

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

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

1/4" - 3/4" RESIN BONDED ANCHOR (TYP.)

3 1/2" X 3 1/2" BLOCKOUT (TYP.) - FIELD CUT CULVERT TO MATCH BLOCKOUT IN HEADWALL

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

STANDARD PLAN B-75.60-00
EDGE OF END SECTION SHEET ROLLED SNUGLY AGAINST STEEL ROD

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

EDGE OF END SECTION SHEET ROLLED SNUGLY AGAINST STEEL ROD

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

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

SAFETY BAR END TREATMENT DETAIL

7/16" X 1" SLOTS (TYP.)

SLOPE

SIDEBOLT (TYP.)

SIDE VIEW

SAFETY BARS (TYP.) - SEE NOTE 5

CROSS DRAINAGE BAR DETAIL

SAFETY BAR END TREATMENT - SEE DETAIL

ISOMETRIC VIEW

CROSS DRAINAGE STRUCTURE

3/8" DIAM. HEX HEAD BOLTS (TYP.)

3/8" DIAM. HEX HEAD BOLTS (TYP.)

3/8" DIAM. THREADED ROD OVER TOP OF END SECTION. SIDE LUGS TO BE BOLTED TO END SECTION

METAL END SECTIONS FOR CIRCULAR PIPES

<table>
<thead>
<tr>
<th>PIPE DIA. (INCHES)</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
<th>OVERALL WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN.</td>
<td>A</td>
<td>H</td>
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</table>

METAL END SECTIONS FOR ARCHED PIPES

<table>
<thead>
<tr>
<th>EQUIV. DIA. (INCHES)</th>
<th>PIPE ARCH DIMENSIONS</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
<th>OVERALL WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
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<td>SPAN (IN.)</td>
<td>RISE (IN.)</td>
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<td>A</td>
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</table>

* SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"
**SAFEY BAR END TREATMENT DETAIL**

1/2" DIA. CARRIAGE HEAD BOLTS (TYP.)

**SAFETY BAR END TREATMENT DETAIL**

1/2" DIA. CARRIAGE HEAD BOLTS (TYP.)

**SIDE VIEW**

**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.

### METAL END SECTIONS FOR CIRCULAR PIPES

<table>
<thead>
<tr>
<th>PIPE DIAM. (INCHES)</th>
<th>GAGE</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
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<td>OVERALL WIDTH</td>
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### METAL END SECTIONS FOR ARCHED PIPES

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### METAL END SECTIONS FOR TAPERED END SECTIONS

<table>
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<tr>
<th>EQUIV. DIAM. (INCHES)</th>
<th>PIPE ARCH MIN. (INCHES)</th>
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**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.
CONCRETE SIDEWALK-plantas may vary

ROADWAY

PLANTING STRIP

24" MIN. SLOPE

TEMPORARY CAP AT EDGE OF R/W, UNLESS OTHERWISE DIRECITED IN CONTRACT

4" DRAIN PIPE

DUMMY JOINT

CONCRETE CURB-TYPE MAY VARY

CONCRETE CURB

WIRE MESH REINFORCEMENT

4 x 8 W4.0 x W4.0 (6 GAGE)

4 x 10 W6.0 x W6.0 (8 GAGE)

(SEE STD. SPEC. 9-07.7)

1/2" MINIMUM COVER

INVERT OF DRAIN SHALL BE AT OR ABOVE GUTTER LINE

ROADWAY

SECTION A

ISOMETRIC

RESIDENTIAL STORM DRAIN, UNDER SIDEWALK

STANDARD PLAN B-82.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

EXPIRES JULY 1, 2007

6/1/06

6/1/06

Matthew J. Stys

State Design Engineer

Washington State Department of Transportation

EFFECTIVE: AUGUST 4, 2014 TO AUGUST 2, 2015
VERTICAL CONNECTION
STANDARD PLAN B-85.10-01
FOR SANITARY SEWER USE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

6/1/09

SHEET OF 1 SHEET
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.

FOR SANITARY SEWER USE

SIDE SEWER CONNECTION

STANDARD PLAN B-85.20-00
45° BEND

4" or 6" SEWER PIPE
(SEE CONTRACT)

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

45° BEND

SEWER MAIN

FOR SANITARY SEWER USE

STANDING SIDE SEWER CONNECTION

STANDARD PLAN B-85.30-00

SHEET 1 OF 1 SHEET
8 INCH SEWER CLEAN-OUT

STANDARD PLAN B-85.40-00

FOR SANITARY SEWER USE

CAST IRON RING AND COVER
One length of ductile iron pipe (Class 50) to solid bearing when span is more than 48' is more than 48".

Flexible joint clearance 2".

Mortar dam or plug as required by engineer.

For sanitary sewer use.
**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.
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.
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 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>TEE AND DEAD ENDS</th>
<th>90° BEND</th>
<th>45° BEND</th>
<th>22.5° BEND</th>
<th>11.25° BEND</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
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SOIL TYPE | SAFE BEARING LOAD (PSF)
----------|----------------------
MUCK, PEAT, ETC. | 0
SOFT CLAY | 1,000
SAND | 2,000
SAND AND GRAVEL | 3,000
SAND AND GRAVEL CEMENTED WITH CLAY | 4,000
HARD SHALE | 10,000

CONCRETE THRUST BLOCK

STANDARD PLAN B-90.40-00
TWO TIE RODS WITH TURNBUCKLES

BLOCKING FOR 11.25° OR 22.5° VERTICAL BENDS

FOUR TIE RODS WITH TURNBUCKLES

BLOCKING FOR 45° VERTICAL BENDS

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

<table>
<thead>
<tr>
<th>PIPE DIAM.</th>
<th>TEST PRESSURE (PSI)</th>
<th>BEND ANGLE</th>
<th>CONCRETE VOLUME (Ft³)</th>
<th>CUBE SIZE (Ft)</th>
<th>TIE ROD DIAM.</th>
<th>TIE ROD EMBEDMENT</th>
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<td>2.8</td>
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<td>250</td>
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<td>7/8&quot;</td>
<td>24&quot;</td>
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<td></td>
<td></td>
<td>45&quot;</td>
<td>355</td>
<td>7.1</td>
<td>1 1/8&quot;</td>
<td>30&quot;</td>
</tr>
</tbody>
</table>
NOTES
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, 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.
1. When required by the Contract, a Snow Load Post Washer shall be used on the backside of the post (in lieu of the 1 3/4" Post Bolt Washer) and a Snow Load Rail Washer shall be placed on the face side of Beam Guardrail Types 1 and 2. Snow Load Rail Washers shall not be installed on terminals.

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

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

4. Timber blocks shall be toe-nailed to the post with a 1/3" galvanized nail to prevent block rotation.

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

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

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

EXPANSION SECTION

3/4" SPLICE HOLES IN CHANNEL RAIL AND SPLICE PLATE, FOR 5/8" CARRIAGE BOLTS

3/4" x 2" POST BOLT SLOT IN CHANNEL RAIL AND SPLICE PLATE, FOR 5/8" BUTTON HEAD BOLT W/ 3/16" OVAL GRIP AND RECESSED NUT

POST CONNECTION

SPLICE PLATE - 3/8" X 4 1/2" X 7 7/8"

3/4" 2" SPLICE SLOT IN CHANNEL RAIL & SPLICE PLATE, FOR 5/8" CARRIAGE BOLT, HEX NUT & WASHER

SPLICE BOLT SLOTS (TYP.) - 29/32" X 1 1/8"

POST BOLT SLOT (TYP.) - 3/4" X 2 1/2"

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

SPLICE BOLT SLOTS (TYP.) - 29/32" X 1 1/8"

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

POST BOLT SLOT (TYP.) - 3/4" X 2 1/2"

POST BOLT SLOT (TYP.) - 29/32" X 1 1/8"

SPLICE BOLT SLOTS (TYP.) - 29/32" X 2"
NOTES

1. Type 10 post shall be 6x8 timber or W6x9. Type 11 post shall be 10x10 timber or W6x15. For additional details see Standard Plan C-1b.

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

3. Spacing may vary depending on application. See Standard Specification Section 5-16.3(1) for rail element requirements.

TYPICAL RAIL ELEMENT

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

TIMBER BLOCK FOR STEEL POST

THREE BEAM GUARDRAIL - NESTED FOR TYPE 11

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

SEE NOTE 1

5/8" x 1 1/4" BUTTON HEAD BOLT W/ 7/32" OVAL GRIP & RECESSION HEX NUT - TWELVE REQUIRED PER SPLICE

EXPANSION SECTION

SEE NOTE 3

POST BOLT SLOT (TYP.) - 3/4" X 2 1/2"

SPLICE BOLT SLOT (TYP.) - 29/32" X 1 1/8"
NOTES

1. Wood posts for all guardrail placement plans shall be 6 x 8 except where noted otherwise.

2. Lower hole is for Rub Rail of Type 2 and Type 3 Beam Guardrail.

3. W6 x 9 steel posts and timber blocks are alternates for 6 x 8 timber posts and blocks. W6 x 15 steel posts and timber blocks are alternates for 10 x 10 timber posts and blocks.

4. Holes shall be located on approaching traffic side of web.

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

6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.
## POST LENGTH TABLE

<table>
<thead>
<tr>
<th>GUARDRAIL TYPE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 through 4 &amp; 31</td>
<td>8' - 0&quot;</td>
</tr>
<tr>
<td>10 or 11</td>
<td>6' - 6&quot;</td>
</tr>
</tbody>
</table>

## GUARDRAIL LENGTH

### TYPE 1 TO 4 & 31
- 8' - 0"
- 10' - 6"
- 12' - 0"
- 14' - 0"
- 16' - 0"

### TYPE 5 TO 8
- 8' - 0"
- 10' - 6"
- 12' - 0"
- 14' - 0"
- 16' - 0"

### TYPE 9 TO 12
- 8' - 0"
- 10' - 6"
- 12' - 0"
- 14' - 0"
- 16' - 0"

### TYPE 13 TO 20
- 8' - 0"
- 10' - 6"
- 12' - 0"
- 14' - 0"
- 16' - 0"

### TYPE 21 TO 30
- 8' - 0"
- 10' - 6"
- 12' - 0"
- 14' - 0"
- 16' - 0"

### TYPE 31
- 8' - 0"
- 10' - 6"
- 12' - 0"
- 14' - 0"
- 16' - 0"

## GUARDRAIL POSTS AND BLOCKS

### W-BEAM GUARDRAIL POSTS AND BLOCKS
- FOR WOOD POSTS
- FOR STEEL POSTS

### W-BEAM
- 6' OR 10' (NOM.)

### WOOD POST
- 6' OR 10' (NOM.)

### THRIE BEAM
- 6' OR 10' (NOM.)

### STEEL POST
- 6' OR 10' (NOM.)

### POST LENGTH TABLE

<table>
<thead>
<tr>
<th>POST</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
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<td>8&quot;</td>
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<tr>
<td>W6 x 15</td>
<td>8&quot;</td>
<td>6 1/4&quot;</td>
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</table>

* NOMINAL (NOM.)

## GUARDRAIL LENGTH

### CONTROLLED RELEASING TERMINAL (CRT) POST
- 6' OR 10' (NOM.)

### SOIL PLATE
- TS 8" x 6" x 0.1875" (STEEL)

## GUARDRAIL POSTS AND BLOCKS

### W-BEAM GUARDRAIL POSTS AND BLOCKS
- FOR WOOD POSTS
- FOR STEEL POSTS

### W-BEAM
- 6' OR 10' (NOM.)

### WOOD POST
- 6' OR 10' (NOM.)

### THRIE BEAM
- 6' OR 10' (NOM.)

### STEEL POST
- 6' OR 10' (NOM.)

### POST LENGTH TABLE

<table>
<thead>
<tr>
<th>POST</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>W6</td>
<td>8&quot;</td>
<td>4 1/4&quot;</td>
</tr>
<tr>
<td>W6 x 15</td>
<td>8&quot;</td>
<td>6 1/4&quot;</td>
</tr>
</tbody>
</table>

* NOMINAL (NOM.)

## GUARDRAIL LENGTH

### CONTROLLED RELEASING TERMINAL (CRT) POST
- 6' OR 10' (NOM.)

### SOIL PLATE
- TS 8" x 6" x 0.1875" (STEEL)
NOTES
1. For post details see Standard Plan, "Beam Guardrail Posts and Blocks".

DETAIL A
1/4" 01A x 1 1/2" hex head bolt with hex nut and 1 1/2" square x .135" washer

DETAIL B
1/4" D14 x 1 1/2" Hex head bolt with hex nut. Guardrail rests on top of bolt.

TYPE 20
 TYPE 21

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

DETAIL A
1/4" 01A x 1 1/2" hex head bolt with hex nut and 1 1/2" square x .135" washer

DETAIL B
1/4" D14 x 1 1/2" Hex head bolt with hex nut. Guardrail rests on top of bolt.

BEAM GUARDRAIL

STANDARD PLAN C-1c

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
INTERMEDIATE GUARDRAIL POST CONNECTION DETAILS

(TYPE A SHOWN)

THRIE BEAM GUARDRAIL REDUCER SECTION

(TYPE A SHOWN)

THRIE BEAM GUARDRAIL REDUCER SECTION

(TYPE B 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

STANDARD PLAN C-1d

SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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.
BEAM GUARDRAIL TRANSITION SECTION
PAY LIMIT - SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT
X SPACES @ 6' - 3"

VARIES - SEE CONTRACT

SEE NOTE 2

CASE 4

NOTE 3

CASE 5

NOTE 3

CASE 6

FLARE RATE TABLE

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<th>POSTED SPEED (MPH)</th>
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<td>60</td>
<td>14:1</td>
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<tr>
<td>55</td>
<td>12:1</td>
</tr>
<tr>
<td>50</td>
<td>11:1</td>
</tr>
<tr>
<td>45</td>
<td>10:1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>9:1</td>
</tr>
</tbody>
</table>
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 6x8 post of the Beam Guardrail Transition Section Type 16, and by lapping it behind the second 6x8 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" to 3" maximum is acceptable. If the last 12" - 6" section extends more than 6" - 3" (but less than 12" - 6"), use a nested 6" - 3" thrie beam section in its place.

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

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

**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>15:1</td>
</tr>
<tr>
<td>60</td>
<td>14:1</td>
</tr>
<tr>
<td>55</td>
<td>12:1</td>
</tr>
<tr>
<td>50</td>
<td>11:1</td>
</tr>
<tr>
<td>45</td>
<td>10:1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>9:1</td>
</tr>
</tbody>
</table>

**NOTES**

- **Case 7**
  - **PLAN VIEW** (Wood post and block shown)
  - **BEAM GUARDRAIL** TYPE 3 OR 4
    - PAY LIMIT (SEE NOTE 1)
  - **BEAM GUARDRAIL** TYPE 1 OR 2
    - PAY LIMIT (SEE NOTE 1)
  - **BEAM GUARDRAIL** TYPE 10
    - PAY LIMIT (SEE NOTE 1)

- **Case 8**
  - **PLAN VIEW** (Wood post and block shown)
  - **BEAM GUARDRAIL** TRANSITION SECTION
    - TYPE 16 - PAY LIMIT (SEE NOTE 1)
    - PAY LIMIT (SEE NOTE 1)
    - PAY LIMIT (SEE NOTE 1)
    - PAY LIMIT (SEE NOTE 1)

---

**GUARDRAIL PLACEMENT STANDARD PLAN C-2b**

**STREET NAME**

**DATE**

**APPROVED FOR PUBLICATION**

**DATE**

**REVISION**
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.
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 shall not be steeper than 10:1.

3. Attach to rail with 3/4" x 9" long bolt, nut and 1/2" washer on back of post.

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

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

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

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

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

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

GUARDRAIL PLACEMENT
WEAK POST INTERSECTION
DESIGN (8'-6" MAX RADIUS)
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 Rail System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.

CASE 14

GUARDRAIL PLACEMENT

STANDARD PLAN C-2h
NOTES

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

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


CASE 15

GUARDRAIL PLACEMENT

STANDARD PLAN C-21

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
NOTES

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

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

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

4. For guardrail to bridge roll connection see applicable Standard Plans(s) or Contract.

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

---

**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>Rate</th>
<th>Posted Speed (MPH)</th>
</tr>
</thead>
<tbody>
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<td>12:1</td>
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<tr>
<td>11:1</td>
<td>50</td>
</tr>
<tr>
<td>10:1</td>
<td>45</td>
</tr>
<tr>
<td>9:1</td>
<td>40 or less</td>
</tr>
</tbody>
</table>

---

**GUARDRAIL PLACEMENT**

**STANDARD PLAN C-2J**
CASE 19 A
SPlice IN CENTER

CASE 19 B
SPlice AT POSTS
SECTION 0

SINGLE W-BEAM RAIL ELEMENT

SECTION A

NESTED W-BEAM RAIL ELEMENTS

SECTION B

CASE 20

GUARDRAIL PAY LIMIT

37'-6" NESTED W-BEAM

6'-3" TYP.

18'-6"

6'-3" TYP.

ELEVATION

GROUND LINE

GUARDRAIL PLACEMENT

18'-9" SPAN

STANDARD PLAN C-2N

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES MAY 3, 2002

1.26.01

STATE OF WASHINGTON

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015
NOTES
1. See Standard Plan C-1b for additional details.
2. One-way traffic layouts are identical to the two-way layout with the exception that only the posts trailing the span need to be CRT's with double blocks.

CASE 21

ONE-WAY TRAFFIC

CRT POSTS WITH TWO BLOCKS (SEE NOTE 2)

WOOD BLOCKS

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

WOOD 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 3/4" MAX width. Plate shall be galvanized after etching.

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

IDENTIFICATION PLATE 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 1A - PAY LIMIT
SEE STANDARD PLAN C-24.10, B OR E CONNECTION
TERMINE CURB AT BRIDGE RAIL OR BARRIER, MATCH FACE
4" EXTENDED CURB SEE NOTE 1
6' - 6" LONG, 10 + 10 POSTS WITH 8 x 8 BLOCKS
8" - 6" LONG, 10 + 10 POSTS WITH 8 x 8 BLOCKS

BEAM GUARDRAIL TRANSITION SECTION TYPE 1B - PAY LIMIT
SEE CONTRACT PLANS FOR SPECIFIED CONNECTION
TERMINE CURB AT BRIDGE RAIL OR BARRIER, MATCH FACE
4" EXTENDED CURB SEE NOTE 1
6' - 6" LONG, 10 + 10 POSTS WITH STANDARD BLOCK (TYP.)
6" - 6" POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL TRANSITION SECTION TYPE 1B - PAY LIMIT
SEE CONTRACT PLANS FOR SPECIFIED CONNECTION
TERMINE CURB AT BRIDGE RAIL OR BARRIER, MATCH FACE
4" EXTENDED CURB SEE NOTE 1
6' - 6" LONG, 10 + 10 POSTS WITH STANDARD BLOCK (TYP.)
6" - 6" POST WITH STANDARD BLOCK (TYP.)

BEAM GUARDRAIL TRANSITION SECTION TYPE 1B - PAY LIMIT
SEE CONTRACT PLANS FOR SPECIFIED CONNECTION
TERMINE CURB AT BRIDGE RAIL OR BARRIER, MATCH FACE
4" EXTENDED CURB SEE NOTE 1
6' - 6" LONG, 10 + 10 POSTS WITH STANDARD BLOCK (TYP.)
6" - 6" POST WITH STANDARD BLOCK (TYP.)
BEAM GUARDRAIL TRANSITION SECTION TYPE 2 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

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

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

TYPE 2

BEAM GUARDRAIL TRANSITION SECTION TYPE 4 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

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 @ 3' - 1 1/2"

TOTAL LENGTH = 6' - 3"
TOTAL LENGTH = 6' - 3"

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

TYPE 5

BEAM GUARDRAIL TRANSITION SECTION TYPE 6 - PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

6' - 0" POST SPACING EIGHT SPACES @ 3' - 1 1/2" MAX.

TOTAL LENGTH = 25' - 0"

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

TYPE 6

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

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

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

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

3. Install Extruded Curb (See Standard Plan P-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 the 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

Rev 1 used for Lengths

Standard Plan C-4b
NOTES

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

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

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

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

5. Length for ET-PLUS (TL3) and SKT-350 is 50’. Length for ET-PLUS (TL2) and SKT-TL2 is 25’.
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.
1. Anchor plate may be constructed from ¼" plates welded to equal strength and dimensions as shown.
2. For end section details, see Standard Plan "Beam Guardrail End Sections".
3. For post details, see Standard Plan "Beam Guardrail Posts and Blocks".
4. Eight ¾" x 1½" machine bolts with hex nut and washer. Place washer on face side of rail.
5. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
6. Toe nail bearing plate with 10d nail at corners to prevent turning.
7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail terminal.
NOTES

1. Rail section and W8 x 18 steel post shall be fabricated to receive 5/8" hex head bolts as shown.
2. All bolts shall be high strength 5/8" hex head bolts with anchor rail washers.
**NOTES**

1. For details, see Standard Plan C-6.
2. For end section details see Standard Plan C-7 or C-7a.
3. For details, see Standard Plan C-10.
4. Outside nut shall be torqued against inside nut a minimum of 100 ft.-lbs.
5. Post and block shall match beam guardrail posts.

---

**BEAM GUARDRAIL**

**ANCHOR PAY LIMIT**

- **W BEAM INSTALLATION**
  - Two 1" nuts and washers (See Note 4)
  - Standard 2" ID pipe sleeve (2 3/8" OD)
  - Bearing plate (See Note 1)
  - Two 1" nuts and washers (See Note 4)
  - Anchor plate typ (See Note 1)
  - Anchor rail washer (See Note 1)

- **END SECTION DESIGN C (See Note 2)**

**ANCHOR POST ASSEMBLY** (See Note 3)

---

**THRIE BEAM GUARDRAIL**

**ANCHOR PAY LIMIT**

- **THRIE BEAM INSTALLATION**
  - Two 1" nuts and washers (See Note 4)
  - Standard 2" ID pipe sleeve (2 3/8" OD)
  - Bearing plate (See Note 1)
  - Two 1" nuts and washers (See Note 4)
  - Anchor plate typ (See Note 1)
  - Anchor rail washer (See Note 1)

- **END SECTION DESIGN C (THRIE BEAM) (See Note 2)**

**ANCHOR POST ASSEMBLY** (See Note 3)

---
**NOTES**

1. Attach W-beam to steel pipe with \( \frac{3}{4}\)" x 1 1/4" button head bolt with no washer. No connection to the post is required.

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

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

4. For details see Standard Plan, "Beam Guardrail Posts".

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

**DETAIL B**

- Tack weld 2 1/2" x 2 1/2" x 1/4" steel plate with 1/4" hole to tubular steel
- 1" Nut
- 1" x 4" Stud threaded full length

**TYPE 5 ANCHOR**

- \( \frac{3}{4}\)" Cable clips (6 required)
- Torque nuts to 50 ft/lbs.
- Bearing plate (see Note 3)

**BEAM GUARDRAIL ANCHOR TYPE 5**

**STANDARD PLAN C-6d**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**OLYMPIA, WASHINGTON**
Beam Guardrail pay limit (see Note 2)

Notes:
1. For details, see Standard Plan, "Beam Guardrail Anchor Type 7".
2. The rail element is to be included in the "Beam Guardrail" pay item. The "Anchor" pay item includes the anchor post, anchor plate, anchor cable, bearing plate, nuts and washers.
3. For details, see Standard Plan, "Beam Guardrail Posts and Blocks".
4. Post shall match beam guardrail posts.

Anchor Post Assembly (see note 3)

Two 1" nuts and washers (see note 1)

Bearing plate (see note 1)

Standard 2" ID pipe sleeve (2½" OD)

Two 1" nuts and washers (see note 1)

Anchor plate (see note 1)

Two 1" nuts and washers (see note 1)

Beari ng plate (see note 1)

Standard 2" ID pipe sleeve (2½" OD)

NOTES
1. For details, see Standard Plan, "Beam Guardrail Anchor Type 1".
2. The rail element is to be included in the "Beam Guardrail" pay item. The "Anchor" pay item includes the anchor post, anchor plate, anchor cable, bearing plate, nuts and washers.
3. For details, see Standard Plan, "Beam Guardrail Posts and Blocks".
4. Post shall match beam guardrail posts.

BEAM GUARDRAIL ANCHOR
TYPE 7

STANDARD PLAN C-6f

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
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, 3-06.6(4), with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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

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

BEAM GUARDRAIL
END SECTIONS

STANDARD PLAN C-7
NOTES

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

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

DESIGN G (THRIE BEAM)

THRIE BEAM END SECTIONS

STANDARD PLAN C-7a

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 4, 2014 TO AUGUST 2, 2015

DESIGN C (THRIE BEAM)

DESIGN D (THRIE BEAM)

DESIGN F (THRIE BEAM)

DESIGN G (THRIE BEAM)
NOTES

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

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

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

4. The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).
NOTE
1. For details on wire rope loop, connecting pin and end notches see Standard Plan “Concrete Barrier Type 2.”

INTERMEDIATE PLAN

TRANSITION PLAN

INTERMEDIATE ELEVATION

TRANSITION ELEVATION

CONCRETE BARRIER TYPE 4 AND TRANSITION SECTION

SECTION A-A

TYPE 4

TRANSITION END VIEW

SECTION B-B

TRANSITION SECTION

STANDARD PLAN C-8a

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EXP. MAY 1, 1993
NOTES

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

CONCRETE BARRIER LIGHT STANDARD SECTION

STANDARD PLAN C-8b

Sheet 1 of 2 Sheets

Washington State Department of Transportation
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

SIDE

SHOULDER

WIDENING

2" DIAM PINNING HOLE (TYP.)

PRECAST CONC. BARRIER TYPE 2

HMA

1" DIAM. X 30" GALVANIZED STEEL PIN (TYP.)

TWO PINS REQUIRED ON THE TRAFFIC SIDE

= TWO PINS TOTAL PER BARRIER SECTION

SECTION VIEWS

TYPE 3 ANCHOR PIN LOCATIONS

TRAFFIC SIDE

TRAFFIC SIDE

HMA

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PRECAST CONC. BARRIER ANCHOR = TYPE 3 (PERMANENT)

STANDARD PLAN C-8e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXP. JULY 24, 2008

2/11/2007

2/2/2007

REMOVED TEMPORARY ANCHORS

NO

DATE

REVISION

BY

PRECAST CONC. BARRIER

ANCHOR = TYPE 3

(PERMANENT)

STANDARD PLAN C-8e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXP. JULY 24, 2008

2/11/2007

2/2/2007

REMOVED TEMPORARY ANCHORS

NO

DATE

REVISION

BY
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 W6 x 35 and W6 x 9 shall be determined by measurement from top of ground to top of grout pad. This distance shall be verified by the Contractor.

2. Attach Guardrail Post to Box Culvert with 3/4” diameter high strength bolts with resin bonded anchors.

3. Drill 1 1/4” diameter hole in concrete slab for 7/8” diameter high strength bolt. Length of bolt is determined by top slab of Box Culvert thickness which shall be verified by the Contractor.

4. For details of post attachment to Double Box Culvert, see Standard Plan C-2i.

POST BEARING PLATE DETAIL

1” DIAMETER HOLE (TYP.)
5/8” STEEL PLATE

POST BASE PLATE DETAIL

TRAFFIC SIDE

WOOD BLOCK FOR STEEL POSTS
- SEE STANDARD PLAN C-15

SEE POST ANCHOR ATTACHMENT DETAIL FOR CENTER OF DOUBLE BOX CULVERT

GROUND LINE

EXISTING BOX CULVERT

BOX CULVERT GUARDRAIL STEEL POST TYPE 2
(0" TO 6" GROUND COVER)

W6 x 9 STEEL POST

POST BEARING PLATE DETAIL

3/4” GROUT PAD

POST BASE PLATE

HIGH STRENGTH BOLTS - FOUR REQUIRED (SEE NOTE 3)

TRAFFIC SIDE

POST BASE PLATE

EXISTING BOX CULVERT

POST ANCHOR ATTACHMENT DETAIL
(SEE NOTE 4)

DOUBLE BOX CULVERT

SEE NOTE 2
SHOULDER 4.0' MIN.

PVEMENT

MATCH SHOULDER SLOPE

HINGE-POINT

2H : 1V OR FLATTER SLOPE

PRECAST CONC. BARRIER TYPE 2

SHOULDER 3.0' MIN.

PVEMENT

MATCH SHOULDER SLOPE

HINGE-POINT

1.5H : 1V OR FLATTER SLOPE

ANCHORED PRECAST CONC. BARRIER TYPE 2

SHOULDER 3.5' MIN.

PVEMENT

MATCH SHOULDER SLOPE

HINGE-POINT

1.5H : 1V OR FLATTER SLOPE

SINGLE SLOPE CONC. BARRIER

CAST-IN-PLACE

FACE OF BARRIER

SHOULDER 2.0' MIN.

HINGE-POINT

2H : 1V OR FLATTER SLOPE

BEAM GUARDRAIL TYPE 1

(SEE NOTE 1)

FACE OF BARRIER

SHOULDER 3.0' MIN.

HINGE-POINT

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

BEAM GUARDRAIL TYPE 1 ON STEEP SLOPES

(SEE NOTE 1)

NOTE

1. For W-Beam Type 3 shoulder application, see Standard Plan C-28.40.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

TRAFFIC BARRIER SHOULDER WIDENING ~ FOR SHOULDERS 6.0' AND WIDER

STANDARD PLAN C-16a
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.
1. Refer to Standard Plans C-1 and C-1b for additional details not shown on this plan.

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

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

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

5. All posts for any standard barrier run shall be of the same type: timber or steel.

**SLOPE \ EMBANKMENT TABLE**

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<th>W (FT)</th>
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<td>2.5 MIN.</td>
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<td>STEEPER THAN 2H : 1V</td>
<td>4.0 MIN.</td>
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<tr>
<td>STEEPER THAN 1H : 1V</td>
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</tbody>
</table>
NOTES

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

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

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

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

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

6. Timber or steel post. Steel post shown.
**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE (FT)</th>
</tr>
</thead>
<tbody>
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<td>15 : 1</td>
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<td>60</td>
<td>14 : 1</td>
</tr>
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<td>55</td>
<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>
</tr>
</tbody>
</table>

**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.

**CASE 4 - 31**

**CASE 5 - 31**
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 "5' - 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.
BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL – PAY LIMIT

BEAM GUARDRAIL TRANSITION SECTION TYPE 21 – PAY LIMIT

BEAM GUARDRAIL TYPE 11 – PAY LIMIT

BEAM GUARDRAIL TRANSITION SECTION TYPE 21 – PAY LIMIT

BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL – PAY LIMIT

NOTES

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

2. Attach the standard wood block to the rail using two 5/8" (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-22.60.

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

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

6. Timber or steel post. Steel post shown.

VARIES – SEE CONTRACT

ONE-WAY TRAFFIC

EDGE OF SHOULDER

REDUCER ELEMENT TYPE C
(TYPE 31) – FOR DETAILS, SEE STD. PLAN C-25.20

TWO-WAY TRAFFIC

CASE 11A-31

CASE 11B-31

CASE 11C-31

MAINTAIN POST SPACING OF 3'-1 1/2" MAX. – ADJUST TRANSITION TO NEAREST FIXED FEATURE

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

MAY 2, 2014 3:09 PM

May 2, 2014 3:09 PM
1. For additional details not shown on this plan, refer to Standard Plan C-20.10.
2. CRT post to be wood only.
3. For additional details not shown, see Standard Plan C-1b.
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. See Contract for transition and connection type.

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

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

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

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

6. The guardrail identification plate shall be mounted at the lower splice bolt on the back side of the rail element at the PC of the guardrail radius.
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 blockouts to steel posts using bolt holes on approaching traffic side of post web.
4. For details not shown, see Standard Plan C-20.10.
5. Wood block shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
NOT STEEPER THAN 10H : 1V

LOCATION OF POST (WITHOUT BLOCK) = W6 x 9 STEEL POST ONLY

LOCATION OF POSTS & BLOCKS (TYP.) = SEE NOTE 4

LOCATION OF POST (WITHOUT BLOCK) = W6 x 9 STEEL POST ONLY

LOCATION OF POSTS & BLOCKS (TYP.) = SEE NOTE 4

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>RATE (FT)</th>
<th>POSTED SPEED (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 : 1</td>
<td>70</td>
</tr>
<tr>
<td>14 : 1</td>
<td>60</td>
</tr>
<tr>
<td>12 : 1</td>
<td>55</td>
</tr>
<tr>
<td>11 : 1</td>
<td>50</td>
</tr>
<tr>
<td>10 : 1</td>
<td>45</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 OR LESS</td>
</tr>
</tbody>
</table>

NOTES

1. Posts installed on shoulder slopes steeper than 10H : 1V shall be 8’ (ft) long.

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

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

Refer to SECTION "C":

Elevation g = (Elevation g - D (0.1)) + 27

4. Timber or steel post. Steel post shown.
NOT STEEPER THAN 10H : 1V

1' - 0" MIN. COVER
OFFSET DISTANCE

NOT STEEPER THAN 10H : 1V
NOT FLATTER THAN 4H : 1V

SECTION A

SECTION B

SECTION C
(SEE NOTE 3)

NOTES

1. Posts installed on shoulder slopes steeper than 10H : 1V shall be 6' (ft) long.

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

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

Refer to SECTION "C":

Elevation G = (Elevation S - D(0.1)) + 31

4. Timber or steel post. Steel post shown.

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>RATE (FT)</th>
<th>POSTED SPEED (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 : 1</td>
<td>70</td>
</tr>
<tr>
<td>14 : 1</td>
<td>60</td>
</tr>
<tr>
<td>12 : 1</td>
<td>55</td>
</tr>
<tr>
<td>11 : 1</td>
<td>50</td>
</tr>
<tr>
<td>10 : 1</td>
<td>45</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 OR LESS</td>
</tr>
</tbody>
</table>
NOTES
1. These terminals are FHWA accepted at Test Level Three (TL-3) and may be used for all posted speeds.
2. An ET-31 (TL-3) - Steel as manufactured by Trinity Industries, Inc. or an SKT-SP-MGS (TL-3) as manufactured by Road Systems, Inc. shall be installed according to manufacturer's recommendations.
3. A reflectorized object marker shall be installed according to manufacturer's recommendations.
4. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the terminal limits.
5. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While these terminals do not require an offset at the end, a flare is recommended. A maximum flare of 25 : 1 or flatter over the length of the terminal is allowed for either the ET-31 (TL-3) - Steel or the SKT-SP-MGS (TL-3), with a maximum offset of 24" (in) over 50' (ft).
6. For terminal details, see WSDOT approved manufacturer's drawings.
NOTES
1. An ET-31 (TL-3) - Wood as manufactured by Trinity Industries, Inc. or an SKT-MGS (TL-3) 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 the manufacturer's recommendations.
3. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the terminal limits.
4. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder.
5. While these terminals do not require an offset at the end, a flare is recommended. A maximum flare rate of 25:1 or flatter over the length of the terminal is allowed for either the ET-31 (TL-3) - Wood or SKT-MGS (TL-3).
6. These terminals are FHWA accepted at Test Level Three (TL-3) and may be used for all posted speeds.
7. For terminal details, see WSDOT approved manufacturer's drawings.
NOTES
1. These Terminals are FHWA accepted at Test Level Two (TL-2) and may be used in applications with speeds of 40 MPH or less.
2. An ET-31 (TL-2) as manufactured by Trinity Industries, Inc. or an SKT-SP-MGS (TL-2) as manufactured by Road Systems Inc. shall be installed according to manufacturers' recommendations.
3. A reflectorized object marker shall be installed according to manufacturers' recommendations.
4. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the Terminal limits.
5. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While these Terminals do not require an offset at the end, a flare is recommended. A maximum flare of 25:1 or flatter over the length of the Terminal is allowed for either the ET-31 (TL-2) or the SKT-SP-MGS (TL-2), with a maximum offset of 24" (in.) over 50' (ft.).
6. For Terminal details, see WSDOT-approved manufacturers' drawings.
**NOTES**

1. For use on the end of guardrail runs when a crashworthy terminal is not required.

2. For additional details not shown, see Standard Plan C-6c.

3. For end section details, see Standard Plan C-7 and C-7a.

4. Use details for Wood Breakaway post shown on this plan and components shown on Standard Plan C-13b.

5. Fasten the Anchor Cable using two 1" (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.
**TRANSITION SECTION - PAY LIMIT**

END SECTION DESIGN F - SEE STD. PLANS C-7 & C-7a

PLAN A CONNECTION

**UNRESTRAINED PRECAST BARRIER**

FACE OF GUARDRAIL

EDGE OF SHOULDER

(SEE NOTE 1)

**PLAN B CONNECTION**

CURB WIDTH - 2" (IN) OR LESS, OR CONCRETE BARRIER

**PLAN C CONNECTION**

CURB WIDTH, GREATER THAN 6" (IN) - 18" (IN) MAX.

NEW BRIDGE TRAFFIC BARRIER (SINGLE-SLOPE BARRIER SHOWN)

(SEE NOTE 4)

**END SECTION DESIGN F - SEE STD. PLANS C-7 & C-7a**

FACE OF GUARDRAIL

EDGE OF SHOULDER

(SEE NOTE 5)

**PLAN D CONNECTION (SEE NOTE 3)**

**PLAN E CONNECTION**

**NOTES**

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, this attachment and blackout is not necessary.

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

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

5. See Bridge Plans for additional connection details.

6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3 (2).

7. Steel posts shown. Timber posts may be used.
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 accept tapered blocks and/or rubrail.

6. Posts 1 and 2 are 10 x 10 timber posts or W6 x 15 steel posts; 7'-0" long. Posts 3 through 9 are 6' x 8 timber posts or W6 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).

ELEVATION VIEW

BEAM GUARDRAIL TRANSITION SECTION TYPE 20 (FOR TYPE 31) - PAY LIMIT

BEAM GUARDRAIL TYPE 31 - PAY LIMIT

FOUR SPACES @ 18 3/4"

FOUR SPACES @ 9" - 1 1/2"

3/4" (IN) DIAM. HOLE (TYP.)

1/2" NOM.

6" NOM.

3/4" (IN) DIAM. HOLE (TYP.)

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
NOTE:
1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety shape barrier. The toe of the single slope and the safety shaped barrier shall be tapered or the barrier blocked out so that the toe of the barrier does not project past the face of the approach guardrail.

2. See Standard Plan C-24.10 for details regarding connection to Bridge rail or traffic barrier.

3. For details of typical components, see Standard Plans C-1b and C-20.10.
NOTES

1. See Standard Plans C-1b, C-1d, C-20.10 and C-25.20 for rail elements and thrie beam block details.

2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.
NOTES
1. See Standard Plan C-1b, C-20.10 and C-25.20 for rail elements and thrice beam block details.
2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.
3. For additional alternatives not shown, see Contract Plans.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: FERN KODAIL

EFFECTIVE: AUGUST 4, 2014 TO AUGUST 2, 2015
NOTES

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

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

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

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

5. All posts for any standard barrier run shall be of the same type: timber or steel.
LEGEND

- Design Layout Line

PLAN VIEW

BEAM GUARDRAIL ANCHOR TYPE 10 PAY LIMIT

BEAM GUARDRAIL TYPE 31 PAY LIMIT

EDGE OF TRAVELED WAY

CABLE BARRIER MINIMUM TAPER LENGTH

LENTH OF NEED

MAX. DEFLECTION - AS SHOWN IN CONTRACT PLANS

W-BEAM GUARDRAIL

EXISTING REDIRECTIONAL LANDFORM

BEAM GUARDRAIL

NON-FLARED TERMINAL PAY LIMIT

BEAM GUARDRAIL ANCHOR TYPE 10 PAY LIMIT - SEE STANDARD PLAN C-23.60

W-BEAM GUARDRAIL

LEGEND

- Design Layout Line

BARRIER PLACEMENT ~ CABLE TO W-BEAM SHIELDING FOR REDIRECTIONAL LANDFORM

STANDARD PLAN C-40.16-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

PAMELA STROEDER

Washington State Department of Transportation
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. 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 - SEE DETAIL
#8 BAR (TYP.)
#8 BAR (TYP.)

BARRIER CONNECTION DETAIL
FOR PERMANENT INSTALLATION

REBAR GRID - FOR PERMANENT INSTALLATION (SEE BARRIER CONNECTION DETAIL)
BEND TO FIT
TOP OF ROADWAY

3/8" (IN) PREMOLDED JOINT FILLER - FOR PERMANENT INSTALLATION
REBAR GRID - SEE DETAIL
#8 BAR (TYP.)
#8 BAR (TYP.)

PREPARED GRADED BASE - HYPOTHETICAL GRADE DIFFERENTIAL
BARRIER TRANSITION DETAIL

TOP OF BARREER
42" HIGH
45" HIGH
54" HIGH

NOTE:
STEEL WELDED WIRE 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

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>
</tr>
</thead>
<tbody>
<tr>
<td>3'-6&quot;</td>
<td>9&quot;</td>
<td>2'-10&quot;</td>
<td>3</td>
<td>2'-6&quot;</td>
<td>2'-10&quot;</td>
<td>1'-7&quot;</td>
<td>8</td>
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<td>3'-4&quot;</td>
<td>1'-9&quot;</td>
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<td>4'-6&quot;</td>
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<td>2'-4 1/2&quot;</td>
<td>5</td>
<td>3'-8&quot;</td>
<td>3'-10&quot;</td>
<td>1'-11&quot;</td>
<td>12</td>
</tr>
</tbody>
</table>

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

ELEVATION BARRIER CONNECTION DETAIL
FOR PERMANENT INSTALLATION

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

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>
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<td>4'-6&quot;</td>
<td>10 1/4&quot;</td>
<td>2'-4 1/2&quot;</td>
<td>5</td>
<td>3'-8&quot;</td>
<td>3'-10&quot;</td>
<td>1'-11&quot;</td>
<td>12</td>
</tr>
</tbody>
</table>
4'-0" BARRIER SHOWN LEVEL

SECTION A

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

SECTION B

4'-0" BARRIER FOR USE WITH A GREATER THAN 3" (IN) TO 6" (IN) MAX. GRADE SEPARATION

HIGH-PERFORMANCE BARRIER
REINFORCING STEEL BENDING DIAGRAM

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

DIMENSION TABLE

<table>
<thead>
<tr>
<th>BARRIER HEIGHT (IN)</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>5&quot;</th>
<th>6&quot;</th>
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<tbody>
<tr>
<td>STD. 3-6&quot; 8&quot;</td>
<td>3&quot;</td>
<td>3.5&quot;</td>
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<td>4.5&quot;</td>
</tr>
</tbody>
</table>

REBAR GRID DETAIL

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

SECTION A

ELEVATION

PLAN

NOTE:
MEET 3/8" WELDED JOINT
FILLER FOR USABILITY
IN ACCORDANCE WITH STANDARD
SPECIFICATION 6-10.3

NOTE:
MEET 3/8" WELDED JOINT
FILLER FOR USEABILITY
IN ACCORDANCE WITH STANDARD
SPECIFICATION 6-10.3

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. 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 HP row in the DIMENSION TABLE, with a minimum height above roadway of
3" - 6" and a minimum embedment of 3" (n).
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).
**SINGLE-SLOPE CONCRETE BARRIER (BID ITEM)**

10 1/2” ~--------D~U~A~L~-F~A~C=ED=----------

1. SEE STANDARD PLAN C-70.10.

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.
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)
NOTE:
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).

NOTE:
STEEL WORLID WIRE 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

VARES: 5" to 1'-0"

VARES: 1'-7 1/2" to 2'-0"

DIMENSION TABLE
(SEE NOTE 4)

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>HORIZONTAL BAR (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD.</td>
<td>3'-6&quot;</td>
<td>8&quot;</td>
<td>2'-0&quot;</td>
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<td>3'-0&quot;</td>
</tr>
</tbody>
</table>

EXPANSION JOINT MODIFICATION
(SEE NOTE 2)

SEEN STANDARD PLANS C-80.10 AND C-88.10

EXPANSION JOINT - FROM DUAL-FACED TO 2 X VERTICAL BACK

TRANSITION SECTION - FROM DUAL-FACED TO 2 X VERTICAL BACK

SECTION A

SECTION B

ISOMETRIC VIEW

SINGLE-SLOPE CONCRETE BARRIER (CAST-IN-PLACE)
TRANSITION SECTION
STANDARD PLAN C-80.30-01

REINFORCING STEEL BENDING DIAGRAM
SEE STD. SPEC. 9-07.1(2) FOR BENDING DIAMETERS
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:
STEEL WELDED WIRE 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

DIMENSION TABLE (SEE NOTE 6)

<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>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD. 3'-6&quot;</td>
<td>6&quot;</td>
<td>1'-4&quot;</td>
<td>3</td>
<td>2'-6&quot;</td>
<td>1'-0 1/4&quot;</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>HIP 4'-0&quot;</td>
<td>9 1/8&quot;</td>
<td>1'-5 1/8&quot;</td>
<td>4</td>
<td>3'-0&quot;</td>
<td>1'-1 1/2&quot;</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

NOTES

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

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

3. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slip-form construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" (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).
This plan is for transitions to Precast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.
DUAL-FACED TRANSITION SECTION LENGTH VARIES PER BARRIER TYPE

VERTICAL BACK LENGTH VARIES PER BARRIER TYPE AND TAPER RATE

SEE CONTRACT FOR TAPER RATE

CONCRETE CAP

PLAN (CAST-IN-PLACE SHOWN)

SINGLE-SLOPE CONCRETE BARRIER DUAL-FACED

NOTE:
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-10's (precast) or C-80's (cast-in-place).

SELECT BORROW INCL. HAUL

3/8" PREMOLDED JOINT FILLER (TYP.)

TOP OF ROADWAY

SECTION A

SLOPE TO DRAIN COMMERCIAL CONCRETE

VARIES 1 to 5' - 0"

STEEL WELDED WIRE FABRIC 3/4" CHAMFER (TYP.)

SINGLE-SLOPE CONCRETE BARRIER DUAL-FACED

ISOMETRIC VIEW (CAST-IN-PLACE SHOWN)

SINGLE-SLOPE CONCRETE BARRIER PLACEMENT (SPLIT)

STANDARD PLAN C-85.10-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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 (precast) or C-80 (cast-in-place).
All dimensions are out to out. All bends are 2" (in) radius.

**BAR LIST**

<table>
<thead>
<tr>
<th>MARK NO.</th>
<th>LOCATION</th>
<th>SIZE</th>
<th>QUANTITY</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>BARRIER - TOP VERTICAL</td>
<td>#4</td>
<td>28</td>
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<tr>
<td>2</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>#4</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>NDL &amp; BARRIER - VERTICAL</td>
<td>#4</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>BARRIER - HORIZONTAL</td>
<td>#5</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>FOUNDATION</td>
<td>#5</td>
<td>32</td>
</tr>
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**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>F</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 5'</td>
<td>3' - 6'</td>
<td>6'</td>
<td>2' - 0'</td>
<td>3' - 4'</td>
<td>3' MIN.</td>
<td>5'</td>
<td>1' - 2'</td>
<td>12</td>
</tr>
<tr>
<td>UP TO 7'</td>
<td>4' - 0'</td>
<td>9 1/8</td>
<td>2' - 2 1/4</td>
<td>3' - 6 1/4</td>
<td>7' MIN.</td>
<td>5</td>
<td>10'</td>
<td>12</td>
</tr>
<tr>
<td>UP TO 10'</td>
<td>4' - 6'</td>
<td>10</td>
<td>1/4</td>
<td>2’ - 4 1/2</td>
<td>3’ - 8 1/2</td>
<td>10</td>
<td>MIN.</td>
<td>6</td>
</tr>
</tbody>
</table>

**NOTES**

1. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-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.
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:
   - Service limit state = 6 ksf
   - Strength limit state = 24 ksf
   - Extreme limit state = 48 ksf

---

**NOTES**

**SECTION A**

**SECTION B**

**TABLE**

**BAR LIST**

**PLAN VIEW**

**ISOMETRIC VIEW**

---

**STATE DESIGN ENGINEER**

---

**APPROVED FOR PUBLICATION**
1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blackout 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.
SINGLE-SLOPE CONCRETE BARRIER FOUNDATION

24' - 0" TAPER

12' - 0" (TYP.)

EXPANSION JOINT (TYP.)

1' - 7 1/2"

EXPANSION JOINT

DUMMY JOINT (TYP.)

3' - 0"

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

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

ELEVATION

SHAFT DEPTH

<table>
<thead>
<tr>
<th>Z</th>
<th>TOTAL SIGN AREA (SF)</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
<th>FRICITION ANGLE (DEGREE)</th>
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<td>13'-0&quot;</td>
<td>200 OR LESS</td>
<td>1500 AND UP</td>
<td>28 MIN.</td>
</tr>
<tr>
<td>16' - 0&quot;</td>
<td>200 OR LESS</td>
<td>1000 - 1499</td>
<td>28 MIN.</td>
</tr>
<tr>
<td>18' - 0&quot;</td>
<td>200 - 400</td>
<td>1500 AND UP</td>
<td>28 MIN.</td>
</tr>
<tr>
<td>22'-0&quot;</td>
<td>200 - 400</td>
<td>1000 - 1499</td>
<td>28 MIN.</td>
</tr>
</tbody>
</table>

NOTES
1. See Standard Specification 8-21.3(9) for construction requirements.
2. Use a template to locate and secure the bolts during foundation installation.
3. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Relier 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.

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>SHAFT CONCRETE</th>
<th>CLASS 4000P</th>
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<tr>
<td>ALL OTHER CONCRETE</td>
<td>CLASS 4000</td>
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<tr>
<td>STEEL REINF. BAR</td>
<td>AASHTO M 31 GRADE 60</td>
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<tr>
<td>ANCHOR RODS</td>
<td>ASTM F 1584 GRADE 105</td>
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<tr>
<td>ANCHOR NUTS</td>
<td>AASHTO M 291</td>
</tr>
<tr>
<td>ANCHOR WASHERS</td>
<td>AASHTO M 293</td>
</tr>
<tr>
<td>ANCHORAGE GALVANIZING</td>
<td>AASHTO M 232</td>
</tr>
<tr>
<td>STEEL PLATE</td>
<td>ASTM A 36</td>
</tr>
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</table>
ANCHOR ROD - 1 3/4" (IN) DIAM. (BARRIER HEIGHT = 4'-2" LONG), THREADED 8" (IN) MIN. EACH END, WITH FOUR HEAVY HEX NUTS AND TWO WASHERS. GALVANIZE EXPOSED ANCHOR ROD END 1'-0" MIN. (TYP.). ARRANGE BARRIERS TO BE INSERTED PP measurement: 3'-6" (IN) TO 6'-0" (IN) TO 12'-0" (TYP.) AT EQUALLY SPACED INTERVALS.

ANCHOR PLATE (TYP.) - SEE STANDARD PLAN G-80.20.

SECTION A

SECTION B

SECTION C

T A B L E

<table>
<thead>
<tr>
<th>GRADING SEPARATION</th>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 7&quot;</td>
<td>3'-0&quot;</td>
<td>8</td>
<td>2'-0&quot;</td>
<td>4'-7&quot;</td>
<td>3'</td>
<td>4</td>
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<td>UP TO 7&quot;</td>
<td>4'-0&quot;</td>
<td>9 1/4&quot;</td>
<td>2'-1 1/4&quot;</td>
<td>4'-9 1/4&quot;</td>
<td>7'</td>
<td>5</td>
<td>12</td>
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<td>UP TO 10&quot;</td>
<td>4'-0&quot;</td>
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<td>2'-4 1/2&quot;</td>
<td>4'-11 1/2&quot;</td>
<td>10'</td>
<td>6</td>
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B A R L I S T

<table>
<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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</thead>
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<tr>
<td>1</td>
<td>BARRIER - TOP VERTICAL</td>
<td>32</td>
<td>23&quot;</td>
<td>10&quot;</td>
<td>4</td>
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<tr>
<td>2</td>
<td>BARRIER - BOTTOM VERTICAL</td>
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<td>3'</td>
<td>6&quot;</td>
<td>4</td>
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<td>3</td>
<td>BARRIER - HORIZONTAL</td>
<td>8</td>
<td>3'</td>
<td>6&quot;</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>BARRIER - TOP VERTICAL</td>
<td>8</td>
<td>4'</td>
<td>10&quot;</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>8</td>
<td>1'</td>
<td>3&quot;</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>CAP - HOOP</td>
<td>4</td>
<td>1'</td>
<td>3&quot;</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>CAP - VERTICAL, EACH CORNER</td>
<td>4</td>
<td>10'</td>
<td>10&quot;</td>
<td>5</td>
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<tr>
<td>8</td>
<td>SHAFT - SPIRAL</td>
<td>1</td>
<td>AS REQD</td>
<td>4</td>
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<tr>
<td>9</td>
<td>SHAFT - VERTICAL</td>
<td>12</td>
<td>2&quot; MINUS CLEARANCES</td>
<td>9</td>
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</tr>
</tbody>
</table>

CONSTRUCTION JOINT WITH ROUGHENED SURFACE: SEE TABLE, COLUMN "Q". IF JOINING TWO SPIRAALS, SEE LAP SPLICE DETAIL, STANDARD PLAN G-80.20, SHEET 2. ADD TWO QHS BARS, EQUALLY SPACED, AT THE TOP OF THE FOUNDATION BARRIER.
NOTES

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

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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.

**NOTE:**

- **Construction Joints in the Footing:**
  - 120 feet maximum
  - Panels shall have at least 3 feet of level ground on each side
  - Construction joints in the footing shall be spaced at 120 feet maximum

**Wind Exposure & Velocity**

- **Noise Barrier Type:**
  - 2A: B1 80
  - 2B: B1 90
  - 2C: B2 80
  - 2D: B2 90

**Wind Exposure & Velocity Table**

- **Note:**
  - The Contract specifies actual wall designations
  - Panels shall have at least 3 feet of level ground on each side
  - Construction joints in the footing shall be spaced at 120 feet maximum

**Cast-in-Place Concrete Wall on Spread Footing**

**Typical Section**

- **Construction Joint with Roughened Surface:**
  - Required for Walls 24'-0" - Type 2C, 24'-0" - Type 2D

**Elevation**

- **Top of Footing:**
  - 2'-0" MIN.
- **Construction Joint (Typ.)**
  - See Note 4
- **1'-0" MIN.**
- **Longitudinal footing reinforcing bar "A" (Typ.)**
- **4 MAX.**
- **1/2" Premolded joint filler in expansion joints (Typ.) 24'-0" Centers**

**Level**

- **(Typ.)**
- **3" (Typ.)**
- **3" (Typ.)**
- **1/4"**
- **UNDISTURBED SOIL**

**Noise Barrier Wall Type 2**

**Standard Plan D-2.04-00**

**Sheet 1 of 2 sheets**

**Approve for Publication:**

77 Washington State Department of Transportation

**Expires August 23, 2006**
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

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

EXPRES AUGUST 23, 2018

APPROVED FOR PUBLICATION
11.10.05
Washington State Department of Transportation
<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 3A</th>
<th>TYPE 3B</th>
<th>TYPE 3C</th>
<th>TYPE 3D</th>
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<tbody>
<tr>
<td></td>
<td>W x H</td>
<td>W x H</td>
<td>W x H</td>
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<tr>
<td>6' - 0'</td>
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</tr>
<tr>
<td>20' - 0'</td>
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<td></td>
<td>3 - 0'</td>
<td>5 - 0'</td>
<td>5 - 0'</td>
<td>5 - 0'</td>
</tr>
<tr>
<td>24' - 0'</td>
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<tr>
<td></td>
<td>3 - 0'</td>
<td>5 - 0'</td>
<td>5 - 0'</td>
<td>5 - 0'</td>
</tr>
</tbody>
</table>

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 3A, 3B, 3C or 3D. 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>3A</td>
<td>B1</td>
<td>80</td>
</tr>
<tr>
<td>3B</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>3C</td>
<td>B2</td>
<td>80</td>
</tr>
<tr>
<td>3D</td>
<td>B2</td>
<td>90</td>
</tr>
</tbody>
</table>

**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**
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
### Notes

1. Wall to be designated Noise Barrier Wall Type A, B, C, or D. 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

**Type 4**

**Standard Plan D-2.08-00**

**Sheet 1 of 2 Sheets**

<table>
<thead>
<tr>
<th>Wall HT</th>
<th>Shaft Dia</th>
<th>Depth (D)</th>
<th>Shaft Rein Bar (DFF)</th>
<th>Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td>5&quot;</td>
<td>12'-0&quot;</td>
<td>5&quot; - 0&quot;</td>
<td>#3 @ 15&quot;</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>5&quot;</td>
<td>12'-0&quot;</td>
<td>5&quot; - 0&quot;</td>
<td>#3 @ 15&quot;</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>5&quot;</td>
<td>12'-0&quot;</td>
<td>5&quot; - 0&quot;</td>
<td>#3 @ 15&quot;</td>
</tr>
<tr>
<td>12'-0&quot;</td>
<td>5&quot;</td>
<td>12'-0&quot;</td>
<td>5&quot; - 0&quot;</td>
<td>#3 @ 9&quot;</td>
</tr>
<tr>
<td>14'-0&quot;</td>
<td>5&quot;</td>
<td>14'-0&quot;</td>
<td>6&quot; - 0&quot;</td>
<td>#4 @ 12&quot;</td>
</tr>
<tr>
<td>16'-0&quot;</td>
<td>5&quot;</td>
<td>16'-0&quot;</td>
<td>7&quot; - 0&quot;</td>
<td>#5 @ 11&quot;</td>
</tr>
<tr>
<td>18'-0&quot;</td>
<td>5&quot;</td>
<td>18'-0&quot;</td>
<td>8&quot; - 0&quot;</td>
<td>#6 @ 8&quot;</td>
</tr>
<tr>
<td>20'-0&quot;</td>
<td>5&quot;</td>
<td>20'-0&quot;</td>
<td>8&quot; - 0&quot;</td>
<td>#6 @ 8&quot;</td>
</tr>
<tr>
<td>22'-0&quot;</td>
<td>5&quot;</td>
<td>22'-0&quot;</td>
<td>10&quot; - 0&quot;</td>
<td>#8 @ 8&quot;</td>
</tr>
<tr>
<td>24'-0&quot;</td>
<td>5&quot;</td>
<td>24'-0&quot;</td>
<td>11&quot; - 3&quot;</td>
<td>#8 @ 8&quot;</td>
</tr>
</tbody>
</table>

**Wall THickness**

- 1" - Wall thickness

**Shaft Dia**

- 5" - Shaft Dia

**Depth (D)**

- 12'-0" - Depth

**Shaft Rein Bar (DFF)**

- 5" - Shaft Rein Bar

**Bars**

- #3 @ 15" - Bars

---

**Diagram Description**

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

---

**Cast-in-Place Concrete Wall on Shaft Foundation**

**Type 4**

**Standard Plan D-2.08-00**

**Sheet 1 of 2 Sheets**

**NOTES**

1. Wall to be designated Noise Barrier Wall Type A, B, C, or D. 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

JOINT AND CORNER DETAIL

REINFORCED PER LISTED WALL HEIGHT
REINFORCEMENT TABLE

BAR "D"

CORNER PANEL

3/4" CHAMFER (TYP.)

1/2" NOISE SEALER (TYP.)

1/2" NOISE SEALER (TYP.)

SHAFT LENGTH FOR PAVEMENT

DEPTH DI OR DJ - SEE NOTE S

PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

SPACING @ 12" THREE SPACES @ 9"

#4 STIRRUP

CONCRETE SHAFT

SHAFT REINFORCEMENT

W 3.5 SPIRAL @ 6" PITCH

DETAIL "B"

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
**NOTES**

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

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

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

4. Construction joints in the foundation shall be spaced at 120 feet maximum.
CAST-IN-PLACE CONC. WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SPREAD FOOTING

NOISE BARRIER WALL
TYPE 6SS
STANDARD PLAN D-2.16-00

NOTE:
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.

NOISE BARRIER WALL Type 6SS
STANDARD PLAN D-2.16-00

EXPIRE AUGUST 23, 2005

APPROVED FOR PUBLICATION
Washington State Department of Transportation

Sheet 1 of 1 SHEET
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 O1 or D2.

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

SOIL TYPE

SOIL TYPE ANGLE OF INTERNAL FRICTION (DEGREES)

D1 32
D2 38

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

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

ELEVATION

SECTION A

SECTION

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 O1 or D2.
NOTES

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

#### Wall Height

<table>
<thead>
<tr>
<th>Type</th>
<th>BARS A’X”</th>
<th>BARS B</th>
<th>BARS”D”X”</th>
<th>Bar “H”</th>
<th>Bar “I”</th>
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</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>3-8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>W3.0 @ 2&quot;</td>
<td>R3 @ 12&quot;</td>
</tr>
<tr>
<td>1'-0&quot;</td>
<td>3-8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>W3.0 @ 2&quot;</td>
<td>R3 @ 12&quot;</td>
</tr>
<tr>
<td>1'-6&quot;</td>
<td>3-8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>W3.0 @ 2&quot;</td>
<td>R3 @ 12&quot;</td>
</tr>
<tr>
<td>1'-12&quot;</td>
<td>3-8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>5/8 @ 18&quot;</td>
<td>W3.0 @ 2&quot;</td>
<td>R3 @ 12&quot;</td>
</tr>
</tbody>
</table>

#### Wind Exposure & Velocity

<table>
<thead>
<tr>
<th>NOISE BARRIER TYPE</th>
<th>NOISE EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9A</td>
<td>81</td>
<td>80</td>
</tr>
<tr>
<td>9B</td>
<td>81</td>
<td>90</td>
</tr>
<tr>
<td>9C</td>
<td>83</td>
<td>80</td>
</tr>
<tr>
<td>9D</td>
<td>83</td>
<td>90</td>
</tr>
</tbody>
</table>

#### Bending Diagram

- **Wind Exposure & Velocity Table**
- **Note:** Wall to be designated Noise Barrier Wall Type 9A, 9B, 9C or 9D. The Contract specifies actual wall designation.

---

### Design Considerations

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.

---

### Pre-Cast Concrete Wall

- **Type 9:** Standard Plan D-2.32-00

---

### Notes

- **Expire August 23, 2006**

---

### Heritage Signatures

- **Harold V. filmo**
- **DATE**

---

### Reference

- **Washington State Department of Transportation**
JOINT AND CORNER DETAIL

FILL VOID WITH GROUT

BAR "D" SPIRAL

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

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

FOOTING

GROUT PAD

GROUT DUCT

BAR "A" (TYP.)

BAR "H" (TYP.)

1/2" NOISE SEALER (TYP.)

3/4" CHAMFER (TYP.)

REINFORCED PIER LISTED WALL HEIGHT REINFORCEMENT TABLE

CORNER PANEL

BAR "D"

ANGLE POINT

TRAFFIC SIDE

1'-0" MIN. (TYP.)

1'-0" CUR. (TYP.)

TRANSVERSE BARS NOT SHOWN

NOISE BARRIER WALL TYPE 9

STANDARD PLAN D-2.32-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE

EXPRES AUGUST 23, 2006

NOISE BARRIER WALL ON SPREAD FOOTING

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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.

PREFAB CONCRETE WALL
ON OFFSET SPREAD FOOTING

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

WASHING HOME DEPARTMENT OF TRANSPORTATION

DESIGNED:

DRAWN:

PREPARED:

APPROVED FOR FIDELIZATION

STATE ENGINEER'S OFFICE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 4, 2014 TO AUGUST 2, 2015
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

1" CLR. (TYP.)
T-6" MIN. (TYP.)

BAR "A" (TYP.)

W
6" FOOTING

FOOTING

GROUT PAD

GROUT DUCTS

BAR "O" SPIRAL

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

FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC

PRECAST CONCRETE WALL
ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
TYPE 10
STANDARD PLAN D-2.34-01
SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

1/31/08

DRAWN BY: ADAM DOCHRAN

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

1" CLR. (TYP.)
T-6" MIN. (TYP.)

BAR "A" (TYP.)

W
6" FOOTING

FOOTING

GROUT PAD

GROUT DUCTS

BAR "O" SPIRAL

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

FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC

PRECAST CONCRETE WALL
ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
TYPE 10
STANDARD PLAN D-2.34-01
SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

1/31/08

DRAWN BY: ADAM DOCHRAN
**SHAFT TO PANEL CONNECTION DETAIL**

Either option acceptable to grout blockouts, anchor bolts and base plate to the limits shown.

- **Rod "A" Anchor Bolt Option**
  - ASTM A563 Nut with ASTM F436 Washer (TYP.)
  - Set the elevation of the leveling nuts before setting the panel.

- **Shaft and Plate**
  - Base Plate: \(1' - 0" \times 1' - 0"\) ASTM A36 (Galvanized, embedded with grout type 2)
  - Slot for anchor bolt: (Anchor Bolt Diameter + 1/4") x 2 1/2" 3/4" Chamfer - All Corners

- **Rod "A" Wedge Head Option**
  - ASTM A563 or 80 as allowed per table.
  - For heights: "H" ≤ 18" in Western Washington and "H" ≤ 20" in Eastern Washington

**SECTION F**

- Table for wedge head option: Tapered Hole Dimensions - No taper for anchor bolt option hole diam. = Rod "A" Diameter + 1/16" (TYP.)

**SECTION E**

- Base Plate Detail (Shaft not shown for clarity)

**BENDING DIAGRAM**

- Varies with angle
- Varies at anchor rod blockout

---

**Wind and Seismic Limitations**

<table>
<thead>
<tr>
<th>Location</th>
<th>Wind Velocity (MPH)</th>
<th>Peak Seismic Ground Acceleration Coefficient on Rock/Site Class B (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Washington</td>
<td>100</td>
<td>0.45</td>
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<tr>
<td>Eastern Suburban</td>
<td>80</td>
<td>0.19</td>
</tr>
</tbody>
</table>

---

**Foundation Design**

- Soil Type
- Angle of Internal Friction, \(\phi\) (Degrees)

<table>
<thead>
<tr>
<th>Type</th>
<th>(\phi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>32</td>
</tr>
<tr>
<td>D2</td>
<td>38</td>
</tr>
</tbody>
</table>

---

**Noise Barrier Wall Type 11**

**Standard Plan D-2.36-03**

Approved for Publication

*Washington State Department of Transportation*
**Epoxy Bonding Agent Between Pilaster and Base Plate**

- Rod “A” threaded bar option
- Edge of panel = surface treatment not shown
- Blockout in panel = to be filled with grout type 2 after setting panel (TYP.)
- Vertical grout option
- Sloped grout option
- Top of grout (TYP.)

**Base Plate**

- Construction joint with roughened surface

**Shaft to Panel Connection**

- Either option available to grout blockouts, anchor bolts, base plate to limits shown

**Detail D**

**Shaft to Panel Connection**

- Rod “A” (TYP.) = see table for diameter
- Rod “A” = deformed reinforcing bar
- Jam nut

**Anchor Bolt Option**

- ASTM A-563 nut with ASTM F-436 washer

**Wedge Head Option**

- ASTM A-706 GR 80 as allowed per table, for heights “H” ≤ 10’ in the west and “H” ≤ 16’ in the east

**Section E**

**Base Plate Detail**

- Base plate, shaft and traffic barrier not shown for clarity

**Section F**

**Epoxy Bonding Agent Between Pilaster and Base Plate for Rod “A” threaded bar option**

- Edge of panel = surface treatment not shown
- Finished ground

**Detail C**

**Shaft to Panel Connection**

- Rod “A” (TYP.) = see table for diameter

**Section C**

**Anchor Plate Detail**

- Hole diam. = bolt diam. + 1/8” (TYP.)
- Pilaster and shaft

**Foundation Design**

- Soil type
- Angle of internal friction, $\phi$ (degrees)

<table>
<thead>
<tr>
<th>Location</th>
<th>Wind Velocity (MPH)</th>
<th>Peak Seismic Ground Acceleration Coefficient on Rock, Site Class II (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Washington</td>
<td>100</td>
<td>0.45</td>
</tr>
<tr>
<td>Eastern Washington</td>
<td>80</td>
<td>0.19</td>
</tr>
</tbody>
</table>

**Wind and Seismic Limitations**

**Dummy Joint Detail**

- Cast in place barrier option

(See Note 9 - Sheet 1)

**Noise Barrier Wall Type 14**

**Standard Plan D-2.46-01**

Sheets 2 of 3 sheets

Approved for publication

Washington State Department of Transportation
NOTES

1. Wall to be designed 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.

:right-of-way: SEE CONTRACT

3/4" CHAMFER (TYP.)

WALL TO BE SET PLUMB (TYP.)

CONSTRUCTION JOINT H

ROUGHENED SURFACE

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

OPTIONAL 2'-0" MIN. SPICE

NOTE:

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015
**Angle Point Plan**

Adjust reinforcement as necessary to accommodate angle point.

**TYPICAL INTERMEDIATE AND END PANEL**

- Noise sealer 1/2" (typ.)
- Joint
- Shaft
- Shaft
- Shaft
- Shaft

**DETAIL C**

- Block-out 0" long - encase base plate & block-out w/ grout after final alignment of wall panel
- 1/4" x 3" x 3" washer (typ.)
- Set elevation of leveling nut before setting panel
- 1 1/4" anchor bolt

**BASE PLATE DETAIL**

- Tapered hole for 1/2" bar (typ.) - see bar 1/8" plate. 1 3/4" x 1/8" x 12". ASTM A 36 galvanized embedded in grout. 3/4" chamfer all corners.
- Slot 1 3/8" x 1 1/4" for 1 1/4" anchor bolt (typ.)

**DETAIL D**

- Noise sealer 1/2" (typ.)
- Shaft
- Shaft
- Shaft
- Shaft

**SHEAR-KEY DETAIL**

Optional shear-key detail

**PRECAST CONCRETE WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SHAFT FOUNDATION**

**NOISE BARRIER WALL TYPE 14SS**

Standard Plan D-2.48-00

Sheet 2 of 2 sheets

Approved for publication

Washington State Department of Transportation
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT.

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

TYPICAL EXPANSION JOINT

#5 (TYP.) SEE DETAIL A

TRAFFIC SIDE

EXPANSION JOINT AT WIDTH STEP

#5 (TYP.) SEE DETAIL A

TRAFFIC SIDE

8" OR 10" CMU

8" CMU

BOND BEAM DETAIL

BOND BEAM UNITS

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

BOND BEAM GROUTING LIMIT

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

EXPIRES AUGUST 21, 2005
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT.

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

EXPANSION JOINT AT WIDTH STEP

PLAN VIEW

#5 (TYP.)

TRAFFIC SIDE

FOOTING WIDTH TRANSITION DETAIL

(FOOTING WIDTH TRANSITION DETAIL)

NOTE: TRANSVERSE BARS NOT SHOWN

MASONRY WALL ON SPREAD FOOTING

NOISE BARRIER WALL

TYPE 17

STANDARD PLAN D-2.62-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

TYPICAL EXPANSION JOINT

SEE DETAIL A

BOND BEAM DETAIL

#5 (TYP.)

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

DETAIL A

TYPICAL BOTH SIDES OF WALL

MASONRY WALL ON OFFSET SPREAD FOOTING

FOOTING WIDTH TRANSITION DETAIL

(FOOTING WITHOUT FOOTING STEP)

NOTE: TRANSVERSE BARS NOT SHOWN
BOND BEAM DETAIL

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

EXPRESSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

#5 (TYP) TRAFFIC SIDE

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

BACKER ROD

BOND BEAM GROUTING LIMIT

12" JOINT

POLYURETHANE SEALANT

DETAIL B

TYPICAL BOTH SIDES OF WALL

PLAN VIEW

TYPICAL EXPANSION JOINT

CONCRETE SHAFT

W 3/8 SPIRAL @ 6" PITCH

#4 @ 1'-6"

2'-0" 3'-0"

#4 ··

10" CMU

8" CMU

TRAFFIC SIDE

TRAFFIC SIDE

DETAIL A

STEP DETAIL

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

BAR AT EQUAL SPACING OR TOTAL NUMBER SEE REINFORCEMENT SCHEDULE

8" CMU

EXPANSION JOINT AT WIDTH STEP

SECTION A

1-5/8 MIN LAP

135° HOOK (TYP)

NOISE BARRIER WALL TYPE 19

STANDARD PLAN D-2.66-00

SHR 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

11/10/05

Wahington State Department of Transportation
**SECTION D**

TYPICAL EXPANSION JOINT

- **TRAFFIC SIDE**
- **EXPANSION JOINT FILLED WITH NOISE SEALER**
- **1 - #5 FULL HEIGHT BAR "C"**
- **BACKER ROD WITH POLYURETHANE SEALANT - BOTH WALL FACES**
- **3/4" DIAM x 1' - 0" SCHED 40 PIPE WITH 8" x 10" GRADE 40 WELDED TAIL, AS SHOWN LAPPED WITH AND SPLICED PER BAR "C"**

**SECTION A**

**TRAFFIC SIDE**

- **1 - #5 FULL HEIGHT BAR "C"**
- **1 1/2" CLAR**
- **Q PILASTER & SHAFT**
- **HORIZONTAL DOWEL - PROVIDE SAME NUMBER AND SIZE AS BAR "B" LAP 2' - 0" MIN**
- **FILL PILASTER W CONCRETE**

**SECTION B**

**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.

**SECTION C**

**RW SIDE**

- **CAP ABOVE**
- **ANGLE POINT PLAN**
- **CAP ABOVE**
- **4" COMPACTED LEVEL CRUSHED GRAVEL BASE**

**SECTION**

**MASTON WALL ON SHAFT FOUNDATION**

- **NOISE BARRIER WALL TYPE 20**
- **STANDARD PLAN D-2.68-00**
- **SHEET 2 OF 2 SHEETS**
- **APPROVED FOR PUBLICATION 11/10/05**
- **WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
NOTES

1. All rebar shall have a minimum 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.

CONCRETE SLAB

EXPANSION JOINT

DOOR FRAME
(SEE NOTE 2)

DOOR DETAIL
(SEE NOTE 2)

FINISHED GRADE

CONCRETE SLAB

BENDING DIAGRAM

#4 BAR
BAR "A"*

SECT ION 0

FOR PRECAST WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 3

STANDARD PLAN D-2.84-00

ISOMETRIC CUTAWAY VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Sheet 1 of 1 Sheet

EXPIRE AUGUST 23, 2006

STANDARD PLAN D-2.84-00

Sheet 1 of 1 Sheet

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Sheet 1 of 1 Sheet

EXPIRE AUGUST 23, 2006
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
EXPANSION JOINT

4'-6" --~

BAR "A" ~

3' (TYP.) ~

/ (1 BAR)

41/2" (TYP.)

3'-0" (TYP.)

85 x 6'-0" (TYP.)

85 x 4'-0" (TYP.)

BAR "A" (7 BARS PER SIDE)

CONCRETE SLAB DETAIL

DOOR DETAIL

(SEE NOTE 2)

#4 x 1'-0" (TYP.)

FOR PRECAST WALL WITH 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

11-18-05

Washington State Department of Transportation

EXPANSION JOINT

2'-6"

4'-6"

2'-6"

4'-6"

41/2" (TYP.)

85 x 6'-0" (TYP.)

BAR "A"

BAR "A" (7 BARS PER SIDE)

CONCRETE SLAB DETAIL

GROUND LINE

WALL

CONCRETE SLAB

BENDING DIAGRAM

BAR "A"

VARIES

VARIES

VARIES

BAR "D"

BAR "B"

BAR "E"

BAR "F"

#4 BAR

4'-6"

2'-0"

1'-0"

41/2"

104°

4'-0"

4'-0"

4'-0"

4'-0"

4'-0"

4'-0"
BENDING DIAGRAM

FRONT VIEW

BAR "A"

SOLID GROUT CAP

CONCRETE SLAB DETAIL

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

FOR MASONRY WALL
(SHAFT FOUNDATION SHOWN)

NOISE BARRIER WALL
ACCESS DOOR TYPE 5

STANDARD PLAN D-2.88-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

HAROLD PATIAGOS
DEPARTMENT OF TRANSPORTATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 5

STANDARD PLAN D-2.88-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

HAROLD PATIAGOS
DEPARTMENT OF TRANSPORTATION
**NOTE**

All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.
GEOTEXTILE FOR UNDERGROUND DRAINAGE CLASS A, MODERATE SURVIVABILITY (ONLY NEEDED IF A GEOGRID IS USED FOR GEOSYNTHETIC REINFORCEMENT)

1'-0" MIN. GEOTEXTILE OVERLAP, TOP & BOTTOM

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. "Apg" 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 "Ts" shall be determined in accordance with WSDOT Standard Practice T925. See Qualified Products List (QPL), Appendix "D," for products in which "Tg" has been determined. "L" and "Sv" are graphically defined. "Z" is the distance from the top of the wall to a geosynthetic layer, and is used to determine "Ts" 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.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PERMANENT GEOSYNTHETIC WALL
STANDARD PLAN D-3.09-00

Sheet 1 of 4 Sheets

Approve for Publication

Washington State Department of Transportation
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>
<th>GEOSYNTHETIC WALL TYPE 5</th>
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NOTE: See Note 4, sheet 1.
### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

**Includes Design for Large Earthquake: Aqs 0.5ftg**

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**NOTE:** See General Note 5, sheet 1.

### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

**Includes Design for Large Earthquake: Aqs 0.25ftg**

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**NOTE:** See General Note 5, sheet 1.
GEOTEXTILE GEOSYNTHETIC WALL:

1. SET FORM ON COMPLETED LIFT.

2. UNROLL GEOSYNTHETIC AND POSITION IT SO THAT A 4'-0" WIDE "TAIL" DRAPE OVER THE FORM. IF A GEOTEXTILE IS USED FOR THE GEOSYNTHETIC REINFORCEMENT, POSITION GEOTEXTILE TO PREVENT BACKFILL FROM SPILLING THROUGH GEOTEXTILE OPENINGS.

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

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

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

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

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

NOTES:

1. Use of the Temporary Form System, as detailed in this plan, is optional.

2. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.
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
- 7/8" (IN) DIAMETER THREADED ANCHOR ROD (STANDARD SPECIFICATION SECTION 3.03.3(3)) GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A32. ANCHOR RODS SHALL BE THREADED TO A MINIMUM OF 1'-0" AT ENDS. PLACE LEVEL AND NORMAL TO WALL, ENGAGE ANCHOR RODS WITH PVC SLEEVE. EMBED PVC ENDS INTO GRADE BEAM AND EDGE BEAM.
- BACKFILL VOID BEHIND WALL WITH SAND CONFORMING TO STANDARD SPECIFICATION SECTION 9.03.13(1) TO 6" ABOVE FINISHED GRADE ON FRONT FACE OF WALL.
- LEVELING PAD, EDGE BEAM, AND GRADE BEAM ARE CAST-IN-PLACE CONCRETE PLACED AT 1'-1" MAXIMUM SLOPE AND THE VERTICAL CONSTRUCTION JOINTS SHALL BE SPACED AT 120' MAXIMUM.
- ONE 3" (IN) DIAM WEEP HOLE PER FASCIA PANEL. HORIZONTAL LOCATION AT THE CENTERLINE FASCIA PANEL.
- ALL VERTICAL PANEL JOINTS SHALL BE SEALED FOR FULL CONTACT WITH AN APPROVED JOINT SEALANT. SEE "EXPANSION JOINT DETAILS", SHEET 2.
- UNLESS OTHERWISE SHOWN, MINIMUM CONCRETE COVER FOR REINFORCEMENT IS 1 1/2". INCREASE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES.
- IF GRADE BEAM IS NEAR CENTERLINE OF ROADWAY, USE ONE GRADE BEAM AT CENTERLINE FOR FASCIA PANEL ON EITHER SIDE.
- CONTACT BRIDGE OFFICE FOR ROADWAY CROSS SLOPES GREATER THAN 0.88FT.
- COORDINATE WALL FINISH AND CONFIGURATION WITH STATE BRIDGE AND STRUCTURES ARCHITECT PER WSDOT DESIGN MANUAL 730.04(5).
- SEE PRECAST FASCIA TABLE, SHEET 2 OF 2.
### Precast Fascia Table

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**Precast Permanent Geosynthetic Wall Fascia Standard Plan D-3.11-03**

- **Effective:** August 4, 2014 to August 2, 2015
- **Approved for publication:** DJB-PA-2014-11-11-AM
- **State Design Engineer:** Bijan Khaleshi

---

**Fascia Panel Bending Diagram**

- **Mark:** 4
- **Size:** 2'-0" STR.
- **Length:** DETERMINE FROM PLANS

---

**Expansion Joint Detail**

- **Backer Rod:** 1/2 MIN. TO 3/4" MAX.
- **Polyurethane Sealant:**

---

**Wall Transition**

- **Geosynthetic Wall to Curtain Wall Transition**
- **At Bridge:** SEE BRIDGE PLAN SHEETS FOR DETAILS

---

**Leveling Pad Detail**

- **Anchor Plate Detail**
  - ASTM A36, A572, or A688
  - "#4" @ 1'-0"
  - TYP.
  - Spacing made equal so that vertical panel joints are plumb
1. Ensure that no concrete enters the PVC conduit during concrete placement.

**EXPANSION JOINT DETAIL**

FOR CAST-IN-PLACE TO PRECAST BARRIER CONNECTION

1 1/4" PVC CONDUIT (TYP.) TO BE INSTALLED PARALLEL TO GRADE AND PARALLEL TO FACE OF BARRIER

1/2" PREMOLDED JOINT FILLER IN EXPANSION JOINT

1/2" MIN. EXPANSION GAP BETWEEN BAR AND CAP

**REINFORCING STEEL BENDING DIAGRAM**

ALL REINFORCING BARS SHOWN ON THIS PLAN SHALL BE ASHHTO M-31 UNLESS OTHERWISE NOTED.

**PERMANENT GEOSYNTHETIC WALL EXPANSION JOINT DETAILS**

STANDARD PLAN D-3.17-01

SHEET 1 OF 1 SHEET
NOTES
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.
TYPICAL GABION

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

FASTENING ADJACENT BASKETS

CROSS-CONNECTING WIRE PLACEMENT, END CELLS

CROSS CONNECTING WIRE PLACEMENT, INTERIOR CELLS OF FRONT GABIONS

LACING DETAIL

WELDED FABRIC

Twisted fabric

Gabions
Standard Plan D-6

Washington State Department of Transportation

Olympia, Washington

EXPRESS JUL 1, 999
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.

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

REINFORCED CONCRETE RETAINING WALL TYPE 1 AND 1SW STANDARD PLAN D-10.10-01
### FOOTING REINFORCEMENT

<table>
<thead>
<tr>
<th>WALL H</th>
<th>BAR ④</th>
<th>BAR ⑤</th>
<th>BAR ⑥</th>
<th>BAR ⑦</th>
<th>STEM REINFORCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>5' 6&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td></td>
</tr>
<tr>
<td>6' 0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>6' 0&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td>6'-6&quot;</td>
<td></td>
</tr>
<tr>
<td>7' 2&quot;</td>
<td>7'-2&quot;</td>
<td>7'-2&quot;</td>
<td>7'-2&quot;</td>
<td>7'-2&quot;</td>
<td></td>
</tr>
<tr>
<td>9' 0&quot;</td>
<td>9'-0&quot;</td>
<td>9'-0&quot;</td>
<td>9'-0&quot;</td>
<td>9'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>10' 3&quot;</td>
<td>10'-3&quot;</td>
<td>10'-3&quot;</td>
<td>10'-3&quot;</td>
<td>10'-3&quot;</td>
<td></td>
</tr>
<tr>
<td>12' 6&quot;</td>
<td>12'-6&quot;</td>
<td>12'-6&quot;</td>
<td>12'-6&quot;</td>
<td>12'-6&quot;</td>
<td></td>
</tr>
</tbody>
</table>

### STEM REINFORCEMENT

<table>
<thead>
<tr>
<th>STEM</th>
<th>MATERIAL</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SERVICE</td>
<td>STRENGTH</td>
</tr>
<tr>
<td></td>
<td>CY/LF</td>
<td>$/LF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MATERIAL

- #6: 1.16 | 7.98 | 2327 |
- #8: 1.49 | 10.63 | 3384 |
- #10: 1.82 | 13.28 | 4850 |
- #12: 2.15 | 16.01 | 5900 |
- #14: 2.48 | 21.96 | 8600 |
- #16: 2.81 | 28.52 | 10400 |

### VERTICAL FACE WALL DESIGN

- WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

### REINFORCED CONCRETE RETAINING WALL

- TYPE 1 AND 1SW

### STANDARD PLAN D-10.10-01

### REINFORCEMENT NOTES

1. **TRAFFIC BARRIER IS USED:**
   - ADD 0.100 CYLPF OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1.
   - ADD 0.123 CYLPF OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10

2. **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

---

**DRAWN BY:** R. L. REEDING

**EFFECTIVE:** AUGUST 4, 2014 TO AUGUST 2, 2015
250 PSF EQUIVALENT LIVE LOAD SURCHARGE WHEN SPECIFIED IN CONTRACT

CEMENT CONC. CUTTER (C.L. 200, 4" THICK)

SURFACE TREATMENT

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

3" CLR.

DRAIN

EXANSION JOINT - 48 CENTERS W/ 1/2" PREMOLDED JOINT FILLER

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

1 1/2" CLR.

SPLIT ELEVATION VIEW
(SHOWING SEPARATE REBAR LAYERS)

TYPICAL SECTION

BAR Q #4

LOCATION | WALL HEIGHT (Ft) | QTY.
----------|-----------------|------
TOP OF FOOTING | 12 1/2" | 5
17 1/2" | 6
17 1/2" | 7
22 1/2" | 6
25 1/2" | 11

BOTTOM OF FOOTING | 12 1/2" | 5
17 1/2" | 6
17 1/2" | 7
22 1/2" | 9
25 1/2" | 11

NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 25W (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 25W (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.

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

REINFORCED CONCRETE RETAINING WALL TYPE 2 AND 2SW STANDARD PLAN D-10.15-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SP"D PLAN D-10.15-01 SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 4, 2014 TO AUGUST 2, 2015
### REINFORCEMENT NOTES

1. If Traffic Barrier is used, add 0.110 CU of concrete Class 4000 for Barrier Alternate 1. Add 0.152 CY of concrete Class 4000 for Barrier Alternate 2. See Standard Plan 0-15-10.


### BAR @ 1'-0" CENTERS

<table>
<thead>
<tr>
<th>BAR</th>
<th>RADII (SEE TABLE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4</td>
<td>1'/2&quot;</td>
</tr>
<tr>
<td>#5</td>
<td>1'/8&quot;</td>
</tr>
<tr>
<td>#6</td>
<td>2'/4&quot;</td>
</tr>
<tr>
<td>#7</td>
<td>2'/8&quot;</td>
</tr>
<tr>
<td>#8</td>
<td>3&quot;</td>
</tr>
<tr>
<td>#9</td>
<td>4'/6&quot;</td>
</tr>
<tr>
<td>#10</td>
<td>5'/3&quot;</td>
</tr>
</tbody>
</table>

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

### DRAWN BY: BILL BERGEN

### APPPROVED FOR SUBMISSION

### WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

### EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015

---

**Table:**

<table>
<thead>
<tr>
<th>WALL H</th>
<th>DIMENSIONS</th>
<th>FOOTING REINFORCEMENT</th>
<th>STEM REINFORCEMENT</th>
<th>MATERIAL QUANTITY</th>
<th>MAXIMUM SOIL PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 1'-4&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6'</td>
<td>6'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 1'-5&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>7'</td>
<td>7'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 1'-6&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
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<td>N/A</td>
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<td>8'-0&quot;</td>
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<td>2'-7&quot; 2'-0&quot;</td>
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<td>N/A</td>
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<tr>
<td>10'</td>
<td>9'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 1'-11&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
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<td>11'</td>
<td>10'-0&quot;</td>
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<tr>
<td>12'</td>
<td>10'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-0&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
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<td>N/A</td>
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<tr>
<td>13'</td>
<td>11'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-1&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>14'</td>
<td>12'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-2&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>15'</td>
<td>13'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-3&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>16'</td>
<td>14'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-4&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>17'</td>
<td>15'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-5&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>18'</td>
<td>16'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-6&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>19'</td>
<td>17'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-7&quot;</td>
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<td>N/A</td>
</tr>
<tr>
<td>20'</td>
<td>18'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-9&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
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<td>N/A</td>
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<tr>
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<td>19'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-11&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>22'</td>
<td>20'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-13&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>23'</td>
<td>21'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-15&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>24'</td>
<td>22'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-17&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>25'</td>
<td>23'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-19&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>26'</td>
<td>24'-0&quot;</td>
<td>3'-0&quot; 1'-0&quot; 2'-21&quot;</td>
<td>2'-7&quot; 2'-0&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

---

**Diagram:**

- **BAR E**: 1'-0" Centers
  - 1/2" R
  - 0'-0"

---

**Diagram:**

- **BAR K AND M**: 1'-0"
  - 0'-0"

---

**Diagram:**

- **STEM REINFORCEMENT**:
  - 1'-0"
  - 3'-0"
  - 6'-0"
NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 3SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 3SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/LF.
5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.

REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 3SW
STANDARD PLAN D-10.20-00
SHEET 1 OF 2 SHEETS

RANDALL KHALAF
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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

SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 4 AND 4SW
STANDARD PLAN D-10.25-00
### VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE

- **Effective Date:** August 4, 2014 to August 2, 2015

#### FOOTING REINFORCEMENT

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>BAR (E)</th>
<th>BAR (F)</th>
<th>BAR (G)</th>
<th>BAR (H)</th>
<th>BAR (I)</th>
<th>STEM REINFORCEMENT</th>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>C</td>
<td>D</td>
<td>h</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>4</td>
<td>4-3'</td>
<td>2-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-3&quot;</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>4-3'</td>
<td>3-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-4-1/2&quot;</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>4-3'</td>
<td>4-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-5&quot;</td>
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<tr>
<td>10</td>
<td>10</td>
<td>4-1/2'</td>
<td>7-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-7-1/2&quot;</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>4-1/2'</td>
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<tr>
<td>14</td>
<td>14</td>
<td>4-1/2'</td>
<td>10-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-10&quot;</td>
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<tr>
<td>16</td>
<td>16</td>
<td>4-1/2'</td>
<td>12-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
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<td>24</td>
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<td>4-1/2'</td>
<td>20-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-20&quot;</td>
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<tr>
<td>26</td>
<td>26</td>
<td>4-1/2'</td>
<td>22-9&quot;</td>
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<td>32</td>
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<td>28-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-28&quot;</td>
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<tr>
<td>34</td>
<td>34</td>
<td>4-1/2'</td>
<td>30-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-30&quot;</td>
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<tr>
<td>36</td>
<td>36</td>
<td>4-1/2'</td>
<td>32-9&quot;</td>
<td>1-0&quot;</td>
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<td>34-9&quot;</td>
<td>1-0&quot;</td>
<td>NA</td>
<td>1-34&quot;</td>
</tr>
</tbody>
</table>
| 40 | 40 | 4-1/2' | 36-9" | 1-0" | NA | 1-36" | 7 | 2 | 40 | 4-1/2' | 36-9" | 1-0" | NA | 1-36" | 7 | 2 | 40 | 4-1/2' | 36-9" | 1-0" | NA | 1-36"

#### STEM REINFORCEMENT

- **Material Quantity:**
  - **Maximum Soil Pressure (PSF):**

#### REINFORCED CONCRETE RETAINING WALL

- **Type:** 4 and 4SW
- **Standard Plan D-10.25-00**

- **Sheet:** FACE WALL
- **Type:** BACKSLOPE

- **Service:** GENERAL
- **Strength:** 2.1

- **D-TYPE:** 0.25-0.0

- **G-SHEET:** 1.0

#### APPROVED FOR PUBLICATION

- Washington State Department of Transportation

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**NOTE:** This document is a sample of a vertical face wall design with 2:1 backslope. It includes dimensions, reinforcement details, and service strength considerations. The design is for reinforced concrete retaining walls with specific types and soil pressures.
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 0.30 g.

EXPANSION JOINT - 48' CENTERS, W/ 1/2 PREMOLDED JOINT FILLER
3" DIAM. DRAINS AT ABOUT 12' CENTERS AND 6" ABOVE FINAL GROUND LEVEL AT FRONT FACE OF WALL

VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE

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

KEY DETAIL
REQUIRED ON WALLS WHERE H > 26'
### Vertical Face Wall Design

#### Dimensions

<table>
<thead>
<tr>
<th>B</th>
<th>C</th>
<th>D</th>
<th>h</th>
<th>A</th>
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<tr>
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<td>3</td>
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#### Footing Reinforcement

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<tr>
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<td>1/4&quot;</td>
<td>3/8&quot;</td>
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<td>12&quot;</td>
<td>12&quot;</td>
<td>15&quot;</td>
<td>18&quot;</td>
<td>24&quot;</td>
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#### Stem Reinforcement

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<th>#7</th>
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<th>#9</th>
<th>#10</th>
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</thead>
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<td>7/32&quot;</td>
<td>1/4&quot;</td>
<td>3/8&quot;</td>
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<td>12&quot;</td>
<td>12&quot;</td>
<td>15&quot;</td>
<td>18&quot;</td>
<td>24&quot;</td>
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#### Material Quantity

<table>
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<tr>
<th>SERVICE</th>
<th>STRENGTH</th>
<th>EXTREME EVENT</th>
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<tr>
<td>300 kbf/ft</td>
<td>1.150 kbf/ft^2</td>
<td>3.000 kbf/ft^2</td>
</tr>
</tbody>
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#### Maximum Soil Pressure (PSF)

| DESIGN EVENT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| LBS/PSF | 538 | 646 | 743 | 840 | 937 | 1034 | 1131 | 1228 | 1325 | 1422 | 1519 | 1616 | 1713 | 1810 | 1907 | 2004 | 2101 | 2208 | 2305 | 2402 | 2500 | 2607 | 2704 | 2802 | 2900 | 3000 | 3100 | 3200 | 3300 | 3400 | 3500 |

**REINFORCED CONCRETE RETAINING WALL**

**STANDARD PLAN D-10.30-00**

**APPROVED FOR BRIDGECORE**

**Washington State Department of Transportation**
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.
### FOOTING REINFORCEMENT

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<th>WALL NO.</th>
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<th>BAR #</th>
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<th>LENGTH</th>
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<td>1/2</td>
<td>1</td>
<td>0.6</td>
<td>1</td>
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<tr>
<td>2</td>
<td>0.15</td>
<td>0.7</td>
<td>1/2</td>
<td>2</td>
<td>0.7</td>
<td>2</td>
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<td>3</td>
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<td>1/2</td>
<td>3</td>
<td>0.8</td>
<td>3</td>
</tr>
</tbody>
</table>

### STEM REINFORCEMENT

<table>
<thead>
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<th>WALL NO.</th>
<th>LENGTH</th>
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<th>SIZE</th>
<th>BAR #</th>
<th>SPAN</th>
<th>LENGTH</th>
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</thead>
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<tr>
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<td>0.10</td>
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<td>1/2</td>
<td>1</td>
<td>0.6</td>
<td>1</td>
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<tr>
<td>5</td>
<td>0.15</td>
<td>0.7</td>
<td>1/2</td>
<td>2</td>
<td>0.7</td>
<td>2</td>
</tr>
<tr>
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<td>1/2</td>
<td>3</td>
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### MATERIAL QUANTITY

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<tr>
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### MAXIMUM SOIL PRESSURE (PSF)

<table>
<thead>
<tr>
<th>WALL NO.</th>
<th>BARS &amp;</th>
<th>(SEE RADIUS)</th>
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<td>8</td>
<td></td>
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</tbody>
</table>

### RADIUS

- **BASE WALL**
  - **FACE WALL**
  - **STANDARD PLAN D-10.35-00**

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

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

APPROVED FOR PUBLICATION

**CONSTRUCTION**

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

**EFFECTIVE**: AUGUST 4, 2014 TO August 2, 2015
VERTICAL FACE WALL DESIGN WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

REINFORCED CONCRETE RETAINING WALL TYPE 7
STANDARD PLAN D-10.40-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BURHANS

TYPICAL SECTION

OFFSET = SET TOP OF WALL BACK
Hx 26... OFFSET = 1/2
H2 29... OFFSET (inches) = H(H/8) - 2

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6 IN. MIN. FROM THE TOP OF THE WALL.

1/25/08

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

BAR 3 4

LOCATION WALL HEIGHT (ft) QTY.
TOP OF FOOTING 16 x 23 5
23 x 26 9
26 x 30 11
BOTTOM OF FOOTING 16 x 23 7
23 x 26 9
26 x 30 11

VERTICAL FACE WALL
WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL TYPE 7
STANDARD PLAN D-10.40-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BURHANS

TYPICAL SECTION

OFFSET = SET TOP OF WALL BACK
Hx 26... OFFSET = 1/2
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WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6 IN. MIN. FROM THE TOP OF THE WALL.

1/25/08

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BAR 3 4

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23 x 26 9
26 x 30 11
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23 x 26 9
26 x 30 11

VERTICAL FACE WALL
WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL TYPE 7
STANDARD PLAN D-10.40-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BURHANS

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1/25/08

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

BAR 3 4

LOCATION WALL HEIGHT (ft) QTY.
TOP OF FOOTING 16 x 23 5
23 x 26 9
26 x 30 11
BOTTOM OF FOOTING 16 x 23 7
23 x 26 9
26 x 30 11

VERTICAL FACE WALL
WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL TYPE 7
STANDARD PLAN D-10.40-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BURHANS

TYPICAL SECTION

OFFSET = SET TOP OF WALL BACK
Hx 26... OFFSET = 1/2
H2 29... OFFSET (inches) = H(H/8) - 2

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6 IN. MIN. FROM THE TOP OF THE WALL.

1/25/08

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

BAR 3 4

LOCATION WALL HEIGHT (ft) QTY.
TOP OF FOOTING 16 x 23 5
23 x 26 9
26 x 30 11
BOTTOM OF FOOTING 16 x 23 7
23 x 26 9
26 x 30 11

VERTICAL FACE WALL
WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL TYPE 7
STANDARD PLAN D-10.40-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BURHANS

TYPICAL SECTION

OFFSET = SET TOP OF WALL BACK
Hx 26... OFFSET = 1/2
H2 29... OFFSET (inches) = H(H/8) - 2

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6 IN. MIN. FROM THE TOP OF THE WALL.

1/25/08

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

BAR 3 4

LOCATION WALL HEIGHT (ft) QTY.
TOP OF FOOTING 16 x 23 5
23 x 26 9
26 x 30 11
BOTTOM OF FOOTING 16 x 23 7
23 x 26 9
26 x 30 11

VERTICAL FACE WALL
WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL TYPE 7
STANDARD PLAN D-10.40-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BURHANS

TYPICAL SECTION

OFFSET = SET TOP OF WALL BACK
Hx 26... OFFSET = 1/2
H2 29... OFFSET (inches) = H(H/8) - 2

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6 IN. MIN. FROM THE TOP OF THE WALL.
SLOPING FACE WALL DESIGN WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 6th Edition 2007 and interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

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

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

DRAIN

CONSTRUCTION JOINT WITH ROUGHENED SURFACE THRU CONSTRUCTION JOINT

SEE BAR @ TABLE

BAR #4

LOCATION WALL HEIGHT (ft) QTY.

TOP OF FOOTING

≤ 12' 5
13' ≤ 16' 6
17' ≤ 22' 7
23' ≤ 30' 9
29' ≤ 35' 11

BOTTOM OF FOOTING

13' ≤ 16' 6
17' ≤ 22' 7
23' ≤ 30' 9
29' ≤ 35' 11

OFFSET - SET 3/4 OF WALL BACK:
H ≥ 2' OFFSET 1/2" H < 2' OFFSET (inches) = H/2 - 2

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6" MIN. FROM THE TOP OF THE WALL.

SPLIT ELEVATION VIEW

(Typically showing separate rebar layers)
### Reinforcement Notes

1. **Traffic Barrier is Used:** ADD 0.1 CY of Concrete Class 4000 for Barrier Alternate 1.

2. **Add 0.153 CU of Concrete Class 4000 for Barrier Alternate 2.** See Standard Plan D-15-10.

3. **Add 10 LB of Reinforcing Steel for Barrier Alternate 1 or 23 LBS of Reinforcing Steel for Barrier Alternate 2.** See Standard Plan D-15-10.

### Sloping Face Wall Design

**With a 250 PSF SPS**

### Bar @ 1'-0" Centers

<table>
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<tr>
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<th>RADIUS</th>
<th>BAR MIN. SPICE</th>
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<tr>
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### Bars K and M

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<th>RADIUS</th>
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### Drawn By: Bill Benning

### SHEET 2 OF 3

**Washington State Department of Transportation**

**APPROVED FOR USE**

**Effective: August 4, 2014 to August 2, 2015**

**Effective: August 4, 2014 to August 2, 2015**
Traffic barrier details for reinforced concrete retaining walls
Standard Plan D-15.10-01

- Beam guardrail transition type 20 connection
- Beam guardrail transition type 21 connection
- F-shape traffic barrier on retaining wall

**Details**
- Construction joint - level transverse with roughened surface
- Attachment guarded to concrete traffic barrier with 7/8" diam. high strength bolts (standard specification 9/28/54/31) with thin slab ferrule inserts or resin bonded anchors. See the contract plans.
- Top of retaining wall
- Diagrams of plan, elevation, and detail views

**Sections**
- Section A: Plan
- Section B: Elevation

**Notes**
- Top of roadway
- Retaining wall reinforcing steel
- Fractured fin finish
- 2@#8 continuous

**Drawn by** Bill Heising

**Washington State Department of Transportation**
REINFORCING STEEL BENDING DIAGRAM

USED WITH SLOPED FACE RETAINING WALL

USED WITH VERTICAL FACE RETAINING WALL

USED WITH SLOPED FACE RETAINING WALL

USED WITH VERTICAL FACE RETAINING WALL

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

1.5" TO 1/2" DEEP IRREGULAR FRACTURE

PLAN VIEW
FRACUTRED FIN FINISH DETAIL

DUMMY JOINT DETAIL

NOTE
SEE ELEVATION FOR LAP SPICE REQUIREMENTS

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

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.10-01
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION
TRAFFIC BARRIER DETAILS
FOR REINFORCED CONCRETE
RETAINING WALLS
STANDARD PLAN D-15.20-02

BEAM GUARDRAIL TRANSITION TYPE 20 CONNECTION

SINGLE SLOPE TRAFFIC BARRIER ON RETAINING WALL

ATTACH GUARDRAIL TO CONCRETE TRAFFIC BARRIER WITH 7/8" DAM HIGH STRENGTH BOLTS (STANDARD SPECIFICATION D-925.60) WITH THIN SLAB FERRULE INSERTS OR RESIN BONDED ANCHORS. SEE THE CONTRACT PLANS.
REINFORCING STEEL BENDING DIAGRAM

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

NOTE
SEE ELEVATION FOR LAP SPLICE REQUIREMENTS

USED WITH A SLOPED FRONT FACE OF A RETAINING WALL
USED WITH A VERTICAL FRONT FACE OF A RETAINING WALL

1 1/2"±1/4" R = 1/16"
1/4" TO 1/2" DEEP IRREGULAR FRACTURE
1"±1/4"

PLAN VIEW
FRACTURED FIN FINISH DETAIL

DUMMY JOINT DETAIL

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

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.20-02

SHEET 2 OF 2 SHEETS

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

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 21, STANDARD PLAN C-25.20

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.

REINFORCING STEEL BENDING DIAGRAM

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

ALL DIMENSIONS ARE OUT TO OUT
SEE STD. SPEC. FOR BENDING DIAMETERS
NOTES
1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.
2. Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is 3/4".
3. Traffic Barrier Connections between the bridge and the approaching roadway vary and may consist of concrete barrier extensions. Install the Date Numerals on the traffic barrier of the bridge itself.

DATE NUMERAL DETAILS

TYPICAL DATE NUMERALS

TYPICAL SECTION VIEW

PLAN VIEW

DATE LOCATION ON TWO-WAY BRIDGES

PLAN VIEW

DATE LOCATION ON ONE-WAY BRIDGES

DATE NUMERALS - SEE DETAILS

TOP OF ROADWAY

TOP OF TRAFFIC BARRIER

BRIDGE TRAFFIC BARRIER (TYP.)

BRIDGE TRAFFIC BARRIER (TYP.)

ALIGN THE NUMERALS PARALLEL TO TOP OF TRAFFIC BARRIER

ELEVATION VIEW

DATE LOCATION DETAIL

TOP OF ROADWAY

DATE NUMERAL PLACEMENT ON BRIDGE TRAFFIC BARRIER

STANDARD PLAN E-1

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

EXPIRES AUGUST 26, 2007

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Deck Framing Plan - Single Lane

Deck Framing Plan - Two Lane

Elevation - Pile Trestle

On pile trestles, when H exceeds 20' but less than 40', longitudinal bracing shall be placed on outside piers 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 3/4" Dia. bolts and lock washers.

Elevation - Frame Trestle

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

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

Brian Gale

State Design Chairman

Washington State Department of Transportation

Olympia, Washington

Effective: August 4, 2014 to August 2, 2015
NOTES

1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
3. All piling shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, ungalvanized.
6. Each deck plank shall be nailed to each stringer with #2 spikes, number 1 or larger.
7. On 17' spans, stringers shall be 6x6 SIE. On 15' spans, stringers shall be 6x6 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.

ACP overlay will see Note 8 > 1' - 0"

SECTION A-A

BASE PLATE DETAIL

1-3/4" DIA hole

DISTRIBUTION PLATE DETAIL

1-3/4" DIA hole

BACKING PLATE DETAIL

1-3/4" DIA hole (Typ)
### 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 0.6" diameter ($d_{ps}$), Grade 270, uncoated strands, AASHTO M203, jack to 0.75 $F_p u$ 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 REINFORCEMENT

- **Deformed Bar**
  - AASHTO M 21 Or 63
  - Cold Drawn Wire
  - AASHTO M 32

- **Plain Steel Bar**
  - AASHTO M 21 Or 63

- **Deformed Wire**
  - AASHTO M 22S

### Weld Dimensions

- **Weld Length** (L):
  - 3/8" x 3/8" x 3/32" x 1/2" or 1/2" x 1/2" x 1/32" x 1/2"

### Spiral Welded Lap Splice Detail

- **Spiral Bar**
  - 1" L

- **Field Weld or Shop Weld**
  - See Table for Weld Dimensions
PILE CAP

PRECAST PILE #4 SPIRAL @ 3" PITCH (TYP.)

PILE CAP - #4 SPIRAL @ 3" PITCH (TYP.) CAST IN PLACE CLASS 4000P CONCRETE ROUGHENED SURFACE PRECAST PILE

PILE CUTOFF WITH STRANDS EXTENDING 2'-0" MINIMUM

PILE CUTOFF WITH STRANDS EXTENDING LESS THAN 2'-0"

BUILD-UP ON PILE DRIVEN BELOW CUTOFF

PILE TO PILE-CAP CONNECTIONS

LIFTING LOOP OR CHOKER (TYP.)

LIFTING POINT (TYP.)

SEE NOTE 1

SEE NOTE 1

SEE NOTE 3

SEE NOTE 3

SEE NOTE 2

SEE NOTE 2

SEE NOTE 3

SEE NOTE 3

PILE BUNKING AND SHIPPING SUPPORT DIAGRAMS

PILE HANDLING DIAGRAMS

PRECAST PILES, HANDLING NOTES

1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.

2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground.

3. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.

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

5. The length of the formed or drilled hole shall allow for potential 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" [SEE CONTRACT]

MATCH ROADWAY SLOPE
1/2" (IN) R.
ROADWAY

1 1/2" R.
1 1/2"

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

FACE OF CURB VARIES 12" TO 24" [SEE CONTRACT]

MATCH ROADWAY SLOPE
1/2" (IN) R.
ROADWAY

1 1/2" R.
1 1/2"

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

NOTE

FACE OF CURB VARIES FROM 6" (IN) TO 0" (IN) - MAINTAIN 1:6 V SLOPE ON SIDE OF CURB

MATCH ROADWAY SLOPE
1/2" (IN) R.
ROADWAY

1 1/2" R.
1 1/2"

DEPRESSED CURB SECTION AT CURB RAMPS AND DRIVEWAY ENTRANCES

FACE OF CURB VARIES 12" TO 24" [SEE CONTRACT]

MATCH ROADWAY SLOPE
1/2" (IN) R.
ROADWAY

1 1/2" R.
1 1/2"

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE PEDESTRIAN CURB

CEMENT CONCRETE PEDESTRIAN CURB AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

FACE OF CURB VARIES 12" TO 24" [SEE CONTRACT]

MATCH ROADWAY SLOPE
1/2" (IN) R.
ROADWAY

1 1/2" R.
1 1/2"

MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE CURBS STANDARD PLAN F-10.12-03 SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation

Banff, Ed
May 6 2014 3:31 PM

5 1/4" 7 1/4"
3 1/4"
4 1/4"
1 1/2" (IN) R.
ROADWAY

5 1/4"
1 1/2" (IN) R.
ROADWAY

5 1/4"
1 1/2" (IN) R.
ROADWAY

May 6 2014 3:31 PM

3 3/4"
3 3/4"
3 3/4"
3 3/4"
1 1/2" (IN) R.
ROADWAY

5 1/4"
1 1/2" (IN) R.
ROADWAY

5 1/4"
1 1/2" (IN) R.
ROADWAY
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.

CEMENT CONCRETE EXTRUDED CURB

SPACING OF ANCHOR BARS
(FOR TYPES 4, 5, AND 6)

#3 BAR

1" MIN. (TYP.)

10'-9"

BETWEEN JOINTS (TYP.)

#3 BARS (TYP.)
TOP VIEW
INSIDE CORNER BLOCK

OUTSIDE CORNER BLOCK

TYPICAL OF ALL END VIEW

INSIDE 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

OUTSIDE CORNER BLOCK

18" (IN) RADIUS BLOCK

30" (IN) RADIUS BLOCK

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'</td>
<td>2'</td>
<td>8'</td>
</tr>
<tr>
<td>4' TO 5'</td>
<td>12'</td>
<td>1 1/2'</td>
<td>10'</td>
</tr>
<tr>
<td>6'</td>
<td>12'</td>
<td>1'</td>
<td>10'</td>
</tr>
<tr>
<td>7'</td>
<td>12'</td>
<td>7 1/8'</td>
<td>10 1/4'</td>
</tr>
<tr>
<td>8'</td>
<td>18'</td>
<td>1 1/8'</td>
<td>15 3/4'</td>
</tr>
<tr>
<td>9'</td>
<td>18'</td>
<td>1'</td>
<td>16'</td>
</tr>
<tr>
<td>10'</td>
<td>18'</td>
<td>7 1/8'</td>
<td>16 1/4'</td>
</tr>
<tr>
<td>11' TO 13'</td>
<td>18'</td>
<td>3/4'</td>
<td>16 1/2'</td>
</tr>
<tr>
<td>14' TO 15'</td>
<td>18'</td>
<td>5/8'</td>
<td>16 3/4'</td>
</tr>
<tr>
<td>16' TO 17'</td>
<td>24'</td>
<td>3/4'</td>
<td>22 1/2'</td>
</tr>
<tr>
<td>18' TO 22'</td>
<td>24'</td>
<td>5/8'</td>
<td>22 3/4'</td>
</tr>
<tr>
<td>23' TO 29'</td>
<td>24'</td>
<td>1/2'</td>
<td>23'</td>
</tr>
<tr>
<td>30' TO 34'</td>
<td>30'</td>
<td>1/2'</td>
<td>29'</td>
</tr>
<tr>
<td>35' TO 48'</td>
<td>30'</td>
<td>3/8'</td>
<td>29 1/4'</td>
</tr>
<tr>
<td>49' TO 60'</td>
<td>30'</td>
<td>1/4'</td>
<td>29 1/2'</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.

**NOTE**

1. Four feet of the sidewalk width shall be the minimum pedestrian accessible route free of vertical and horizontal obstructions. Gratings, Access Covers, Junction Boxes, Cable Vaults, Pull Boxes and other appurtenances within the sidewalk must have slip resistant surfaces, be flush with surface, and match grade of the sidewalk.

**SIDEWALK ADJACENT TO WALL DETAIL**

**RAISED EDGE DETAIL**

**CEMENT CONCRETE CURB AND SIDEWALK**

**STANDARD PLAN F-30.10-03**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

**STATE DESIGN ENGINEER**
1. Provide a separate Curb Ramp for each marked or unmarked crosswalk. Curb Ramp location shall be placed within the width of the associated crosswalk, or as shown in the Contract Plans.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances in front of the Curb Ramp or on any part of the Curb Ramp or Landing.
6. The Bid Item "Cement Concrete Curb Ramp Type ___" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp maximum running slope shall not require the ramp length to exceed 15 feet to avoid chasing the slope indefinitely when connecting to steep grades. When applying the 15-foot max. length, the running slope of the curb ramp shall be as flat as feasible.
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will be no material to retain.
NOTES

1. Provide a separate Curb Ramp for each marked or unmarked crosswalk. Curb Ramp location shall be placed within the width of the associated crosswalk or as shown in the Contract Plans.

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

3. Do not place Grasings, Junction Boxes, Access Covers, or other appurtenances in front of the Curb Ramp or on any part of the Curb Ramp or Landing.


6. The Bid Item "Cement Concrete Curb Ramp Type " does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian curb or Sidewalks.

7. The Curb Ramp maximum running slope shall not require the ramp length to exceed 15 feet to avoid chasing the slope indefinitely when connecting to steep grades. When applying the 15-foot max. length, the running slope of the Curb Ramp shall be as flat as feasible.


9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

LEGEND

SLOPE IN EITHER DIRECTION
NOTES
1. Provide a separate Curb Ramp for each marked or unmarked crosswalk. Curb Ramp location shall be placed within the width of the associated crosswalk or as shown in the Contract Plans.

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

3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances in front of the Curb Ramp or on any part of the Curb Ramp or Landing.


6. The Bid Item "Cement Concrete Curb Ramp Type _" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalk.

7. The Curb Ramp maximum running slope shall not require the ramp length to exceed 15-feet to avoid chasing the slope indefinitely when connecting to steep grades. When applying the 15-foot maximum length, the running slope of the Curb Ramp shall be as flat as feasible.


LEGEND
SLOPE IN EITHER DIRECTION

SLOPE TREATMENT - SEE STANDARD PLAN F-30.10

DETECTABLE WARNING SURFACE - SEE STANDARD PLAN F-45.10

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DEPRESSED CURB AND GUTTER - SEE STANDARD PLAN F-15.12

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DEPRESSED CURB AND GUTTER - SEE NOTE 4

DETECTABLE WARNING SURFACE - SEE STANDARD PLAN F-45.10

DETECTABLE WARNING SURFACE - SEE STANDARD PLAN F-45.10

SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. This plan is to be used where pedestrian crossing in one direction is not permitted.
2. Curb ramp location shall be placed within the width of the associated crosswalk, or as shown in the Contract Plans.
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 in front of the curb ramp or landing.
5. See the Contract Documents for the curb design specified.
7. The bid item "Concrete Concrete Curb Ramp Type..." does not include the adjacent Curb or Depressed Curb and Gutter, Pedestrian Curb or Sidewalk, or the pedestrian crossing closure sign.
8. The curb ramp maximum running slope shall not require the ramp length to exceed 15 feet to avoid chasing the slope indefinitely when connecting to steep grades. When applying the 15 foot maximum length, the running slope of the curb ramp shall be as flat as feasible.
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 be no material to retain.
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 curb ramp maximum running slope shall not require the ramp length to exceed 15' (ft) to avoid chasing the slope indefinitely when connecting to steep grades. When applying the 15' (ft) max. length, the running slope of the curb ramp shall be as flat as feasible.

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

LEGEND

SLOPE IN EITHER DIRECTION
CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3, & 4

**SECTION E**

- 1/2" (IN) R. (TYP.)
- 3/8" (IN) EXPANSION JOINT (TYP.)
- SIDEWALK (SEE CONTRACT)
- MATCH SIDEWALK WIDTH (SEE CONTRACT)
- DEPRESSED CURB & GUTTER (OR SEE CONTRACT)
- 1/2" LIP BETWEEN ROADWAY GUTTER & CURB (OR SEE CONTRACT)

**SECTION F**

- 1/2" (IN) R. (TYP.)
- 3/8" (IN) EXPANSION JOINT (TYP.)
- SIDEWALK (SEE CONTRACT)
- MATCH SIDEWALK WIDTH (SEE CONTRACT)
- DEPRESSED CURB & GUTTER (OR SEE CONTRACT)
- 1/2" LIP BETWEEN ROADWAY GUTTER & CURB (OR SEE CONTRACT)

**NOTE 1**

-Buffer Strip (TYP.)

**NOTE 2**

- Cement concrete driveway entrance type 3 pay limit

**NOTE 3**

- Cement concrete curb & gutter (see note 3)

**NOTE 4**

- Driveway (see note 7)

**NOTE 5**

- Driveway entrance side slope (TYP.)

**NOTE 6**

- Driveway ramp (see note 7)

**NOTE 7**

- Driveway entrance ramp section

**NOTE 8**

- Depressed curb & gutter

**NOTE 9**

- 2' - 0" 3/B" (IN) EXPANSION JOINT (TYP.)

**NOTE 10**

- See standard plan F-30.10

**NOTE 11**

- Standard plan F-80.1-03

**NOTE 12**

- CL. 4000 concrete, per standard spec. 0-06.3

**NOTE 13**

- Cements concrete driveway entrance type 4 pay limit

**NOTE 14**

- Cements concrete driveway entrance type 4 pay limit

**NOTE 15**

- Driveway entrance ramp section

**NOTE 16**

- Depressed curb & gutter

**NOTE 17**

- 2' - 0" 3/B" (IN) EXPANSION JOINT (TYP.)

**NOTE 18**

- See standard plan F-30.10

**NOTE 19**

- CL. 4000 concrete, per standard spec. 0-06.3
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.
NOTES
1. Refer to the Sign Specification Sheet of the Contract for the 'V' and 'W' distances.
2. The minimum vertical distance from the bottom of the sign to the ground shall not be less than 7 ft for signs located within the Design Clear Zone.

GROUND-MOUNTED SIGN PLACEMENT
STANDARD PLAN G-20.10-0
SHEET 1 OF 1 SHEET

Washington State Department of Transportation
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" (f) 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 (NOM.)</th>
<th>DEPTH</th>
<th>HOLE DIAMETER</th>
<th>NOTCH DEPTH (SEE NOTE 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x4</td>
<td>3'-0&quot;</td>
<td>NOT REQ'D</td>
<td>NOT REQ'D</td>
</tr>
<tr>
<td>4x6</td>
<td>4'-0&quot;</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>6x6</td>
<td>4'-0&quot;</td>
<td>SEE NOTES 3 &amp; 4</td>
<td></td>
</tr>
<tr>
<td>6x8</td>
<td>5'-0&quot;</td>
<td>SEE NOTES 3 &amp; 4</td>
<td></td>
</tr>
<tr>
<td>6x10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td></td>
</tr>
<tr>
<td>8x10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td></td>
</tr>
<tr>
<td>6x12</td>
<td>7'-0&quot;</td>
<td>SEE NOTE 2</td>
<td></td>
</tr>
</tbody>
</table>

**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" (f) minimum spacing is required between posts.

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

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

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

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

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

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

STEEL SIGN SUPPORT
TYPES PL, PL-T, & PL-U
INSTALLATIONS DETAILS
STANDARD PLAN G-24.30-01

SHEET 1 OF 2 SHEETS

APPENDIX FOR PUBLICATION

Washington State Department of Transportation
**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 pretightening 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 bolt.


---

**EXPLODED VIEW**

**TYPE SB-1**

SLIP BASE ASSEMBLY

---

**TYPE SB-2**

SLIP BASE ASSEMBLY

---

**TYPE SB-3**

SLIP BASE ASSEMBLY

---

**STATE DESIGN ENGINEER**

---

**STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3 INSTALLATION DETAILS**

**STANDARD PLAN G-24.40-0**

**SHEET 2 OF 4 SHEETS**

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Washington State Department of Transportation

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**APPROVED FOR PUBLICATION**

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**STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3 - 8" (IN)**
When reading this natural text, please note the following:

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.


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.


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

3. A 2" (in) post with a 2 1/4" (in) PSST anchor or a 2 1/4" (in) post with a 2 1/2" (in) PSST anchor may be substituted. See Contract Plans.

4. Perforated square steel post shall meet the requirements of Standard Specification 9-06.

5. Use only base connection manufacturer supplied hardware that meets the requirements of Standard Specifications 9-06 and 9-28.

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 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' (ft) wheel path.

5. On fill slopes, the maximum sign height is 9' (ft) for posts closest to the edge of traveled way.

SUPPLEMENTAL PLAQUE
EDGE OF TRAVELED WAY

WIDE FLANGE STEEL SIGN POST (UPPER SECTION)

WIDE FLANGE STEEL SIGN POST (LOWER SECTION)

BREAKAWAY HINGE PLATE CONNECTION

MAJOR AND SECONDARY SIGN SUPPORT INSTALLATION

ISOMETRIC VIEW
WINDBEAM AND SIGN POST CONNECTION

(ATTACH POST CLIPS ON BOTH SIDES OF WIDE FLANGE STEEL SIGN POST)

MAJOR SIGN

SECONDARY SIGN

BREAKAWAY HINGE PLATE

VIEW B

BOLTS ON ONE SIDE OF EACH WIDE FLANGE STEEL SIGN POST

Z-BAR

HINGE PLATE (TYP.)

Hinge Point

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

1/4" (IN) x 2 1/4" (IN) HEX BOLT, 3/4" (IN) LOCK WASHER, AND 3/4" - 10 UNC BOLT (TYP.)

3/16" (IN) ALUMINUM RIVET

ALUMINUM POST CLIPS

ALUMINUM WINDBEAM

WIDE FLANGE STEEL SIGN POST

STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

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

A  B  C  D
3'-0"  2'-6"  1'-0"  6"
3'-0"  2'-6"  1'-0"  6"
4'-0"  2'-6"  1'-3"  9"

SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

MOUNTING BRACKET AND STEEL STRAP
(SEE NOTE 1)

BACK OF SIGN PANEL

LEVEL

DIMENSIONS

X  Y  C  D
3'-0"  2'-6"  1'-0"  6"
3'-0"  2'-6"  1'-0"  6"
4'-0"  2'-6"  1'-3"  9"

LEVEL

MOUNTING BRACKET AND STEEL STRAP
(SEE NOTE 1)

BACK OF SIGN PANEL

SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

STATE DESIGN ENGINEER
Washington State Department of Transportation
NOTES

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

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

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

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type III, IV, VIII or IX sheeting.

SIGN PANEL

FIELD DRILL 5/16" DIAMETER HOLE IN SIGN PANEL (TYP.) FOR SIGN ATTACHMENT, SEE DETAIL - STANDARD PLAN G-22.10, SHEET 2 OF 2 (TYP.)

STEEL PIPE SIGN POST

FOR SIGN ATTACHMENT, SEE DETAIL - STANDARD PLAN G-24.00

1/4" DIAMETER x 1" LONG HEX HEAD BOLT, NUT, AND WASHERS (TYP.) - SEE NOTE 4

SIGN BRACE ON TIMBER POST

SIGN PANEL

FIELD DRILL 5/16" DIAMETER HOLE IN SIGN PANEL (TYP.) FOR SIGN ATTACHMENT, SEE DETAIL - STANDARD PLAN G-30.10

STEEL TUBE SIGN POST

1/4" DIAMETER x 1" LONG HEX HEAD BOLT, NUT, AND WASHERS (TYP.) - SEE NOTE 4

SIGN BRACE

SIGN PANEL

MOUNTING BRACKET AND STEEL STRAP WITH WINDBEAM FOR STANDARD PLAN G-30.10, SHEET 2 OF 2 (TYP.)

WINDBEAM

SIGN BRACE ON STEEL PIPE

FOR SIGN ATTACHMENT, SEE DETAIL - STANDARD PLAN G-30.10

1/4" DIAMETER x 1" LONG HEX HEAD BOLT, NUT, AND WASHERS (TYP.) - SEE NOTE 4

SIGN BRACE

STEEL TUBE SIGN POST

SIGN PANEL

MOUNTING BRACKET AND STEEL STRAP DETAIL

FIELD DRILL 5/16" DIAMETER HOLE IN SIGN PANEL (TYP.) FOR SIGN ATTACHMENT, SEE DETAIL - STANDARD PLAN G-30.10

STEEL PIPE SIGN POST

MOUNTING BRACKET AND STEEL STRAP - SEE NOTE 4

5/16" DIAMETER HEX HEAD BOLT AND WASHERS

SIGN PANEL

5/16" DIAMETER HEX HEAD BOLT AND WASHERS

SIGN BRACE

FOR SIGN ATTACHMENT, SEE DETAIL - STANDARD PLAN G-30.10

STEEL PIPE SIGN POST

SIGN BRACE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SIGN BRACING

STANDARD PLAN G-50.10-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
### SIGN BRACE DIMENSIONS

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<thead>
<tr>
<th>SIGN TYPE</th>
<th>YIELD</th>
<th>DIAMOND-SHAPED</th>
<th>OTHERS</th>
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<tr>
<td>A</td>
<td>1/3 SIGN WIDTH - 3 1/4”</td>
<td>1/2 SIGN WIDTH - 2 1/4”</td>
<td>1/2 SIGN WIDTH - 1”</td>
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### SIGN POST TYPE

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<tr>
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<th>BRACE</th>
<th>TYPE</th>
<th>HEIGHT</th>
<th>WIDTH</th>
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<tr>
<td>4 x 4 OR 6 x 6</td>
<td>3 1/2”</td>
<td>TIMBER POST</td>
<td>2 1/2”</td>
<td>2 1/2”</td>
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<tr>
<td>6 x 8</td>
<td>3 1/2”</td>
<td>TIMBER POST</td>
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<td>6 x 8</td>
<td>3 1/2”</td>
<td>STEEL PIPE</td>
<td>2 1/2”</td>
<td>2 1/2”</td>
</tr>
</tbody>
</table>

### NOTE

1. For sign installations on round steel posts, see Standard Plan G-30.10, sheet 2 of 2.
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 parent 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" 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, Luminaires and Traffic Signs 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). Tightly 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-75.4f.
VERTICAL "FAR" TRUSS DIAGONAL (TYP.)

TRUSS & SIGN

VERTICAL "NEAR" TRUSS DIAGONAL (TYP.)

PANEL LENGTH (F - 2' MAX.) TO BE CONSTANT THROUGHOUT SPAN

\[ L = \frac{21'}{2} - 0' \text{ MAX.} \]

BOTTOM OF LUMINAIRE BRACKET, WHEN SIGN LIGHTING IS SHOWN IN THE CONTRACT

HAND HOLE ON SIDE \( \rightarrow \) AWAY FROM TRAFFIC

\[ X/2 \]

\[ X \times 2 \]

\[ L = 21' - 0' \text{ MAX.} \]

BOTTOM OF BASE PLATE

BASE ELEVATION

ELEVATION

DOUBLE CANTILEVER SIGN STRUCTURE

SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE.

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)

STANDARD PLAN G-60.10-02

SHEET 2 OF 4 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation
HEMISPHERICAL POST FINIAL, 118" MIN. THICKNESS. INSTALL AFTER GALVANIZING

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

CUT HOLE IN POST FOR HOLE PLUNGE 1/8" MAX. CLEARANCE ALL AROUND

ELEVATION

ROTATED 90° TO SHOW CUTOUT

15/16" DIA. HOLE (TYP.) (CUT HOLES IN OPPOSITE PLANE FOR SINGLE CANTILEVER)

CHORD

6" DIA. BOLT CIRCLE

1/2" DIA. HOLE AS CLOSE TO END AS POSSIBLE TO FACILITATE GALVANIZING

1/2" DIA. BOLTS x 2 1/2" LONG (STD. SPEC. 9.0.5.2) - INSTALL BOLTS WITH HEAD TOWARD CHORD

7/8" DIA. BOLTS x 2 1/2" LONG (STD. SPEC. 9.0.5.2) - INSTALL BOLTS WITH HEAD TOWARD CHORD

7/8" PLATE MIN. 5/16" x 1/2" SLOT FOR 3/8" ALLEN SET SCREW

5/16" x 1/2" SLOT FOR 3/8" ALLEN SET SCREW

1/8" PLATE MIN. 5/16" x 1/2" SLOT FOR 3/8" ALLEN SET SCREW

6" DIA. BOLT CIRCLE

3/4" MAX

3/8" ALLEN HOLLOW SET SCREW

1/8" PLATE MIN.

BASE - SIDE

3" DIA. PIPE / 0.300 SPLICE WITH 3" DIA. PIPE (T = 0.216) (SEE CHORD SELECTION TABLE)

2 1/2" DIA. PIPE / 0.276 SPLICE WITH 2 1/2" DIA. PIPE (T = 0.203) (SEE CHORD SELECTION TABLE)

1/2" DIA. HOLE IN CHORD AT EACH END OF ALL DIAGONAL CHORDS AND STRUTS

DIAGONALS

ISOMETRIC

BASE - TOP

SECTION A

4 1/2" CHORD

1/2" DIA. BOLT CIRCLE

3/4" MAX

15/16" DIA. HOLE (TYP.) FOR FOUR 7/8" DIA. BOLTS (ASTM A 325)

TYPICAL TRUSS DETAILS

ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORD

TYPICAL TRUSS DETAILS
REMOVABLE RAIN TIGHT HAND HOLE COVER WITH GASKET - FASTEN WITH TWO STAINLESS STEEL (ASTM F 593) SCREWS

HOLE IN POST BASE (HOLE DIAM = POST O.D. - 2"

2" DIAM. HOLES FOR ANCHOR BOLTS (TYP.)

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

INSIDE EDGES SHALL BE ROUNDED AND SMOOTH ALL AROUND

POST BASE DETAILS

DRILL AND TAP FOR 1/4" DIAMETER CAP SCREW - SPACING APPROX. 3/4 O.C. ASTM F 593, W.S.S. WASHER LIBERALLY COAT THE THREADS WITH ANTI-SEIZE COMPOUND (TYP.)

WELDER GALV CLOTH 1/16" x 7/16" SQ WRAP AROUND BASE PLATE WITH 2" MIN. LAP

SECTION C

BASE WELD DETAIL

24" O.D. PIPE IT = 0.955 SPlice WITH
24" O.D. UPPER POST (SEE POST SELECTION TABLE)
16" O.D. PIPE IT = 0.785 IT WITH
18" O.D. UPPER POST (SEE POST SELECTION TABLE)
VALUES OF Z

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (psf)</th>
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<tbody>
<tr>
<td>Z</td>
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<tr>
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<tr>
<td>200 SF - 400 SF</td>
<td>16'-0&quot;</td>
<td>22'-0&quot;</td>
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CONCRETE CLASS 4000

CONCRETE CLASS 6000

CONSTRUCTION JOINT W/ ROUGHENED SURFACE

ANCHOR PLATE (TYP.) - SEE DETAIL, SHEET 2

ANCHOR ROD END FOR 1'-0" MIN.

ANCHOR PLATE (TYP.)

ANCHOR PLATE (TYP.)

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

GROUNDING CONDUCTOR SHALL BE NON-INSULTED #4 AWG STANDED COPPER - PROVIDE 3'-0" BLACK (ROUTE TO GROUNDING STUD)

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

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

ANCHOR ROD END FOR 1'-0" MIN.

VALUES OF Z

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.
2 1/2" Diameter Hole for Anchor Bolt (Typ.)

ANHOR PLATE DETAIL

1/2" Plate (ASTM A 36)
(No Galvanizing Required)

MAY BE FIELD BENT (Typ.)

SPRAL WELDED LAP SPICE DETAIL

SPRAL LAP SPICE DETAIL

WELDING SHALL MEET THE REQUIREMENTS OF STD. SPEC. 5-02.3(24)E
FOR WELD DIMENSIONS - SEE TABLE BELOW

COLUM AND SHAFT SPIRAL OPTIONS

<table>
<thead>
<tr>
<th>DEFORMED BAR</th>
<th>Plain Steel Bar</th>
<th>Cold Drawn Wire</th>
<th>Deformed Wire</th>
<th>Weld Dimensions (INCHES)</th>
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<tr>
<td>AASHTO M 31</td>
<td>AASHTO M 31</td>
<td>AASHTO M 32</td>
<td>AASHTO M 225</td>
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<td>D31</td>
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MATERIAL SPECIFICATIONS

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<tr>
<th>SHEET CONCRETE</th>
<th>Class 4000P</th>
<th>All Other Concrete</th>
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<tr>
<td>STEEL REIN. BAR</td>
<td>AASHTO M 31</td>
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<td>AASHTO M 31</td>
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<td>ANCHOR NUTS</td>
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<td>ANCHOR WASHERS</td>
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<td>PLATE</td>
<td>ASTM A 36</td>
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NOTES

1. See Standard Specification 8-21.3(9) for construction requirements.

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

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

ANCHOR PLATE (TYP.) - SEE DETAIL, STANDARD PLAN G-64.30, SHEET 2

ARCH FOR SLOPED GRADE ISOMETRIC

CANTILEVER SIGN
STRUCTURE (TRUSS-TYPE)
FOUNDATION TYPES 2 & 3
STANDARD PLAN G-60.30-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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**VALUES OF Z**

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<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
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<td>13'-6&quot;</td>
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**MATERIAL SPECIFICATIONS**

- **CONCRETE**: CLASS 4000P
- **STEEL REIN. BAR**: AASHTO M 31, GRADE 60
- **ANCHOR RODS**: ASTM F 1554, GRADE 105
- **ANCHOR NUTS**: AASHTO M 291
- **ANCHOR WASHERS**: AASHTO M 293
- **ANCHORAGE GALV. WASHING**: AASHTO M 232
- **ANCHOR PLATE**: ASTM A 36

**CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)**

**FOUNDATION TYPES 2 & 3**

**STANDARD PLAN G-60.30-01**

Sheet 2 of 2 sheets

Approved for publication

Washington State Department of Transportation
MATERIAL SPECIFICATIONS

| PIPE (CHORDS, DIAGONALS, SHAPES AND POSTS) | ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR A 50 GRADE B |
| PLATES | ASTM A 36 |
| SHAPES | ASTM A 36 ASTM A 992 |
| BOLTS, NUTS, WASHERS | STG SPEC 9-05.50 |
| PIPE, PLATE & SHAPE GALVANIZED | AASHTO M 111 |
| FASTENER, GALVANIZED | AASHTO M 232 |

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' maximum spacing. Locate symmetrically about centerline of span if possible. An interior diagonal is not required at span ends.
4. No post splice 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.

ELEVATION

Y₁ = HEIGHT OF SHALLOWEST SIGN ON STRUCTURE, D = 1'-0" MIN

Y₂ = HEIGHT OF ANY SIGN WITH HEIGHT GREATER THAN Y₁

STRUCTURE DIMENSIONS

<table>
<thead>
<tr>
<th>SPAN LENGTH</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>
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<tbody>
<tr>
<td>60' OR LESS</td>
<td>4'-0&quot;</td>
<td>3' x 216&quot;</td>
<td>1-1/4&quot; x 140&quot;</td>
<td>10' x 279&quot;</td>
<td>2-1/2&quot; x 203&quot;</td>
<td>384</td>
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<tr>
<td>61' to 90'</td>
<td>5'-0&quot;</td>
<td>4' x 237&quot;</td>
<td>2' x 154&quot;</td>
<td>10' x 279&quot;</td>
<td>2-1/2&quot; x 203&quot;</td>
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<td>91' to 100'</td>
<td>6'-0&quot;</td>
<td>5' x 256&quot;</td>
<td>2' x 154&quot;</td>
<td>10' x 307&quot;</td>
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<tr>
<td>101' to 150'</td>
<td>7'-0&quot;</td>
<td>6' x 280&quot;</td>
<td>2-1/2&quot; x 203&quot;</td>
<td>10' x 307&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.
Drilled hole in chord at each diagonal and strut shall be 1" diameter for spans over 60' - for spans 60' or less, diameter shall be 3/4".

Elevation Section:
- Ends of diagonals shall be cut to fit neatly against chord or post. Fillet weld size to be diagonal tube or pipe thickness plus 1/16".

Interior diagonal - where required:
- 3/4" max.

Section A:
- 3/4" backing plate
- 2" min.

Section D:
- 3" slot in horizontal diagonal for plate 3/8".

Alternate Joint Detail:
- Not for connections between vertical diagonals and chords.

CHORD FIELD SPLICE DATA:

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>f</th>
<th>t</th>
<th>BOLT K DIAMETER</th>
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<tr>
<td>60' OR LESS</td>
<td>5/8</td>
<td>3/4</td>
<td>1/16</td>
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<tr>
<td>61' TO 90</td>
<td>7/8</td>
<td>1 1/2</td>
<td>7/8</td>
</tr>
<tr>
<td>91' TO 120</td>
<td>9/16</td>
<td>1 1/4</td>
<td>7/8</td>
</tr>
<tr>
<td>121' TO 152</td>
<td>9/16</td>
<td>1 1/4</td>
<td>7/8</td>
</tr>
</tbody>
</table>

Chord Field Splice:
- No chord field splice permitted in middle third of span length.
- 3/16" shims are required at the remaining two chord joints when interior diagonal is installed.
DRILL AND TAP FOR 1/4" DIAMETER CAP SCREW - SPACING APPROX. 5" O.C.
ASTM F 593, W/ S.S. WASHER, LIBERALLY
COAT THE THREADS WITH ANTI-
SEIZE COMPOUND
(TYP.)

1 1/2" DIAM. HOLE FOR ANCHOR BOLT (TYP.)

WELDED GALV. CLOTH
11/16" x 7/16" SQ. WRAP
AROUND BASE PLATE
WITH 3" MIN. LAP

BASE PLATE HOLE =
6" DIAM.
1 - 1/8" BOLT CIRCLE

TOP OF FOUNDATION

POST BASE DETAILS

1/4" BACK-UP BAR
SEAL HELD

OPENING MARK

TOP

SECTION

BASE WELD DETAIL

TOP OF FOUNDATION

SIGN BRIDGE
(TRUSS-TYPE)
STANDARD PLAN G-70.10-02
SHEET 4 OF 4 SHEETS
WELDED GALV. CLOTH
11/16" x 7/16" SQ. WRAP
AROUND BASE PLATE
WITH 3" MIN. LAP

POST BASE DETAILS

ANCHOR ROD (TYP.)

TOP OF FOUNDATION

POST

ANCHOR BOLT

TOP OF BASE

SCREEN DETAIL

1 1/2" DIAM. HOLE FOR ANCHOR BOLT (TYP.)

BASE PLATE HOLE =
6" DIAM.
1 - 1/8" BOLT CIRCLE
MATERIAL SPECIFICATIONS

- CONCRETE CLASS 4000P
- STEEL REIN. BAR AASHTO M 31 GRADE 60
- ANCHOR RODS ASTM F 1554 GRADE 105
- ANCHOR NUTS AASHTO M 291
- ANCHORAGE GALVANIZED AASHTO M 293
- ANCHOR PLATE ASTM A 36

TABLE

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>60' OR LESS</th>
<th>61' TO 90'</th>
<th>91' TO 120'</th>
<th>120' TO 150'</th>
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<tr>
<td>DIMENSION D</td>
<td>4'-0&quot;</td>
<td>5'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>BAR SPACES N</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>SHIFT DEPTH C</td>
<td>2</td>
<td>2-3/4&quot;</td>
<td>3-3/4&quot;</td>
<td>4&quot;</td>
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ALLOWABLE LATERAL BEARING PRESSURE (PSF)

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<td>91' TO 120'</td>
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<td>120' TO 150'</td>
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BAR LIST

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<tr>
<th>FOUNDATION TYPE</th>
<th>MARK</th>
<th>LOCATION</th>
<th>SPAN LENGTH</th>
<th>QTY.</th>
<th>SIZE</th>
<th>QTY.</th>
<th>SIZE</th>
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</thead>
<tbody>
<tr>
<td>2 AND 3</td>
<td>①</td>
<td>CAP - TOP</td>
<td>61' TO 90'</td>
<td>6</td>
<td>5-5/8&quot;</td>
<td>6</td>
<td>5-5/8&quot;</td>
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<tr>
<td>②</td>
<td>CAP - SIDES</td>
<td>61' TO 90'</td>
<td>14</td>
<td>5-5/8&quot;</td>
<td>14</td>
<td>5-5/8&quot;</td>
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</tr>
<tr>
<td>③</td>
<td>CAP - HOOPS</td>
<td>61' TO 90'</td>
<td>6</td>
<td>5-5/8&quot;</td>
<td>6</td>
<td>5-5/8&quot;</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td>CAP - BOTTOM</td>
<td>61' TO 90'</td>
<td>6</td>
<td>5-5/8&quot;</td>
<td>6</td>
<td>5-5/8&quot;</td>
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<tr>
<td>⑤</td>
<td>FND. WALL - VERTICAL</td>
<td>61' TO 90'</td>
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<td>4-1/8&quot;</td>
<td>10</td>
<td>4-1/8&quot;</td>
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</tr>
<tr>
<td>⑥</td>
<td>FND. WALL - TIES</td>
<td>61' TO 90'</td>
<td>6</td>
<td>1-1/4&quot;</td>
<td>6</td>
<td>1-1/4&quot;</td>
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<tr>
<td>⑦</td>
<td>FND. WALL - HORIZONTAL</td>
<td>61' TO 90'</td>
<td>6</td>
<td>5&quot;</td>
<td>6</td>
<td>5&quot;</td>
<td></td>
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<tr>
<td>⑧</td>
<td>FND. WALL - HORIZONTAL</td>
<td>120' TO 150'</td>
<td>6</td>
<td>5&quot;</td>
<td>6</td>
<td>5&quot;</td>
<td></td>
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</table>

CONCRETE below finished ground line shall be placed directly against undisturbed earth, or alternatively, backfill placed around foundation shall be compacted in conformance with Standard Specification 2-05.3(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-70.30-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

D + 2'-8" D + 2'-8"

BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)
2" RADIUS, UNLESS OTHERWISE NOTED
NOTES
1. Install Sign Lighting Luminaires (and Brackets) only when required in the Contract.
2. Windbeam and 3" Z-Bar are aluminum. All nuts, bolts, washers, and other hardware shall be stainless steel, except as noted.
3. See Standard Plan G-90.20 (Mono tube), or G-90.30 (Truss) for additional Overhead Sign Mounting details.
4. Galvanize all non-stainless steel parts.

OVERHEAD SIGN BRACING AND LIGHTING PLACEMENT

STANDARD PLAN G-90.10-01

SHEET 1 OF 1 SHEET

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DATE
NOTES

1. Refer to Contract Plans for Monotube Beam Bracket element sizes, dimensions, and weld symbols.


3. Galvanize all non-stainless steel parts.


5. Hand holes shall be installed at the time of fabrication. Only additional conduits for lighting accommodations to previously non-illuminated structures may be installed in field as long as the proper repairs are made in the structure. For details not shown, see Standard Plan J-78.40.

6. For VMS mounting, the Contractor may substitute W6 x 12 steel or W8 x 13 steel sections for the Vertical Brace W4 x 13 steel.

7. 3'-0" max. Vertical Brace and Monotube Beam Bracket spacing for walk-in cabinet Type VMS installation.

8. An acceptable alternative to a Locknut with nylon insert shall be as follows:
   - Nylock Blue Nylon Torque-Patch
   - Nylock Precote 30
   - ND Patch 360 Ring Patch

All products shall be applied the full length of the bolt threads with 360 degrees coverage.
NOTES
1. U-Bolts, Washers and Nuts shall be stainless steel, except as noted.
3. Galvanize all non-stainless steel parts.
4. For VMS mounting, the contractor may substitute W6 x 12 Steel or W8 x 13 Steel sections for the Vertical Brace W4 x 13 Steel.
5. 3'-0" MAX. Vertical Brace spacing for Walk-In Cabinet Type VMS installation.
6. An acceptable alternative to a Locknut with Nylon insert shall be as follows:
   - Nylon Blue Nylon Torque-Patch
   - Nylon Prescribe 30
   - Ring Patch
   All products shall be applied the full length of the bolt threads with 360 degrees coverage.

U-BOLT CONNECTION - 3/8" DIAM. U-BOLT, IMTH 2 LOCKNUTS AND FLAT WASHERS (TYP.)

VERTICAL BRACE - W4 X 13 STEEL (SEE NOTE 4)

OVERHEAD SIGN MOUNTING (TRUSS STRUCTURE)
STANDARD PLAN G-90.30-02
SHEET 1 OF 1 SHEET

Washington State Department of Transportation

[Diagram of sign mounting structure]
Sign Lighting Luminaire shall include a 3/4" 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.

See Standard Plan J-75.40 and J-75.45 for Sign Light Luminaire Electrical Details.
**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-95.30.
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".

**MATERIAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Pipe</td>
<td>ASTM A 36 OR ASTM A 53 B, TYPE E OR S, OR ASTM A 500 B</td>
</tr>
<tr>
<td>Plates and Shapes</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>Structural Tubing</td>
<td>ASTM A 500 B</td>
</tr>
<tr>
<td>Galvanizing For Pipe Plates and Shapes</td>
<td>AASHTO M 111</td>
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<tr>
<td>High Strength Bolts, Nuts, &amp; Washers, Inc.</td>
<td>Std. Spec. 9-06.9(2)</td>
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<td>All Other Bolts</td>
<td>Std. Spec. 9-06.9(1)</td>
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<tr>
<td>Fasteners Galvanizing</td>
<td>AASHTO M 232</td>
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<tr>
<td>Steel Grating</td>
<td>ASTM A 36</td>
</tr>
</tbody>
</table>

MODIFY DIMENSION AS REQUIRED FOR PROPER FIT-UP WITH THE VMS DOOR OPENING.

**ELEVATION**

MAINTENANCE WALKWAY

**PLAN**

MAINTENANCE WALKWAY

END VIEW

MAINTENANCE WALKWAY GATE

END VIEW
**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.)**
- **BEARING BAR**
- **W4x13 (TYP.)**
- **3/16" MIN. THICKNESS**
- **3/8" MAX.**

**SECTION F**

**1/4" TOE PLATE**

- **EVERY FOURTH BEARING BAR AND NEAR ALL TOE PLATE CORNERS**
- **GRATING FASTENER SEE DETAIL**
- **CROSS BAR (TYP.)**
- **BEARING BAR**
- **W4x13 (TYP.)**
- **3/16" MIN. THICKNESS**
- **3/8" MAX.**

**SECTION G**

- **1/4" TOE PLATE**
- **GRATING FASTENER SEE DETAIL**
- **CROSS BAR (TYP.)**
- **BEARING BAR**
- **W4x13 (TYP.)**
- **3/16" MIN. THICKNESS**
- **3/8" MAX.**

**INSTALL AND ARRANGE THE GRATING FASTENERS ACCORDING TO THE MANUFACTURER’S RECOMMENDATIONS.**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**MAINTENANCE WALKWAY FOR SIGN BRIDGES**

**STANDARD PLAN G-95.10-01**

**5/16/11**

**APPROVED FOR PUBLICATION**
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

MAINTENANCE WALKWAY INSTALLED ON MONOTUBE SIGN BRIDGE

(WALKWAYS MAY BE USED WITH OTHER LAYOUTS THAN THOSE SHOWN ABOVE)

1. **NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.**
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. **5/8" DIAM. 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 TURNBUCHE.**
5. **HANDRAIL FIT-UP WITH VMS DOOR OPENING IS THE RESPONSIBILITY OF THE CONTRACTOR.**

**NOTES:**

- STANDARD PLAN G-95.20-02
- SHEET 1 OF 3 SHEETS
- APPROVED FOR PUBLICATION
- SCALE: 1/4" = 1'-0"

**MATERIAL SPECIFICATIONS**

<table>
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<tr>
<th>MATERIAL</th>
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<tr>
<td>PIPE</td>
<td>ASTM A 36 OR ASTM A 53 Grade B, Type E or E. OR ASTM A 500 Grade B</td>
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<td>PLATES AND SHAPES</td>
<td>ASTM A 36</td>
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<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 500 Grade B</td>
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<td>GALVANIZING FOR PIPE PLATES AND SHAPES</td>
<td>AASHTO M 111</td>
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<td>HIGH STRENGTH BOLTS, NUTS &amp; WASHERS, INCL. MOUNTING BEAM BOLTS</td>
<td>STD SPEC. 9-05(3)</td>
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<td>ALL OTHER BOLTS</td>
<td>STD SPEC. 9-06(1)</td>
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<tr>
<td>FASTENER GALVANIZING</td>
<td>AASHTO M 232</td>
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<tr>
<td>STEEL GRATING</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>WIRE ROPE</td>
<td>ASTM A 603 W CLASS A WEIGHT Zinc Coated Wires Throughout</td>
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**ALLOWABLE ALTERNATE MATERIAL:** FEDERAL STANDARD RR-W-410F TYPE 6 CLASS 3 GALVANIZED
**Provide a 3/4" drain hole for galvanizing, top & bottom (Typ.)**

**Structural lugs (size to fit rope splelter socket) (Typ.) see detail "A"**

**Fall restraint**

**Elevation View**

**Section A**

**Structural lug (intermediate support) see detail "B" (see note 3)**

**Monotube**

**Fabricated from L4x4 x 3/8"**

**3/4" H.S. bolt w/nut & 2 washers, galv. (Typ.)**

**Section B**

**1/4" cover plate top & bottom**

**3/4" plate**

**Thread each end (Typ.)**

**3/4" x 12" x 1'-8" plate**

**1 1/8" diam. hole (Typ.)**

**Fall restraint bracket installation on new monotube sign bridge**

**Fall restraint bracket installation on existing monotube sign bridge**

**1/4" min. from top of grating**

**Monotube beam**

**Monotube**

**Fabricated from L4x4 x 3/8"**

**3/4"x4 x 5/16"**

**3/4" x 13" x 1'-8" plate**

**Existing monotube beam and bracket plate**

**Field locate 1 1/8" diameter holes @ front and back of monotube (Typ.)**

**1 1/8" diam. hole (Typ.)**

**1/4" min. from top of grating**

**Existing monotube**

**2" (Typ.)**

**2" (Typ.)**

**2" (Typ.)**

**MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE SIGN BRIDGE**

**STANDARD PLAN G-95.20-02**

**Sheet 2 of 3 sheets**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**5/16/11**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**Effective: August 4, 2014 to August 2, 2015**
MAINTENANCE WALKWAY
MOUNTING FOR
MONOTUBE SIGN BRIDGE
STANDARD PLAN G-95.20-02
MAINTENANCE WALKWAY
PARTIAL PLAN

MAINTENANCE WALKWAY
MOUNTING FOR
TRUSS-TYPE SIGN BRIDGE
STANDARD PLAN G-95.30-02
SHRUB, TREE AND GROUND COVER PLANTING DETAIL

MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

SEE NOTE

EXISTING SOIL

BREAK UP ROOTBALL OF CONTAINER PLANTS, PRUNE CIRCLING ROOTS

LOWER WRAPPED (B&B) ROOTBALL INTO HOLE, CUT AWAY ALL WRAPPING MATERIALS FROM ROOTBALL AND REMOVE FROM HOLE, ROUGHEN SOIL AT EDGES OF ROOTBALL TO STIMULATE ROOTS

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

SLOPE PLANTING DETAIL

(INCLUDES ALL PLANTS ON SLOPES)

PLANT RHIZOME WITH CROWN / GROWTH POINTS AT FINISHED GRADE

FINISHED GRADE

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

TUBER OR RHIZOME PLANTING DETAIL

PLANTING HOLE 3 TIMES THE ROOT SPREAD

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

EMERGENT PLANTING DETAIL

SPREAD ROOTS OUT

SEE NOTE

EXISTING SOIL

BREAK UP ROOTBALL OF CONTAINER PLANTS, PRUNE CIRCLING ROOTS

PLANTING HOLE 3 TIMES THE ROOT SPREAD

LOWER WRAPPED (B&B) ROOTBALL INTO HOLE, CUT AWAY ALL WRAPPING MATERIALS FROM ROOTBALL AND REMOVE FROM HOLE, ROUGHEN SOIL AT EDGES OF ROOTBALL TO STIMULATE ROOTS

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

STREET TREE PLANTING AND STAKING DETAIL

(APPLIES TO CONTAINER, BALL AND BURLAPPED, (B&B) DECIDUOUS AND CONIFERS)

MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

NOTE

Backfill with soil removed from hole ~ See planting area soil preparation detail or Special Provisions.
LIVE STAKE INSTALLATION IN RIPRAP

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

FILL VOIDS WITH NATIVE SOIL

EXISTING SOIL

LIVE STAKE INSTALLATION IN QUARRY SPALLS

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

EXISTING SOIL

MIN. 6" BURIAL INTO EXISTING SOIL

LIVE STAKE INSTALLATION ON SLOPES

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

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.

EXISTING SOIL

LIVE STAKE INSTALLATION

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

EXISTING 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.

**NOTE**

**BASE ASSEMBLY**

- **POST SLEEVE**
- **BASE PLATE**
- **TOP PLATE**
- **COVERAGE PLATE**
- **1 1/8" X 1 7/8" SQUARE PLATE**
- **1/8" X 1 1/2" DIAM. DRAIN HOLE**
- **1/8" X 1 1/2" STEEL PLATE**
- **1/8" X 3/4" CENTERED HOLE**
- **1/8" X 1 1/2" X 2" STEEL PLATE WITH ROUNDED CORNERS**
- **1/4" X 1 1/2" X 2" STEEL PLATE WITH ROUNDED CORNERS AND 3/4" CENTERED HOLE**

**BASE PLATE**

- **1/8" X 3/4" DIAM. DRAIN HOLE**
- **1/8" X 1 1/2" FULL SURFACE HEAVY DUTY WELD-ON HINGE**
- **1/8" X 3/4" CENTERED HOLE**
- **1/8" X 1 1/2" X 2" STEEL PLATE**
- **1/8" X 1 1/2" X 2" STEEL PLATE**
- **1/8" X 4 1/2" DIAM. STEEL PLATE**
- **STEEL PIPE - ASTM A-106, NPS 4 (4" NOM.), SCHEDULE 40**
- **STEEL PIPE - ASTM A-106, NPS 3 (3" NOM.), SCHEDULE 10**
- **1/2" REFLECTIVE TAPE (TYP.)**
- **1/2" REFLECTIVE TAPE (TYP.)**
- **1/4" X 1 1/2" X 2" STEEL PLATE WITH ROUNDED CORNERS AND 3/4" CENTERED HOLE**

**COVER PLATE**

- **3/4" DIAM**
- **1 1/4"**
- **6 1/2"**
- **8 1/2"**
- **8 1/2" X 1 1/4"**
- **1 1/8" X 1 1/2" X 2" STEEL PLATE**
- **1/8" X 4 1/2" DIAM. STEEL PLATE**
- **1/8" X 1 1/2" DIAM. DRAIN HOLE**
- **3/4" DIAM. DRAIN HOLE**

**TOP PLATE**

- **1 1/8" X 1 3/4" X 4 1/2" STEEL PLATE**
- **1/8" X 1 1/2" X 2" STEEL PLATE**
- **1/8" X 4 1/2" DIAM. STEEL PLATE**
- **1/8" X 4 1/2" DIAM. STEEL PLATE**
- **1/8" X 3/4" CENTERED HOLE**
- **1/8" X 1 1/2" X 2" STEEL PLATE**
- **1/8" X 4 1/2" DIAM. STEEL PLATE**
- **1/8" X 1 1/2" X 2" STEEL PLATE**

**SECTION A**

- **POST**
- **CHAIN**
- **BASE ASSEMBLY**
- **FINISHED GRADE**
- **CONCRETE FOOTING - COMMERCIAL CONCRETE**
- **GRANULAR, FREE DRAINING MATERIAL**
- **1/8" PLATE**
- **4 3/4" DIAM.**
- **3 13/16" DIAM.**
- **1 1/4"**
- **8 1/2"**
- **8 1/2" X 1 1/4"**
- **1/8" PLATE**
- **1/8" PLATE**
- **3/4" DIAM.**
- **1 1/4"**
- **8 1/2"**

**PLAN VIEW**

- **DIRECTION OF PEDESTRIAN/BICYCLE TRAFFIC**
- **ROUNDED FOOTING**
- **SQUARE FOOTING**
- **POST**
- **TOP PLATE**
- **1/8" PLATE**
- **1/8" PLATE**
- **POST SLEEVE**
- **BASE PLATE**
- **COVER PLATE**
- **1/8" X 1 7/8" SQUARE PLATE**
- **1/8" CHAIN - GRADE 3, 6" LONG**
- **CAP**
- **SEAL WELD**
- **SEAL WELD**
- **1/8" X 1 1/4" X 2" X 6" COVER PLATE**
- **BASE PLATE**

**SECTION A**

- **POST**
- **CHAIN**
- **BASE ASSEMBLY**
- **FINISHED GRADE**
- **CONCRETE FOOTING - COMMERCIAL CONCRETE**
- **GRANULAR, FREE DRAINING MATERIAL**
- **1/8" PLATE**
- **4 3/4" DIAM.**
- **3 13/16" DIAM.**
- **1 1/4"**
- **8 1/2"**
- **8 1/2" X 1 1/4"**
- **1/8" PLATE**
- **1/8" PLATE**
- **3/4" DIAM.**
- **1 1/4"**
- **8 1/2"**

**SECTION A**

- **POST**
- **CHAIN**
- **BASE ASSEMBLY**
- **FINISHED GRADE**
- **CONCRETE FOOTING - COMMERCIAL CONCRETE**
- **GRANULAR, FREE DRAINING MATERIAL**
- **1/8" PLATE**
- **4 3/4" DIAM.**
- **3 13/16" DIAM.**
- **1 1/4"**
- **8 1/2"**
- **8 1/2" X 1 1/4"**
- **1/8" PLATE**
- **1/8" PLATE**
- **3/4" DIAM.**
- **1 1/4"**
- **8 1/2"**
CONCRETE FOOTING - COMMERCIAL CONCRETE
6" x 1/4" DIA. STEEL BAR

FINISHED GRADE

SECTION A

CONCRETE FOOTING - COMMERCIAL CONCRETE
6" x 1/4" DIA. STEEL BAR

FINISHED GRADE

SECTION A

POST

NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

ROUND FOOTING

SQUARE FOOTING

PLAN VIEW

STEEL CAP PLATE

1/8" DRILLED HOLE

1/2" REFLECTIVE TAPE (TYP.)

STEEL PIPE - ASTM A 53, NPS 3 (3" NOM.), SCHEDULE 80

1/2" REFLECTIVE TAPE (TYP.)

5/16" DRILLED HOLE

PAINT ASSEMBLY WITH A "HIGHLY VISIBLE" COLOR (SAFETY YELLOW IS ACCEPTABLE)

BOLLARD TYPE 2

STANDARD PLAN H-60.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
WOOD POST FASTENERS

<table>
<thead>
<tr>
<th>SIZE/TYPE</th>
<th>QUANTITY</th>
<th>WASHERS</th>
<th>LOCKNUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; DAM. x 3/4&quot; BOLT</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; DAM. x 3/4&quot; BOLT</td>
<td>4</td>
<td>8</td>
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</tbody>
</table>

STEEL POST FASTENERS

<table>
<thead>
<tr>
<th>SIZE/TYPE</th>
<th>QUANTITY</th>
<th>WASHERS</th>
<th>LOCKNUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; DAM. x 2 3/4&quot; BOLT</td>
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<td>4</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

MAILBOX - SIZE 1, 1A, OR 2 (SIZE 1A SHOWN) (SEE TABLE, SHEET 2, FOR DIMENSIONS)

PLATFORM - SEE DETAIL, SHEET 2 AND NOTE 2

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

3/16" HEAD BOLT, 2 WASHERS & LOCKNUT (TYP.)

NOTE 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.

NOTE 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.

NOTE 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. Adjustment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

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

NOTE 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" x 1" PHILLIPS HEAD SCREW,
2 WASHERS, AND LOCKNUT
WITH NYLON INSERT (TYP.)
- 4 SETS MIN.

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

MAILBOX MOUNTING HOLE (TYP.)
SPACE PROVIDED ON BOTH
ENDS TO ALLOW ACCESS TO
FASTENERS - SEE NOTE 4

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

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

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

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

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

MAILBOX SUPPORT
TYPE 2
STANDARD PLAN H-70.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
SNOW GUARD DETAIL

BEHIND CURB

* UNLESS OTHERWISE SHOWN IN THE PLANS

MAILBOX PLACEMENT SECTIONS

EDGE OF SHOULDER OR TURNOUT

6" TO 12"

FACE OF CURB

3" TO 12"

CURB TYPE VARIES

SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

MAILBOX SUPPORT TYPE 2

STANDARD PLAN H-70.20-01

MAILBOX SUPPORT TYPE 1
(WOOD POST SHOWN)

ANCHORING SYSTEM - SOCKET AND WEDGE SHOWN
(SEE NOTE 1)

MAILBOX SUPPORT TYPE 2

FOR DETAILS, SEE STANDARD PLAN H-70.10

5" MIN. BETWEEN MAILBOXES

NEWSPAPER BOX - SEE NOTE 8

SHEET 2 OF 2 SHEETS

ANCHORING SYSTEM - SOCKET AND WEDGE SHOWN
(SEE NOTE 1)

SNOW GUARD - WHEN REQUIRED, PLACE ON LEADING END OF SUPPORT (SEE DETAIL)
MAILBOX SIZE

SEE TABLE, STANDARD PLAN H-70.10, SHEET 1, FOR DIMENSIONS

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

45° ELBOW - SEE NOTE 3
1 1/4" PIPE x 6" LONG (THREAD ONE END)
1" NOM. DIA., SCHED. 40 Pipe x 3" LONG - SEE NOTE 4 & DETAIL "A," SHEET 2

ADDITIONAL WASHERS - AS REQUIRED TO FILL GAP (TYP.)
1 3/4" MUFFLER CLAMP, 2 WASHERS
AND 2 LOCKNUTS (TYP.)

VERTICAL SUPPORT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD BOTH ENDS)

HORIZONTAL MOUNT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD ONE END)

ASSEMBLY DETAIL

ISOMETRIC VIEW

MAILBOX & PLATFORM

MAILBOX MOUNTING HOLE (TYP.)

MATCH END OF PIPE

SPACE PROVIDED ON BOTH ENDS TO ALLOW ACCESS TO FASTENERS

PLATFORM

SEE NOTE 6

ALIGNMENT DETAIL
SIDE VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

MAILBOX SUPPORT
TYPE 3

STANDARD PLAN H-70.30-02

SHEET 1 OF 2 SHEETS

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.

INSTALL PLASTIC CAP OR PLUG

PLATFORM - SEE NOTE 5

45° ELBOW - SEE NOTE 3
1 1/4" PIPE x 6" LONG (THREAD ONE END)

ADDITIONAL WASHERS - AS REQUIRED TO FILL GAP (TYP.)
1 3/4" MUFFLER CLAMP, 2 WASHERS
AND 2 LOCKNUTS (TYP.)

VERTICAL SUPPORT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD BOTH ENDS)

HORIZONTAL MOUNT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD ONE END)

ASSEMBLY DETAIL

ISOMETRIC VIEW

MAILBOX - SIZE 1 OR 1A (SIZE 1A SHOWN)

SEE TABLE, STANDARD PLAN H-70.10, SHEET 1, FOR DIMENSIONS

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

45° ELBOW - SEE NOTE 3
1 1/4" PIPE x 6" LONG (THREAD ONE END)
1" NOM. DIA., SCHED. 40 Pipe x 3" LONG - SEE NOTE 4 & DETAIL "A," SHEET 2

ADDITIONAL WASHERS - AS REQUIRED TO FILL GAP (TYP.)
1 3/4" MUFFLER CLAMP, 2 WASHERS
AND 2 LOCKNUTS (TYP.)

VERTICAL SUPPORT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD BOTH ENDS)

HORIZONTAL MOUNT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD ONE END)

ASSEMBLY DETAIL

ISOMETRIC VIEW

MAILBOX - SIZE 1 OR 1A (SIZE 1A SHOWN)

SEE TABLE, STANDARD PLAN H-70.10, SHEET 1, FOR DIMENSIONS

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

45° ELBOW - SEE NOTE 3
1 1/4" PIPE x 6" LONG (THREAD ONE END)
1" NOM. DIA., SCHED. 40 Pipe x 3" LONG - SEE NOTE 4 & DETAIL "A," SHEET 2

ADDITIONAL WASHERS - AS REQUIRED TO FILL GAP (TYP.)
1 3/4" MUFFLER CLAMP, 2 WASHERS
AND 2 LOCKNUTS (TYP.)

VERTICAL SUPPORT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD BOTH ENDS)

HORIZONTAL MOUNT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD ONE END)
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.
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.

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)

GEOTEXTILE FOR SILT FENCE - SEE STANDARD SPECIFICATION SECTION 9-33.2 (1), TABLE 8

POST - WOOD OR STEEL (TYPICAL)

FASTEN TO POST EVERY 6" O.C.

GEOTEXTILE (TYPICAL)

SEE NOTE 1

TYPICAL SILT FENCE WITHOUT BACKUP SUPPORT
ISOMETRIC
(STEEL POSTS SHOWN)

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

SPlice DETAIL
(WOOD POSTS SHOWN)
NOTES
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 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.
BACKFILLED & COMPACTED NATIVE SOIL

NATIVE SOIL

POST - SEE STD. SPEC. 5-01.3(9)A

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

GEOTEXTILE

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.

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)

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL INSTALLATION DETAIL
(WOOD POSTS SHOWN)

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.

SPLICED DETAIL
(WOOD POSTS SHOWN)

NOTES
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 5-01.3(9)A and 5-01.3(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.

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 HIGH VISIBILITY SILT FENCE WITHOUT BACKUP SUPPORT ISOMETRIC (STEEL POSTS SHOWN)

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)

TYPICAL 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)

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL INSTALLATION DETAIL
(WOOD POSTS SHOWN)

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.

SPLICED DETAIL
(WOOD POSTS SHOWN)

NOTES
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 5-01.3(9)A and 5-01.3(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.

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 HIGH VISIBILITY SILT FENCE WITHOUT BACKUP SUPPORT ISOMETRIC (STEEL POSTS SHOWN)

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)

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL INSTALLATION DETAIL
(WOOD POSTS SHOWN)

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.

SPLICED DETAIL
(WOOD POSTS SHOWN)
PLACE SAND BAGS AS REQUIRED AROUND CULVERT TO PROVIDE SUPPORT FOR SILT FENCE.

SILT FENCE DESIGN

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

SILT FENCE - SEE STD. PLAN I-30.10

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

COMPOST BERM DESIGN

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

COMPOST BERM - SEE STD. PLAN I-80.12

NOTE

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

POST - SEE STD. SPEC. 8-01.3(9A)

EMBED POSTS INTO SAND BAGS AS REQUIRED

FLOW

EDGE OF GEOTEXTILE

SECTION A

GEOTEXTILE FOR TEMPORARY SILT FENCE - SEE STD. PLAN I-30.20-00

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

EROSION CONTROL AT CULVERT ENDS

STANDARD PLAN I-30.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
NOTES

1. Wattles shall be in accordance with Standard Specification 9-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification 8-01.3(10).

2. Securely knot each end of Wattle. Overlap adjacent Wattle ends 12" behind one another and securely tie together.

3. Compact excavated soil and trenches to prevent undercutting. Additional staking may be necessary to prevent undercutting.

4. Install Wattle perpendicular to flow along contours.

5. Wattles shall be inspected regularly and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.

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

7. Refer to Standard Specification 8-01.3(16) for removal.

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

THIS PLAN IS NOT LEGAL ENGINEERING.

THE OFFICIAL PLAN IS REPRODUCED FOR PUBLIC USE.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WATTLE SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
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<tbody>
<tr>
<td>1H : 1V</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>20'-0&quot;</td>
</tr>
<tr>
<td>5H : 1V</td>
<td>30'-0&quot;</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>40'-0&quot;</td>
</tr>
</tbody>
</table>

WATTLE INSTALLATION ON SLOPE

STANDARD PLAN 1-30.30-01

SHEET 1 OF 1 SHEET
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(15).
8. Refer to Standard Specification 8-01.3(16) for removal.

BIODEGRADABLE EROSION CONTROL BLANKET
SEE NOTE 4

COMPOST SOCK (TYP.)
SEE DETAIL

PROTECTED AREA

COMPOST SOCK DETAIL

ISOMETRIC VIEW

CATCH BASIN INSTALLATION

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

SANDRA Z. SAVILAS
LICENSE NO. 880
DATE: 6 June 2018

COMPOST SOCK

STANDARD PLAN 1-30.40-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
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).
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).
BIODEGRADABLE CHECK DAM

1. Biodegradable Check Dams may need additional or modified staking to prevent undercutting or scouring.

NON-BIODEGRADABLE CHECK DAM

1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer’s recommendations and shall perform in accordance with Standard Specification 8-01.3(6).

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

3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.

GENERAL NOTES

1. Check Dams shall meet the requirements of Standard Specifications 8-01.3(6) and 9-14.5(4).

2. In channels, install the sloped ends of the Check Dam a minimum of 8" higher than the spillway to ensure water flows over the dam and not around it.

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

4. Remove Check Dams in accordance with Standard Specification 8-01.3(16).

NOTE:

THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC OUTLINE. THE ORIGINAL SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
NOTES
1. 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.

INSTALLATION STEPS:
1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket down the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

STATE OF
WASHINGTON
LANDSCAPE ARCHITECT
LICENSE NO. 860
DATE: 4 June 2013

BIODEGRADABLE EROSION CONTROL BLANKET
PLACEMENT FOR SLOPES
STANDARD PLAN 1-60.10-01

STAPLES - 4" APART, STAGGERED, 6" O. C.

SHINGLE SPLICE - SECTION A

EXTEND BLANKET FAR ENOUGH OVER CREST OF SLOPE TO EFFECTIVELY PREVENT UNDERCUTTING AND TO PROVIDE SECURE ANCHORING

ISOMETRIC VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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.

INSTALLATION STEPS:

1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Stagger 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.
SECTION A

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

COMPACTED NATIVE MATERIAL
CONSTRUCTED BY EXCAVATION OR EMBANKMENT

PLACE CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION AND A MINIMUM OF 0.15' CRUSHED ROCK UNDER THE SPALLS, FROM THE EDGE OF THE EXISTING ROADWAY TO THE RADIUS RETURNS, OR AS DIRECTED BY THE ENGINEER.

PROVIDE GEOTEXTILE
- SEE STD. SPEC. SECTION 9-33

PLACE CONSTRUCTION GEOTEXTILE FOR INGRESS / EGRESS AREA

STABILIZED CONSTRUCTION ENTRANCE

GROUND LINE

OUTFLOW CHANNEL IS CONSTRUCTED BY EXCAVATION

1'-0" DEPTH OVERFLOW

1'-0" DEPTH OF 3/4" - 1 1/2"

WASHED GRAVEL BACKFILL

SEDIMENT TRAP BOTTOM

NOTE

SECTION

TEMPORARY SEDIMENT TRAP

25'-0" R MIN. (TYP.)

4'-0" QUARRY SPALLS

AS REQUIRED - 100" MIN. EXCEPT MAY BE REDUCED TO 50" MIN. FOR SITES WITH LESS THAN ONE ACRES OF EXPOSED SOIL.

1'-0" MIN

PLACE CONSTRUCTION GEOTEXTILE FOR INGRESS / EGRESS AREA

15'-0" MIN

ISOMETRIC VIEW

STABILIZED CONSTRUCTION ENTRANCE

MISCELLANEOUS EROSION CONTROL DETAILS

STANDARD PLAN 1-80.10-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CERTIFICATE NO. 000598

M. W. MAURER

STATE OF WASHINGTON LICENSED LANDSCAPE ARCHITECT

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
**TYPE A SERVICE, 120 VOLT**

- Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
- Bend conduit to allow removal of weatherhead, strap below bend
- 1" conduit, three #12
- 30'-Class V treated timber pole
- Bend conduit to pole and strap within 1' above meter
- 3" - 6" nipple or warp fitting
- LB Conduit Body
- Hub and gasket
- Service breaker, 120VAC, IP 5 IN

**PHOTOELECTRIC CONTROL DETAILS**

- Photoelectric control oriented to north sky
- Threadless couplings (Typ)
- Conduit body
- Timmer pole
- Two #8 x 3" galvanized lag screws
- Two 1/4" x 1/2" brass bolts; drill bracket to fit meter base
- Two #8 x 1/2" galvanized bolts

- See Note 5

**TYPE B SERVICE, 120/240 VOLT**

- Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
- Bend conduit to allow removal of weatherhead, strap below bend
- 1" conduit, three #12
- 30'-Class V treated timber pole
- Bend conduit to pole and strap within 1' above meter
- 3" - 6" nipple or warp fitting
- Hub and gasket (Typ)

**TYPE C SERVICE, 480 VOLT**

- Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
- Bend conduit to allow removal of weatherhead, strap below bend
- 1" conduit, three #12
- 30'-Class V treated timber pole
- Bend conduit to pole and strap within 1' above cabinet
- 3" - 6" nipple or warp fitting
- Hub and gasket

- See Note 5

**TYPE A, B AND C SERVICE LIGHTING DETAILS**

**STANDARD PLAN J-3**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**OLYMPIA, WASHINGTON**

**Sheet 1 of 2 Sheets**

**APPROVED FOR PUBLICATION:**

**STATE DESIGN ENGINEER:**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DATE:**

**EFFECTIVE: AUGUST 4, 2014 TO AUGUST 2, 2015**
NOTES:
1. Metering arrangements may vary with different serving utilities. The contractor shall verify the requirements of the utility prior to installing the service equipment.
2. All service pole conduit shall be secured to the pole with conduit strap at 5' centers.
3. All risers and service equipment shall be installed on side of pole that is away from traffic.
4. Where required by the serving utility, service breakers shall be installed above the meter socket in a separate raintight enclosure.
5. Bend and attach to pole within 1' of enclosure. See Standard Plan "Typical Grounding Details."
6. For Type B service wiring diagram, use Standard Plan "Modified Type B Service."
7. For Type C service wiring diagram, use Standard Plan, "Type C Service."
8. See breaker schedule in contract for breaker and contactor sizes.

SECTION A-A

TYPE A WIRING DIAGRAM
120 Volt

TYPE A, B AND C SERVICE LIGHTING DETAILS

STANDARD PLAN J-3

APPROVED FOR PUBLICATION

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

Sheet 2 of 2 Sheets
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 back of the enclosure. The utility may require the dimension between the door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting detail, see Standard Plan J-3b. The Contractor shall verify the serving utility's requirements prior to fabrication of and installing the service equipment.
2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor shall verify the serving 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 pad lockable. Each door shall be gasketed. Initial 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 5 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, 5, 7, 8, 9, 16, 21 and 24. Key number 4 name plate shall read: "Photocell Bypass Test On" and "Photocell Test Off-Automatic." See Service Cabinet detail.
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. Jumpering 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 Eusear Drawing 309 requirements.
NOTEs
2. Where shown in the plans, install plaque (R10-329) "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.
4. Junction Box serving the Standard shall preferably be located 5" - 0" (10'-0" Max.) from the Standard.
2. 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 the PBP post height to accommodate plaque and leave a 2" (in) space between signs.
4. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
5. 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 full circle crimp-on connector (crimped with a manufacturer recommended crimper).
NOTES

1. See Standard Specification 9-08.14 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 not in compliance with NCHRP 350 crash test criteria. The Breakaway Base Connection details are only shown on this plan to illustrate how parts are assembled.


4. Where shown in the plans, install plaque (R10-33P) "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.

EXPLODED VIEW

BREAKAWAY BASE CONNECTOR
(SEE NOTE 1)

PEDESTRIAN PUSHBUTTON POST - 3" (IN) STEEL PIPE (SCHEDULE 40)

GROUNDING CONNECTION - SEE DETAIL

FIELD DRILL AND TAP FOR 1/4-20 THREAD BOLT (TYP.)

ANCHOR COUPLING (TYP.)

TOP OF PAVED SURFACE

SHIM (TYP.) - NO MORE THAN TWO PER COUPLING

ANCHOR FERRULE (TYP.)

GROUNDING CONDUCTOR

ANCHOR COUPLING (TYP.)

BRACKET ADAPTER (TYP.)

ANCHOR CONDUCTOR FERRULE (TYP.)

COUPLING BOLT (TYP.)

1" THREAD

3" (IN) PEDESTRIAN PUSHBUTTON POST

1/4" (IN) DIAMETER ELECTRICAL CONDUIT

CONDUIT COUPLING - INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUB-OUT)

PREMOLDED JOINT FILLER

COMMERCIAL CONCRETE

FOUNDATION DETAIL

1" (IN) DIAM. ELECTRICAL CONDUIT

1'-6" SQUARE

2'-0"

3'-0"

1/4" (IN) CHAMFER (TYP.)

3" (IN) PEDESTRIAN PUSHBUTTON POST

2" (IN) PEDESTRIAN PUSHBUTTON POST

2 1/4" STEEL PIPE CAP

TOP OF POST

PORT WALL

STAINLESS STEEL HEX NUTS

GROUNDING CONNECTION DETAIL

* WELD STUD TO POLE WALL TO MAXIMUM EXTENT POSSIBLE - 1/2" (IN) MINIMUM WELD

CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS (SHOWN EXPLODED FOR CLARITY)
NOTES


2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11 gage, 4 1/2" (in) O.D. at slipfitter weld. Taper shall be 0.14" (in) per foot.

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.


6. Hand holes shall include a removable, rain-tight cover and gasket, fastened with two stainless steel screws (ASTM 563).

7. 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 a manufacturer recommended crimper).

8. The junction box serving the standard shall preferably be located 5'-0" (15'-0" max.) from the standard.

9. Where shown in the plans, install plaque (R10 - 32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" two inches above the Accessible Pedestrian Signal (APS) Assembly.
NOTES


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**

---

**SC PEDESTRIAN HEAD TERMINATIONS**

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**7C PEDESTRIAN HEAD TERMINATIONS**

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**ASSOCIATED PHASE NUMBER**
ACCESSIBLE PEDESTRIAN PUSHTOON FRAME ADAPTER

ATTACH ADAPTER TO PUSHBUTTON - 1/4"-20 X 2" STAINLESS STEEL SCREWS (TYP.)

ATTACH ADAPTER TO PUSHBUTTON STATION - 1/4" DIA. COUNTERSUNK HOLE, 3/8" LONG FLAT HEAD SCREWS (TYP.)

PEDESTRIAN PUSHTOON INSTRUCTIONAL SIGN

ATTACH SIGN TO ADAPTER - 1/4-20 X 3/8" STAINLESS STEEL SCREWS (TYP.)

PEDESTRIAN PUSHTOON FRAME ADAPTER

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY

METAL POLE INSTALLATION

PPB-M
WOOD POLE INSTALLATION
ALTERNATIVE 1
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

KEY
1. FACE PLATE
2. 1/4-20 • 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

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
WOOD POLE INSTALLATION
ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

PRE-DRILL (3) 1/4" WEEP HOLES IN BOTTOM RADIUS OF CONDUIT DRIP LOOP. REAM HOLES WITH DRILL BIT TO ELIMINATE BURRS

INSTALL FITTING WITH NYLON WASHER ON OUTSIDE OF HOUSING - SEAL WITH SILICONE AFTER UNIT IS FULLY ASSEMBLED

WOOD POLE INSTALLATION
ALTERNATIVE 3
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER POLE)

COUNTERBORE - DIAMETER TO FIT CONDUIT

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

STATE DESIGN BUREAU

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015
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 in concrete: Provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimping tool) for maximum strength.
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-20.70.
6. Keeper Plate shall not extend beyond the edges of the pole base plate.

DIMENSIONS ARE OUT TO OUT

[Diagram details and specifications]

MATCHLINE FOR SQUARE CONCRETE FOUNDATION

SEE DETAILS ABOVE MATCHLINE FOR ROUND CONCRETE FOUNDATION

USE DETAILS ABOVE MATCHLINE FOR ROUND CONCRETE FOUNDATION

MATCHLINE
NOTES
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°, 225°, 270°, or 315° shall utilize:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.
7. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.

2. All poles shall be hot dip galvanized per AASHTO M 111.

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.

FLASHING BEACON TYPE 1
SINGLE FLASH BEACON SHOWN

COLOR USE

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INSTALL SIZED REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-30.28 FOR GROUND CONNECTION DETAILS

EQUIPMENT GROUNDING CONDUCTOR LEVELING NUT (TYP.)

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

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

STEEL REINFORCING WITH ULTRAFUSE CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

2C (SH) &&W CABLE - FROM FOUNDATION WIRING

2C (SH) &&W CABLE - TO FLASHING BEACON

INSTALL 2C (SH) &&W CABLE - SEE STANDARD PLAN J-21.16 FOR MOUNTING HARDWARE DETAILS

FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.16

CLAMP CONDUCTORS TO PREVENT SLIPPING (TYP.)

EQUIPMENT GROUNDING CONDUCTOR LEVELING NUT (TYP.)

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3

CLAMP CONDUCTOR TO STEEL REINFORCING WITH ULTRAFUSE CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

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

1. See Standard Specification 9-29.3 for Cable Conductor requirements.


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

4. Heat shrink cap all spare conductors not terminated on a terminal strip.

5. When a Pedestrian Push Button is specified in contract plans, see Standard Plan J-20.20 for details.

6. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) – See Detail A, Standard Plan J-28.70.
NOTES
2. Steel shaft shall be tapered either round or dodecagon (12 sided), 11 gage, 4 1/2" O.D. at slipfitter. Taper shall be 0.14 inches per foot.
3. All poles shall be hot dip galvanized per AASHTO M111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code -Steel. All butt welds shall be ground flush with base metal.
6. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
HOUSING FIXTURE - THREE 12" DISPLAYS

TERM INAL BLOCK

HOUSING FIXTURE - THREE 6" DISPLAYS

IMSA 20-1 SC #14 CABLE CONTINUING FROM LOWER TRAFFIC SIGNAL HEAD

IMSA 20-1 SC #14 CABLE CONTINUING FROM FOUNDATION WIRING

IMSA 20-1 SC #14 CABLE CONTINUING TO UPPER TRAFFIC SIGNAL HEAD

BRONZE 12 SECTION TERMINAL COMPARTMENT

FIELD DRILL HOLE AND INSERT AN INSULINER OR SIMILAR DEVICE TO PROTECT CONDUCTORS

INSTALL SIZED REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

1/4" WEEP HOLE

DETAIL A

UPPER TRAFFIC SIGNAL HEAD WIRING

IMSA 20-1 SC #14 CABLE CONTINUING TO TERMINAL COMPARTMENT

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-33.20 FOR GROUND CONNECTION DETAILS

SPARE WIRE (TYP.) - HEAT SHRINK CAPPED, CABLE TIE TO IMSA 20-1 SC #14 CABLE
(SEE NOTE 5)

EQUIPMENT GROUNDING CONDUCTOR

LEVELING NUT (TYP.) - SEE NOTE 4

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3

CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

PERSPECTIVE VIEW RAMP METER

NOTES

2. See Standard Specifications 9-29.17 for additional Mounting Bracket and Fitting information not shown.
3. Suplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. Top of Leveling Nut height shall be 1" maximum above foundation.
5. Heat shrink cap all spare conductors not terminated on a terminal strip.
6. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.
3/8" PREMOLDED JOINT FILLER

SEE TYPICAL SECTION FOR REINFORCEMENT

TOP OF FOUNDATION LEVEL WITH GRADE

NOT STEEPER THAN 1.5H : 1V

FINISHED GRADE SLOPE = FLAT TO 10H : 1V
(10H : 1V SLOPE SHOWN)

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

EXISTING GRADE OR FILL SLOPE = FLAT TO 10H : 1V
CASE B

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

EXISTING GRADE OR FILL SLOPE = 3H : 1V TO 2H : 1V
CASE D

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

EXISTING GRADE OR FILL SLOPE = 10H : 1V TO ≤ 3H : 1V
CASE C

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

FINISHED GRADE SLOPE = 3H : 1V OR FLATTER BUT NOT FLATTER THAN 10H : 1V

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

FINISHED GRADE SLOPE = FLAT TO 2H : 1V
(4H : 1V SLOPE SHOWN)

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

TOP OF FOUNDATION LEVEL WITH GRADE

NOTE

** = 2'- 0" FOR 3'- 0" DIAM. FOUNDATION
2'- 0" FOR 4'- 0" DIAM. FOUNDATION
2'- 0" FOR 3'- 0" SQUARE FOUNDATION

EXISTING GRADE OR FILL SLOPE = 3H : 1V TO 2H : 1V
CASE C

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

FINISHED GRADE SLOPE = FLAT TO 2H : 1V

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

FINISHED GRADE SLOPE = FLAT TO 2H : 1V

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

FINISHED GRADE SLOPE = FLAT TO 2H : 1V

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

FINISHED GRADE SLOPE = FLAT TO 2H : 1V

SIGNAL STANDARD FOUNDATION
- SEE STANDARD PLAN J-26.10

PLAN

ELEVATION
NOTES

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: ASTM A53 GR. B OR A690 GR. B
   - Nuts: AASHTO M 164 (ASTM A325)
   - Washers: AASHTO M 291 (ASTM A263) GRADE DH
   - AASHTO M 293 (ASTM F436)

6. All bolts, rods, and related hardware shall be galvanized after fabrication per ASTM F2326.

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.

TEMPORARY SIGNAL STANDARD ADAPTOR
STANDARD PLAN J-26.20-00

SECTION 1

ADAPTOR 1 TOP SHOWN
(ADAPTOR 1 BOTTOM, ADAPTOR 2 TOP, AND ADAPTOR 2 BOTTOM SIMILAR)
ALL FONTS MARKED A SHALL BE ENGRAVED OR STAMPED

ENGRAVED FONT (TYP.)
FONT SHALL BE ENGRAVED OR STAMPED 0.02'' (IN) DEEP

ALL DIMENSIONS ARE IN INCHES

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

PUBLICATION SHEET: 1 OF 5 SHEETS

STANDARD PLAN J-26.20-00

ADAPTOR 1 TOP PLATE

TOP VIEW

SEE NOTE 9 (TYP.)
6" (IN) RADIUS (TYP.)

3/8" (IN) THICK PLATE (TYP.)

1" (IN) RADIUS (TYP.)

2" (IN) DIA. HOLE (TYP.)

ELEVATION VIEW
ADaptor LIFTING TOOL
REMOVE ALL BURRS AND SHARP EDGES

ADAPTOR 2 TOP PLATE SHOWN
(ADAPTOR 1 TOP PLATE SIMILAR)

2 - 7" (IN) DIA. BOLTS WITH WASHERS FOR 22" (IN) B.C.
2 - 1-1/2" (IN) DIA. BOLTS WITH WASHERS FOR 18" (IN) B.C.

ASSEMBLED VIEW
ADAPTOR LIFTING TOOL
WITH ADAPTOR 2 SHOWN
(ADAPTOR 1 SIMILAR)

2 - 1-1/2" (IN) DIA. HOLE (TYP. OF 2 PLACES)

2-1/4" (IN) DIA. HOLE (TYP. OF 2 PLACES)

7-1/2" (IN) x 10-3/8" (IN) x 3/8" (IN) THICK PLATE (TYP.)

1-3/4" (IN) DIA. HOLE (TYP. OF 2 PLACES)

13-1/2"
13-1/2"
16" B.C.

SECTION 1

7-1/2" 12" 7-1/2"
**ALTERNATE #1**

**Drilled Shaft-Type Construction - Depth "D"**

For lateral bearing pressure = 2500 PSF & Ø = 34", 1500 PSF & Ø = 28", 1000 PSF & Ø = 26"

**GROUNDSLOPE = 3H:4V or FLATTER**

<table>
<thead>
<tr>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 PSF</td>
<td>2'-0&quot; Round</td>
<td>1000 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>1500 PSF</td>
<td>2'-0&quot; Round</td>
<td>1500 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>2500 PSF+ OR GREATER</td>
<td>2'-0&quot; Round</td>
<td>2500 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
</tbody>
</table>

**GROUNDSLOPE = 3H:1V TO 3H:1V**

<table>
<thead>
<tr>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 PSF</td>
<td>2'-0&quot; Round</td>
<td>1000 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>1500 PSF</td>
<td>2'-0&quot; Round</td>
<td>1500 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>2500 PSF+ OR GREATER</td>
<td>2'-0&quot; Round</td>
<td>2500 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
</tbody>
</table>

**ALTERNATE #2**

**Corrugated Metal Pipe Type Construction - Depth "D"**

For lateral bearing pressure = 2500 PSF & Ø = 23", 1500 PSF & Ø = 18", 1000 PSF & Ø = 17"

**GROUNDSLOPE = 3H:4V or FLATTER**

<table>
<thead>
<tr>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 PSF</td>
<td>2'-0&quot; Round</td>
<td>1000 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>1500 PSF</td>
<td>2'-0&quot; Round</td>
<td>1500 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>2000 PSF+ OR GREATER</td>
<td>2'-0&quot; Round</td>
<td>2000 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
</tbody>
</table>

**GROUNDSLOPE = 3H:1V TO 3H:1V**

<table>
<thead>
<tr>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
<th>Bearing Pressure</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 PSF</td>
<td>2'-0&quot; Round</td>
<td>1000 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>1500 PSF</td>
<td>2'-0&quot; Round</td>
<td>1500 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
<tr>
<td>2000 PSF+ OR GREATER</td>
<td>2'-0&quot; Round</td>
<td>2000 PSF</td>
<td>16'0&quot; Round</td>
<td>Special Foundation Type</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. This structure has been designed according to the Fifth Edition 2009 ASHRAE Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Basic wind velocity = 90 mph, Design Life/Recurrence Interval = 50 years, and Fatigue Category III.

2. Foundations are designed for Type IV and V Strain Pole Standards with a minimum mast arm length of 16'-0".

3. 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.

4. Foundations constructed within Ecology Embankments shall be increased in depth by the depth of the Ecology Embankment.

5. 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.


**ALTERNATE #2 - CONSTRUCTION METHOD**

Metal (drainsurface) form required.

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

Place the concrete foundation.

After concrete has cured, remove the entire paper or cardboard form portion. Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).
FASTEN BASE PLATE (SEE NOTE 5)

HOLE DETAIL

WITH 1 1/2" STEEL GASKET-HAND HOLE REMOVABLE (ASTM F-592) SCREWS STAINLESS STEEL WASHER CENTERED 1' PLATE BOLT, 1 1/2" LONG ANCHOR DIAMETER+(TYP.)

Cover with and nut RAINTIGHT FOR 3 GAGE FOR 1/0 GAGE

STRAIN POLE CHART

<table>
<thead>
<tr>
<th>KEY</th>
<th>ITEM</th>
<th>POLE CLASS (Resistant Horizontal Tension)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>POLE GAGE OR THICKNESS</td>
<td>3 2 1 1/4 1/2 5/16</td>
</tr>
<tr>
<td>A</td>
<td>BASE PLATE</td>
<td>15&quot; 17&quot; 19&quot; 20&quot; 20&quot; 22&quot;</td>
</tr>
<tr>
<td>B</td>
<td>ANCHOR BOLT CIRCLE DIAM.</td>
<td>15&quot; 17&quot; 19&quot; 20&quot; 20&quot; 22&quot;</td>
</tr>
<tr>
<td>C</td>
<td>POLE BASE DIAMETER</td>
<td>11&quot; 12 1/2&quot; 14&quot; 14&quot; 15&quot; 18&quot;</td>
</tr>
<tr>
<td>D</td>
<td>BASE PLATE THICKNESS</td>
<td>1 1/2&quot; 1 1/2&quot; 1 1/2&quot; 1 3/4&quot; 1 3/4&quot; 1 3/4&quot;</td>
</tr>
<tr>
<td>E</td>
<td>ANCHOR BOLT DIAMETER</td>
<td>1 1/4&quot; 1 1/2&quot; 1 1/2&quot; 1 3/4&quot; 1 3/4&quot; 1 3/4&quot;</td>
</tr>
</tbody>
</table>

* MINIMUM REQUIRED DIMENSION - CONTRACTOR MAY REVISE WITH ENGINEER APPROVAL.

NOTES

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals: Basic wind velocity 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.

2. 2 1/2" diameter weatherhead may be substituted for the elbow and nipple assembly.

3. Pole shaft shall have 0.14" ft/ps.


5. Hand holes may be 6" x 4", oval or rectangle. Provide a "J" or "C" hook at 90° or 180° off upper hand hole.


TYPE IV AND V STRAIN POLE STANDARD

STANDARD PLAN J-27.15-00

SHEET 1 OF 1 SHEET

APPROVAL OF SPECIFICATION

Washington State Department of Transportation

[Signature]
1. The plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50' (H1).

3. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

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.

END TAPER FOR OPPOSING TRAFFIC (SEE TAPER NOTE)

TOE OF EMBANKMENT WIDENING FOR END TAPER FOR OPPOSING TRAFFIC (SEE TAPER NOTE)

END TAPER FOR OPPOSING TRAFFIC (SEE TAPER NOTE)

TOE OF EMBANKMENT WIDENING FOR END TAPER FOR OPPOSING TRAFFIC (SEE TAPER NOTE)
CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

CASE B
SLOPES FLATTER THAN 3H:1V

CASE C
FORE SLOPES 4H:1V OR FLATTER

CASE D
FORE SLOPES STEEPER THAN 4H:1V (2H:1V MAX.)

EMBANKMENTS

FILL MATERIAL

STEEL LIGHT STANDARD FOUNDATION

HAND HOLE

SLIP BASE

SLOPE ROUNDED

OFFSET DISTANCE (3.0' MIN.)

EDGE OF SHOULDER

SECTION VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

STEEL LIGHT STANDARD PLACEMENT (SLIP BASE)

STANDARD PLAN J-28.22-00

SHEET 2 OF 2 SHEETS
NOTES
SECTION VIEW

CASE I
POSTED SPEED LIMIT LESS THAN 35 MPH

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

NOTES
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. See Standard Plans J-28.24 and J-28.26 for maximum heights of exposed foundation when no embankment widening is to be installed.

Place the concrete foundation. After concrete has cured, remove the paper or cardboard form portion. Construct the embankment widening (if required).

**METHOD 2**

**METAL (SUBLIFACE) 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 (pipe) 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).
HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT - SEE TABLE - STD. PLAN J-28.30

ROUND WASHER (TYP.) - SIZE TO MATCH ANCHOR BOLT

LUMINAIRE POLE

POLE BASE PLATE

KEEPER PLATE

ANCHOR/SLIP PLATE ASSEMBLY - SEE STD. PLAN J-28.42

CAPPED CONDUIT

SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30

2" (IN) DIAM. X 3/4" (IN) GROUT WELL (TYP.)

EXPLODED VIEW

PLATE WASHER DETAIL

3/8" (IN) I.D. DRAIN TUBE IN GROUT PAD

EXPLODED VIEW

PLAN VIEW

SLIP BASE

SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30

TORQUE ANCHOR BOLTS (SEE NOTE 4)

THE FINAL HEIGHT OF THE ANCHOR BOLTS MUST BE 1/8" (IN) BELOW THE TOP OF THE ANCHOR/SLIP PLATE ASSEMBLY TO ENSURE PROPER FUNCTION OF THE SLIP BASE

TOP OF ANCHOR BOLT

3 3/8" MAX

LEAVE 1/8" (IN) HOLLOW IN THE CENTER OF THE GROUT PAD

APPLICATION AREAS

NOTE:

1. 50' (ft) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.

2. Galvanizing shall be in accordance with AASHTO M 111.

3. See Standard Plans C-8b, C-8.15, and J-28.60 for foundation and base plate requirements when light standards are mounted on 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.

**NOTES**

1. 50' (H1) poles with double mast arms or poles weighing in excess of 1000 lbs. shall not be installed on a slip base.

2. The Slip and Anchor Plates shall be manufactured from ASTM A572 GR.50 or ASTM A588. All Slip Plate notched surfaces shall be finished smooth.

3. The clamping bolts shall be high-strength steel, manufactured from AASHTO 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 luminare 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.

---

### CLAMPING BOLT TABLE

<table>
<thead>
<tr>
<th>LUMINAIRE HEIGHT (FT)</th>
<th>MAST ARM TYPE</th>
<th>MAST ARM LENGTH (FT)</th>
<th>CLAMPING BOLT DIAMETER (IN)</th>
<th>D &quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>20' TO 50'</td>
<td>SINGLE</td>
<td>6&quot; TO 16'</td>
<td>1&quot;</td>
<td></td>
</tr>
<tr>
<td>20' TO 45'</td>
<td>DOUBLE</td>
<td>6&quot; TO 8'</td>
<td>1&quot;</td>
<td></td>
</tr>
<tr>
<td>46' TO 50'</td>
<td>DOUBLE</td>
<td>6&quot; TO 8'</td>
<td>1&quot;</td>
<td></td>
</tr>
<tr>
<td>20' TO 45'</td>
<td>DOUBLE</td>
<td>10&quot; TO 16'</td>
<td>1&quot;</td>
<td></td>
</tr>
<tr>
<td>46' TO 50'</td>
<td>DOUBLE</td>
<td>10&quot; TO 16'</td>
<td>1&quot;</td>
<td></td>
</tr>
</tbody>
</table>

---

**SLIP BASE NOT ALLOWED**
EXPLODED ISOMETRIC VIEW

STEEL LIGHT STANDARD ELBOW DETAIL

FOR LUMINAIRE POLES WITH SINGLE MAST ARM 12'-0" OR LESS AND DOUBLE MAST ARMS 9'-0" OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.

NOTES

1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111.
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.

PLATE WASHER (TYP.) - SEE STD. PLAN J-28.42

LOCK WASHER (TYP.)

PLATE WASHER (TYP.) - SEE STD. PLAN J-28.42

LOCK WASHER (TYP.)

PLATE WASHER (TYP.) - SEE STD. PLAN J-28.42

LOCK WASHER (TYP.)

ELBOW MOUNTING ON BRIDGE OR RETAINING WALL

STANDARD PLAN J-28.45-02

TYPICAL SECTIONS

BRIDGE PEDESTRIAN BARRIER

SINGLE-SLOPE BRIDGE TRAFFIC BARRIER

F-SHAPE BRIDGE TRAFFIC BARRIER
LUMINAIRE POLE

1. Pole Base Plate for a Slip Base design shall be 1 1/4" thick manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" thick manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" thick 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.


7/14/11

Washington State Department of Transportation

Approved for Publication

LUMINAIRE POLE FABRICATOR.
NOTES


2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.


4. Install grout after plumbing the pole.

Steel Light Standard Barrier Mounted Base

Standard Plan J-28.60-01

Section B

SECTION B

Conductor Attachment

Bracket = 1/4" Thick Steel, 2" Wide x 4" Long

Clamp = 1/8" Thick Steel, 2" Wide x 3" Long

STEEL LIGHT STANDARD BARRIER MOUNTED BASE

STANDARD PLAN J-28.60-01

Sheet 1 of 1 Sheet

Approved for Publication

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

5/16/11

STEEL LIGHT STANDARD BARRIER MOUNTED BASE

STANDARD PLAN J-28.60-01

Sheet 1 of 1 Sheet

Approved for Publication

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

5/16/11
NOTES

1. These Foundations are designed for a minimum of 1,500 PSF allowable lateral bearing pressure for the soil. A Special Foundation shall be required for soil with allowable lateral bearing pressure lower than 1,500 PSF.
2. These Foundations are designed for installation on level ground, or on sloping ground, not to exceed 2:1 slopes. Slopes steeper than 2:1 require a special design.
3. Foundations constructed within ecology embankments shall be increased in depth, by the depth of the ecology embankment.
4. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office through the Engineer for Special Foundation Designs.
5. The top 2'-0" of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.
6. Galvanized Welded Wire Mesh shall be 2 mesh per linear inch, 0.0625" diam. wire, with 0.4375" overlap. Contractor to form fit and install.

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/Recurrence Interval 50 years and Fatigue Category III.

WIND VELOCITY:

90 MPH
Maximum Pole Deflection shall not exceed 0.7" in 30 MPH and 1.4" in 70 MPH wind.

LOAD CASE #1

Camera (-1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:
Dish (-1) - 1' - 0" diameter @ pole top level.

LOAD CASE #2

Camera (-1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:
Camera (-2) - EPA = 0.54 sq. ft. each @ 1' - 0" and 2' - 0" from pole top, and:
NEMA Cabinet (2) - EPA = 1.33 sq. ft. each @ 3' - 8" from pole top, install both NEMA cabinets back to back, and:
Radio Equipment (2) - EPA = 2.25 sq. ft. each @ 2' - 0" and 9' - 0" from pole top.

EPA = Effective Projected Area

ALTERNATE #2 - CONSTRUCTION METHOD

Shoring or Extra Excavation as Required. Excavated area shall be backfilled with Controlled-Density Fill or with soil in accordance with Standard Specification 8-20.3(2).

CAMERA POLE FOUNDATION DETAILS

STANDARD PLAN J-29.10-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WILLIAM P. BACON

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Li #51c.

1.5/8" ELBOW TOP PLATE (A 36)

25.50" DIAM. BOLT CIRCLE

25" DIAM. HAND HOLE

TAP FOR 1 1/4" DIAM. BOLT FOR 1 1/4" - 8 UNC, 8" LONG BOLT THREADED FULL LENGTH (ASTM A295) WITH TWO HEAVY HEX NUTS AND 3 ROUND WASHERS (TYP.) (ASTM A295 or F1554 GR. 105)

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 3 1/2" high (A36)) on all four sides after truing pole, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.
See Note 1.

2. Minimum lid thicknesses are shown. The diamond pattern shall be a minimum of 28% of the overall thickness. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lip cover plate and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

3. Lid support members shall be 3/16" min. thick steel C, L, or T shape, welded to the frame. Exact configurations vary among manufacturers.

4. A 1/4-20 NC x 3/4" S. S. ground stud shall be welded to the bottom of each lid; include (2) S. S. nuts and (2) S. S. flat washers.

5. The hinges shall allow the lids to open 180°.

6. Bolts and nuts shall be liberally coated with anti-seize compound.

7. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to the ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-20 NC x 3/4" S. S. bolt, (2) each S. S. nuts, and (2) each S. S. flat washers. Equipment Bonding Jumper shall be 85 AWG min. x 4' of tinned braided copper.


9. See the Standard Specifications for alternative reinforcement and class of concrete.


11. Capacity = conduit diameter = 24".

12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement; actual configurations of assembly will vary among manufacturers. See approved manufacturer's shop drawing for specifics.

13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults and Pull Boxes shall not be placed within the sidewalk, walkway, shared use path, traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.

14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 8" min. to 18" max. for final grade of new construction only. See Standard Specification 9-28.19. Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 8" min. to 10" max. See Standard Specification 9-28.19.
1. Install the Junction Box on the Timber Sign Post or the Steel Sign Support that is farthest from the roadway.

NOTES

1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel welded seam construction. Finish shall be # 36 for backside and # 4 for the cover. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel.

2. Holes for conduit(s) shall befield drilled or punched in the box ends. See Section B.

3. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box conduit connection. Use an insulated, grounded end bushing on the inside for GRS conduit. Use a sealing lock nut and a rigid PVC conduit bushing on the inside for PVC conduit.

4. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 9-32.3(4) for details.

5. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.

6. Junction Box shall only be used in barriers with stationary-forms. If Slip-Form Traffic Barrier is required, use Conduit shown in the Alternative PVC Conduit detail.

7. conduit Capacity = 8" (4" per end).

8. Conduits shall only enter Junction Box from ends as shown.

9. When converting RMC to PVC in Stationary-Form Barriers, route a # 8 Stranded, Non-Insulated Grounding Conductor along Conduit, secure Conductor to Conduit with clamp as shown on Conduit Deflection Fitting "B" detail, convert RMC to PVC in Stationary-Form Barrier (per Standard Plan J-48.11); omit Conductor when this detail is not used.
NOTES
1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 8-03.3(20).
2. Mount the stainless steel support using an approved resin-bonded anchor system installed per manufacturer's recommendation. Anchor bolt embedment shall be 4 1/2" minimum. Resin-bonded anchors shall be stainless steel and shall be 3/8" diameter. Expansion Anchors are not allowed.
3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in the concrete.
5. The System Identification letters on the box lid shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specifications 8-29.2(4).
6. 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 6 times multiplier for length and width dimensions.
7. Equipment Bonding Jumper shall be # 8 AWG (min.) × 1 foot of tinned, braided copper.
8. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit connection. An insulated grounded end bushing shall be used to terminate Rapid Metal Conduit.
9. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.

NOTES ON ELEVATION VIEW
- Equipment Bonding Jumper - See Contract for conduit size and number
- Copper Solderless Crimp Connector
- Equipment Bonding Jumper - See Section 5
- Equipment Bonding Jumper - See Section 8
- Equipment Bonding Jumper - See Section 9
1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction. Mounting Tabs 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, grounded, and bushing on the inside for Rigid Metal Conduit.

3. Equipment Bonding Jumper shall be #6 AWG (min.) x 3 feet minimum of stranded, braided copper.

4. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 9-29.2(4).

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 NBC 314.28 using the 8 times multiplier for length and width dimension.


7. Field drill 1/2" 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 9-29.2(3). For drain tube routing, see Standard Plan J-50.16.

8. Conduct capacity is 12" - 4" per side.

9. Conduits shall enter through the sides as shown. Conduits 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 Standard Plan J-40.36 for additonal requirements.
SEE ENTRANCE SAWCUT DETAIL, THIS SHEET

DETAIL "A" SEE STANDARD PLAN J-50.10 SHEET 2

SEE CORNER SAWCUT DETAIL (TYP.)

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT (TYP.)

LEAD-IN SAWCUTS (TYP.)

SEE STANDARD PLAN J-50.15 SHEET 2

SEE CORNER SAWCUT DETAIL (TYP.)

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT (TYP.)

SHOULDER

32'-0" (TYP.)

32'-0" (TYP.)

32'-0" (TYP.)

32'-0" (TYP.)

TYPE 1 STOP LINE LOOP (40' LONG OR AS SHOWN IN THE CONTRACT)

TYPE 1 STOP LINE LOOPS

NOTE:
1. For Installation Notes and Details see Standard Plan J-50.15.

TYPE 1 INDUCTION LOOP

STANDARD PLAN J-50.10-00

NOTES

CENTER OF LOOP AND VEHICLE LANE

LEAD-IN SAWCUT

CHISEL OUT 1/8" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT (TYP.)

CENTER OF LOOP AND VEHICLE LANE

LOOP SAWCUT

LEAD-IN SAWCUT

TRAFFIC FLOW

TYPE 1 STOP LINE LOOP WIRING DIAGRAM

ENTRANCE SAWCUT DETAIL

SEE ENTRANCE SAWCUT DETAIL

STOP LINE

LOOP NUMBER MARKING DETAIL

PHASE NUMBER

LANE NUMBER

LOOP NUMBER

F1 and S1

S = START
F = FINISH

LOOP SERIES START OR FINISH MARKING SLEEVE

SPLICED (TYP.) (OFFSET CRIMPS)

JUNCTION BOX

2G(S)+CABLE

TYPE 1 STOP LINE LOOP WIRING DIAGRAM

ENTRANCE SAWCUT DETAIL
NOTES
1. For Installation Notes and Details see Standard Plan J-50.15.
3. All of the loop lead-in wires shall return to the Junction Box.
4. For Splice Detail, see Standard Plan J-50.15.
5. For additional Induction Loop details, see Standard Plan J-50.15.
NOTES

1. For Installation Notes and Details see Standard Plan J-50.16.


3. All of the loop lead-in wires shall return to the Junction Box.

4. For Splice Details, see Standard Plan J-50.15.

5. For Loop numbering Layout Details, see sheet 3.

6. For additional Induction Loop Details, see Standard Plan J-50.15.
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
 SECTION A

SAWCUT EXISTING PAVEMENT (BOTH SIDES OF TRENCH)

TOP OF EXISTING PAVEMENT OR LEVELING COURSE OF NEW PAVEMENT

SAWCUT (PER CONTRACT OR AS APPROVED BY THE ENGINEER)

2" LONG HIGH TEMP BACKER ROD @ 24" CTR.

LOOP LEAD-IN WIRE, (#14 AWG) OR (#12 AWG) - ONE TWISTED PAIR

STANDARD JUNCTION BOX

SECTION B

TRENCH WIDTH = SEE STD. SPEC. 8-20.3(6)

MATCH EXISTING PAVING MATERIAL

TO CABINET

 LOOP SEALANT (PER CONTRACT OR AS APPROVED BY THE ENGINEER)

LOOP LEAD-IN WIRES - TWISTED PAIR

TOP OF EXISTING PAVEMENT OR LEVELING COURSE OF NEW PAVEMENT

SECTION C

SAWCUT EXISTING PAVEMENT (BOTH SIDES OF TRENCH)

TOP OF EXISTING PAVEMENT OR LEVELING COURSE OF NEW PAVEMENT

SAWCUT (PER CONTRACT OR AS APPROVED BY THE ENGINEER)

2" LONG HIGH TEMP BACKER ROD @ 24" CTR.

LOOP LEAD-IN WIRE, (#14 AWG) OR (#12 AWG) - ONE TWISTED PAIR

SECTION D

TRENCH WIDTH - SEE STD. SPEC. 8-20.3(6)

MATCH EXISTING PAVING MATERIAL

SEE PVC CONDUIT SIZING TABLE

SECTION E

FULL DEPTH SAWCUT

EDGE OF PAVED SHOULDER (SHOWN) OR EDGE OF EXTRUDED CURB OR EDGE OF GUTTER PAN OR EDGE OF TRAFFIC BARRIER

MATCHING EXISTING PAVING MATERIAL

INDUCTION LOOP DETAILS

STANDARD PLAN J-50.15-00

SHEET 1 OF 3 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 4, 2014 TO AUGUST 2, 2015
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 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 PUBLICATION
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

STUB-OUT DETAIL
WITH CEメント CONCRETE CURB OR GUTTER

Cement concrete barrier - single slope barrier shown. See contract plans for size and type

STUB-OUT DETAIL
WITH GUARDRAIL AND CURB

STUB-OUT DETAIL
WITH ROADWAY

STUBOUT CONDUIT PLACEMENT DETAILS

INDUCTION LOOP DETAILS
STANDARD PLAN J-50.15-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015
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. Prefomed 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(14D).

5. Layout Prefomed 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.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PREFORMED LOOP INSTALLATION DETAILS FOR NEW BRIDGE DECKS

STANDARD PLAN J-50.16-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation
NEMA JUNCTION BOX IN SIDEWALK WITH SLIP RESISTANT LID - SEE STANDARD PLAN J-40.40 - SEE CONTRACT DOCUMENTS FOR SIZE.

2-2" CONDUITS IN BARRIER
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

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Sidewalk

Loop Lead-In (2 Max Per 1" Conduit)

2" Conduit in Sidewalk

Loop Lead-In (2 Max Per 1" Conduit)

NEMA JUNCTION BOX IN SIDEWALK WITH SLIP RESISTANT LID - SEE STANDARD PLAN J-40.40 - SEE CONTRACT DOCUMENTS FOR SIZE.

2-2" CONDUITS IN BARRIER

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Sidewalk

Loop Lead-In (2 Max Per 1" Conduit)

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Barrier

Loop Lead-In (2 Max Per 1" Conduit)

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Barrier

Loop Lead-In (2 Max Per 1" Conduit)

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Barrier

Loop Lead-In (2 Max Per 1" Conduit)

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Barrier

Loop Lead-In (2 Max Per 1" Conduit)

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Barrier

Loop Lead-In (2 Max Per 1" Conduit)

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" Conduit in Barrier

Loop Lead-In (2 Max Per 1" Conduit)
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 1/4".
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).
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 9.33.2(1)B, for further information.
11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets, according to the Color Code Identification Chart. For Wire Color Code 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.
**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  
Lane 3 - (drive lane) - Loop L1, Piezo P1, Loop L2  
Lane 4 - (pass lane) - Loop L3, Piezo P2, Loop L4

**PLAN VIEW**

**TYPICAL 4 LANE PTR LAYOUT WITH MEDIAN**

---

**SECTION A**

**SHOULDER NOTCH - SEE NOTES 6 AND 7 FOR CONDUIT SIZE**

**FOR CONDUIT DIAM. SEE NOTE 8**

**SHOULDER NOTCH - SEE NOTE 10**

**JUNCTION BOX - SEE NOTE 10**

**ADVANCED INDUCTION LOOP MODIFIED TYPE 2 (TYP.) SEE NOTE 9**

**OFFSET LANE LINE (TYP.)**

**LEAD-IN SAVCUT (TYP.)**

**HOME RUN CONDUIT**

**HOME RUN CONDUIT (UNDER ROADWAY) (WHERE APPLICABLE)**

**INCREASING MILEPOST DIRECTION**

**DECREASING MILEPOST DIRECTION**

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**PERMANENT TRAFFIC RECORDER INSTALLATIONS**  
**STANDARD PLAN J-50.20-00**  
**SHEET 2 OF 3 SHEETS**
INDUCTION LOOP / PIEZO AXLE SENSOR
NUMBER IDENTIFICATION

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 1 - (drive lane) - Loop L1, Piezo P1, Loop L6
Lane 2 - (center lane) - Loop L3, Piezo P2, Loop L4
Lane 3 - (center lane) - Loop L1, Piezo P1, Loop L2
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 (STCCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCCDO 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 @ 16 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete pavement lanes, install the loops 4" to 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in Contract.

8. Use Schedule 40 PVC conduit from the Junction Box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit for each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation, see Standard Specification 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)8 for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets. For Wire Color Code Identification Chart & Detail see Standard Plan J-60.30.

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.
INCREASING DIRECTION

Lane 1 - (drive lane) - Loop L1, Piezo P1, Piezo P2, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P3, Piezo P4, Loop L4

DECREASING DIRECTION

Lane 3 - (drive lane) - Loop L1, Piezo P1, Piezo P2, Loop L2
Lane 4 - (drive lane) - Loop L3, Piezo P3, Piezo P4, Loop L4

PLAN VIEW

TYPICAL 4 - LANE WIM LAYOUT WITH MEDIAN

INCREASING DIRECTION

INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

DECREASING DIRECTION

INDUCTION LOOP TO PIEZO AXLE SPACING

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL</td>
<td>6'</td>
<td>12'</td>
</tr>
<tr>
<td>URBAN</td>
<td>2'</td>
<td>10'</td>
</tr>
</tbody>
</table>
**Sawcut Layout for Permanent Traffic Recorder Site**

(Modified Type 2 Loop Shown)

1. Using paint and a straightedge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 8 ft. of cable inside the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" blade width, cut the piezo slot approximately 4 to 6 inches longer than the piezo length. The piezo slot depth must be a minimum of 1" to a maximum of 1 1/2".

3. Lead-in cuts for the piezo coax shall be 1/4" minimum width, at a depth of 1 1/2" to 2".

4. Using a pressure washer, remove all slurry and loose material from the 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. This depth will be measured and set by Statewide Travel and Collision Data Office (formerly TDO) inspector on site.

8. Place two pieces of 2" duct tape along the length of the sensor slot. Tape shall 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.

10. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor.

11. Remove tape.

12. Class 2 sensor installation is complete after epoxy has cured. Class 1 WIM sensors shall be sanded flush with the pavement surface the entire length of the piezo sensor. Use a belt sander with a coarse grit paper to get an even surface finish.

13. Lead-in placement and saw-cut methods vary depending on Regional preference and location. 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 6" for class 1 sensor, for the length of the sensor. Use the 3/4" brackets.
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.

COLOR CODE IDENTIFICATION

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</table>

COLOR CODE WIRE DETAIL

WHITE IS ALSO USED FOR DESIGNATING INCREASING MILE POST DIRECTION

COLOR CODED LABELS ON ALL WIRES

SEE COLOR CODE IDENTIFICATION TABLE AND NOTE 1

SINGLE PAIR LOOP LEAD CABLE

YELLOW BAND = 4

WHITE BAND = INCREASING MILE POST DIRECTION

PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS

STANDARD PLAN J-50.30-00

SHEET 3 OF 3 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. If parallel circuits of different sizes are contained in one conduit, the size of the grounding conductor shall be determined on the basis of the largest conductor. Only one grounding conductor is required for each conduit, regardless of the number of circuits contained.
2. Service ground per serving utility requirement. If the utility uses aluminum service conductors, an approved Al-Cu pressure-type ground connector shall be used to secure the service neutral to the copper neutral bar in the service enclosure. Except for the above, all grounding conductors shall be copper.
3. Equipment grounding conductors and grounding electrode conductors shall be sized in accordance with the National Electric Code (No. 8 minimum).

TYPICAL GROUNDING DETAILS

STANDARD PLAN J-60.05-00

1. TRAFFIC SIGNAL CABINET
2. CABINET GROUNDING BUS (COPPER)
3. RIGID PVC OUTLET BOX WITH PVC OR PE INNERDUCT
4. GROUNDING TERMINAL OR CONNECTION TO EQUIPMENT GROUNDING SYSTEM
5. BONDING JUMPER ATTACHED TO BOX WALL COUPLING NUT
6. BONDING JUMPER ATTACHED TO BOX (LEDS) GROUND STUD OR BAR
7. END BELL BUSHING (TYP. ALL NON-METALLIC CONDUIT TERMINATIONS)
8. CODE SIZE PVC
9. HIGH-DENSITY POLYETHYLENE CONDUIT (HDPE)
10. NON-METALLIC CONDUIT (PVC) SCHEDULE 80
11. BOX (LEDS) GROUND STUD OR BAR
12. CABLE VAULT
13. PULL BOX
14. ITS CABINET
15. EDGE OF FOUNDATION
16. GROUND ROD
17. EDGE OF FOUNDATION OR 12" DRAIN TILE WITH APPROVED COVER
18. COIL SIZE RMC
19. ELECTRICAL LOAD SUPPORT (SUPER POLE AND TRAFFIC SIGNAL POLE)
20. COPPER SOLIDLESS CRIMP CONNECTOR
21. GALLERIZED STEEL, RIGID METAL CONDUIT (RMC)
22. OPTION A - 10' RMC WITH FIELD BEND APPROVED ADAPTER FITTING GROUNDING BUSHING
23. OPTION B - 10' RMC
24. GS FACTORY ELBOWS APPROVED ADAPTER FITTING GROUNDING BUSHING
25. GS COUPLING GROUNDING BUSHING
26. SERVICE ENCLOSURE
27. GROUNDED SERVICE ENCLOSURE
28. GROUNDED SERVICE GROUNDING BUSHING BRAIDED COPPER
29. SERVICE NEUTRAL BONDING
30. GROUND STUD OR BAR IN METAL CONDUIT WITH PVC OUTERDUCT AND GALVANIZED STEEL RIGID PVC OUTERDUCT WITH PVC OR PE INNERDUCT
31. JUMPERS ATTACHED TO BOX (LEDS) GROUND STUD OR BAR
32. JUMPERS ATTACHED TO BOX LID (S)
33. TO SERVICE NEUTRAL BUS"
COMBINED GALVANIZED STEEL RIGID METAL CONDUIT (RMC) AND RIGID PVC CONDUIT (PVC) APPLICATION

FIBER OPTIC CABLE ONLY, NO METALLIC CONDUCTORS

FROM DIFFERENT SERVICE

TOP OF PAVEMENT OR EXISTING GROUND

TOP OF PAVEMENT OR EXISTING GROUND

TOP OF PAVEMENT OR EXISTING GROUND

TOP OF PAVEMENT OR EXISTING GROUND

SECTION A

SECTION B

SECTION C

SECTION D

SECTION E

TYPICAL GROUNDING DETAILS

STANDARD PLAN J-60.05-00
Required to supplement equipment grounding furnished in standards wherein direct burial aerial feeds, or where required in the plans.

Required at all service and separately derived systems.

Type D service cabinet shown. Use this concept for Type E cabinet or transformer. Type D service cabinet shall be installed on lower surface of foundation only.

Type B service cabinet and transformer cabinet shall be installed on raised surface of foundation only.

Type B modified service cabinet.

Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing.

SEE STANDARD PLAN J-10.10

SEE KEY ON SHEET 1 FOR PARTS

TYPICAL GROUNDING DETAILS
STANDARD PLAN J-60.05-00

RIGID PVC CONDUIT (PVC) APPLICATION

GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION

SEE STANDARD PLAN J-36

SEE STANDARD PLAN J-36

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
PROFESSIONAL ENGINEER
3/8" x 2" x 2" Frame Bonding Stud Plate with 1/4NC x 1" Stainless Steel Bonding Stud.
- Weld Bonding Stud to Frame Bonding Plate.
- Weld to lid support frame.
- 1/4" weld - 3 sides.
- Grind lid bearing surface flat after welding.
- All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (inch) chamfer or rounding.
- Protect conductors with fireproof cloth prior to welding.
- Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

Weld all around lid bonding stud - 1/4 NC x 1" stainless steel - liberally coat entire assembly w/ anti-seize compound.
NOTES

1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adaptor in the barrier.

   PVC Conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adaptor.

   RMC Conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.


3. Pipe wrap tape shall be 2" wide, 20 mil 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 from conduit Deflection Fitting to 1" max. beyond (inside) barrier surface.

- 1" - 0" long, 3/4" thick extended closed-call foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.

- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1" - 0" on each side of the joint.

- 10" - 0" long section of RMC conduit.

- Deflection Fitting shall be in neutral state after installation.
SCHEMATIC
SHOW FOR DUAL-CONDUI T INSTALLATION
(CIRCUIT TYPES MAY VARY)

CONDUIT DEFLECTION FITTING "B" DETAIL
CONVERT RMC TO PVC IN STATIONARY-FORM BARRIER

CONDUIT DEFLECTION FITTING "A" DETAIL
CONDUIT FITTING - TYPE DX - PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE

3/4" CLOSED-CELL FOAM SLEEVE - WRAP 1-1/2 TIMES AROUND CONDUIT AND CONDUIT FITTING

CONDUIT PIPE

WIRE TIE (TYP.) - 1") (REQUIRED)

3" (TYPE)

PLACE @ EXIT FROM STRUCTURE

CONDUIT PIPE

PLACE @ EXIT FROM STRUCTURE

CONDUIT DEFLECTION FITTING "A" DETAIL
CONDUIT FITTING - TYPE DX - PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE

CONDUIT DEFLECTION FITTING "B" DETAIL
CONDUIT FITTING - TYPE DX - FOR DEFLECTION OF 30° AND 3/4" MOVEMENT

CONDUIT FITTING - TYPE DX FOR DEFLECTION OF 30° AND 3/4" MOVEMENT. CONDUIT PIPES PLACED THROUGH RETAINING WALL TRAFFIC BARRIER. SHALL BE FITTED WITH DEFLECTION FITTINGS AT MAXIMUM SPACING OF 120°. THE DEFLECTION FITTINGS SHALL BE PLACED AT THE TRAFFIC BARRIER OPEN JOINT THAT COINCIDES WITH THE RETAINING WALL STEM EXPANSION JOINT NEAREST TO THE TRANSVERSE CONSTRUCTION JOINT IN THE WALL FOOTING.

STANDARD PLAN J-60.11-00
SECT 2 OF 2 SHEETS

6-15-13

CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL
STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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**

- 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-40.10. Use NEMA 3R Junction Box with slip-forms. See Standard Plan J-40.37.

- Where conduit in a structure is routed across a cold joint with continuous reinforcing steel, install premolded joint filler and wrap the conduit pipe for 1' - 0" on each side of the joint. Omit pipe-wrap tape on PVC conduit.

- Where conduit exits from a structure, wrap the conduit pipe for 1" - 0" on each side from the exiting point.

- 10' - 0" long section of RMC conduit.

- Conduit Deflection Fitting shall be in neutral state after installation.

- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1" - 0" on each side of the joint.
NOTES

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6-02.3(20). There shall be a minimum of a 3" edge distance to the centerline of anchor holes in concrete. Mount the stainless steel support using an approved resin bonded anchor system. Anchors shall be stainless steel and shall be of 3/8" diameter (expansion anchors are not allowed). Anchor Bolt embedment of 4 1/2" minimum.

2. Number of clamps shall be determined by number of conduits to be attached to the Stainless Steel Channel Support. See Conduit Plans for conduit routing.

3. Add additional Attachment Bolts when required to maintain 8" maximum spacing between adjacent Attachment Bolts.

4. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line. When barrier is not plumb, size spacer to maintain back of barrier line.

2. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line.
3. Slotted Channel mounting plate shall be installed where conduit is routed along column.

**NOTES**

**ISOMETRIC VIEW**

**COLUMN MOUNT DETAILS**

**SECTION C**

**STAINLESS STEEL CHANNEL**

**SLOTTED CHANNEL MOUNTING PLATE**

**ISOMETRIC VIEW**

**WOOD POLE MOUNT DETAILS**

**SECTION D**

**SECTION B**

**ROUND COLUMN MOUNT SHOWN**

**SQUARE COLUMN MOUNT SHOWN**

**STAINLESS STEEL CHANNEL MOUNTING DETAILS ON COLUMN OR POLE**

**STANDARD PLAN J-60.14-00**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**6/8/2010**
1. Center pipe section.
2. Locknut.
3. Flange.
4. Flared nipple.
5. Type B pedestal pipe.
6. Type H vehicle pipe.
7. Bronze collar.
8. Tree with set screw.
10. Bronze terminal compartment with:
    - Gasketed cover
    - Fasteners
    - Wire leads
    - Mounting saddle for side mounts
    - 1/4" drain hole
    - 1/2" position terminal strip
    - Vanitory for side mounting.
12. Ornament Cap.
15. Type E hinge mount - left or right, see contract.
16. Fastener with spacer -
    + 1/4" lag screws on wood pole
    + 1/2" bolts tapped to metal pole.
17. Flathead socket bolt.
18. 1/2" insert hole for external wire entrance.
19. Terminal block and phenolic tag.
20. Insulator - 1/8" diam hole.
21. Signal head with backplate.

**NOTE:**
1. See contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
6. Back plates shall be constructed of anodized aluminum and shall be mounted with stainless steel hardware. A 2-inch-wide strip of yellow retro-reflective, type IV prismatic sheeting, conforming to the requirements of Standard Specification 9-28.12, shall be applied in accordance with the manufacturer's requirements. The application surface of the back plate shall be cleaned, degreased with isopropyl alcohol, and dried prior to application of the sheeting. See Standard Specification 9-25.16(2).
7. Drill a 1/4" drain hole in the bottom of each signal assembly, and one in the bottom of each pedestal head. When signal assembly is mounted horizontally, drill a 1/4" drain hole at the lowest point of each section of the signal assembly.
**NOTES**

1. Type M mounting shall have “O” ring groove and seal top and bottom of signal attachment.
2. Type M mounting for conventional heads shall have a 2” diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2” diameter opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 14” nominal arms.
5. See Standard Plan J-75.30 for tether wire, and backplate requirements.
6. Apply bead of silicone around the perimeter of all top and end cap openings prior to installation of the end cap assembly.
NOTES
1. Typical view shown. Verify power source location, quantities, location of signs, and sign structure fixtures in Contract Plans.
2. Route IMA 20-1 3C #14 cable(s) from isolation switch along inside bottom of the Monotube Mast Arm to the liquidtight conduit connector(s) at hand hole(s).
3. Route separate IMA 20-1 3C #14 cable from load side of terminal strip to each additional light fixture (where applicable) and provide sufficient slack wire per Standard Specification 8-20.3(b).
4. Label all conductors with sign light and circuit number at isolation switch, hand hole(s), and ballast enclosure(s). Labels shall be a PVC or Polyolefin wire marking sleeve per Standard Specification 9-29.
5. Install quick-disconnect fuse kits between the power supply wires and the pole and bracket cable per Standard Specification 9-29.7. Fuse size shall be 200% larger than load size.
6. The conductors in the IMA 20-1 3C #14 cable shall be black, red, and white. The white conductor shall be permanently identified as an equipment grounding conductor per NEC.
7. All GRS conduits embedded in foundation shall be terminated with Grounding End Bushing and bonded to the Foundation Grounding Bus. All PVC conduits embedded in foundations shall be terminated with End Bell Bushing.
8. Hand holes shall be installed at the time of fabrication. Only additional conduits for lighting accommodations to previously non-illuminated structures may be installed in field as long as the proper repairs are made to the structure. For hand hole details, see Standard Plan J-75.41.
10. All holes shall be drilled and tapped.
11. Use the Retrofit Details only when the following conditions apply:

A. Existing W4 x 13 Luminaire Brackets are to be replaced for a new Sign-Lighting Luminaire. The span between the existing Luminaire Brackets is too wide to attach a new Sign-Lighting Luminaire and Luminaire Mounting Plate.

B. The span between the existing Luminaire Brackets is too wide to attach a new Sign-Lighting Luminaire and Luminaire Mounting Plate.

12. If the sign structure includes a maintenance walkway, the Luminaire Mounting Plate shall be bolted to the walkway grating.
1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder or the traveled way. Use a 9" thick lid for new Pull Box installations. Use a 8" thick Heavy Duty Lid when converting a Standard Duty Pull Box into a Heavy Duty Pull Box in the paved shoulder or the traveled way and no overlay is called for in the Contract. Otherwise, see Contract Plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Pull Box and Lid when placed in unpaved areas. Use Standard Duty Pull Box in sidewalks, walkways, and shared-use paths.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" thick.

4. Standard Duty Pull Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" in thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

5. A 1/4-20 UNC x 3/4" S. S. ground stud with (2) S. S. nuts and (2) S. S. flat washers shall be attached to the Standard Duty Lid and coated with anti-seize compound. Provide a 5/8" diameter cored hole in the ductile iron lid gusset (Heavy Duty Lid) with 1/2-13 UNC x 1 1/4" S. S. bolt, (3) S. S. flat washers, and (2) S. S. nuts for the Bonding Jumper.

6. Connect a Bonding Jumper to the steel conduit bushing for GRS conduit and connect the steel conduit bushing jumper to the equipment ground at the threaded brass ground insert. Connect the equipment grounding conductors in the PVC and/or GRS conduits to the brass ground insert. The Bonding Jumper shall be #8 min. x 4" (ft.) of tinned brazed copper between the lid and the frame of the Heavy Duty tops and from the Heavy Duty top to the threaded brass ground insert. The Bonding Jumper shall be #8 min. x 4" (ft.) of tinned brazed copper between the lid on a Standard Duty Pull Box and the threaded brass ground insert. See Contract Plan Sheets and Standard Plan J-60.85 for Bonding Jumper requirements.

7. The system identification letters shall be 1/8" in thickness formed by engraving, casting, stamping, or with a S. S. weld bead. See COVER MARKING DETAIL. See Standard Specification 9-29.24(4). Ductile iron lid lettering shall be recessed.

8. Cement concrete shall be Class 4000.

9. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

10. Capacity - conduit diameter = 40" (in.).

11. Excavate material, place 6" crushed surfacing pad per Standard Specification Section 8-20.3(6). Field bend #3 reinforcing bar to allow conduit into the Pull Box. Field bend reinforcing bar back into place, wire tie in (2) places, and cast in commercial concrete (commercial concrete only allowed for box bottom/wall completion).

12. This drawing depicts a typical Pull Box assembly. Reinforcing not shown. Each manufacturer's Pull Box assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.
NOTES

1. The Small Cable Vault shall be used in unpaved areas, and shall not be installed in the paved shoulders or traveled way. Use Small Cable Vault in sidewalks, walkways, and shared-use paths. Heavy Duty Cable Vault shall be used when installed in the paved shoulder or the traveled way.

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 stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

4. A 1/4" - 20 UNC x 3/4" (IN) ground stud with two nuts and two flat washers shall be welded to each lid and coated with anti-seize compound. A 1/4" - 20 UNC x 3/4" (IN) ground stud with two nuts and three flat washers shall be welded to the frame and coated with anti-seize compound.

5. Connect a bonding jumper to the steel conduit bushing for RMC conduit and connect the steel conduit bushing jumper to the equipment ground at the hex coupling nut welded to the stainless steel channel. Connect the equipment grounding connectors in the PVC and/or RMC conduits to the hex coupling nut. The bonding jumper shall be #8 min. x 1' (ft) of tinned braded copper between the lid and the frame and shall be #8 min. x 4' (ft) of tinned braded copper from the frame to the hex coupling nut. See Contract Plans and Standard Plan J-80.05 for bonding jumper requirements.

6. The system identification letters shall be 1/8" (in) line thickness formed by engraving, stamping, or with a stainless steel weld bead. See COVER MARKING DETAIL, Standard Specification 9-29.2(4).

7. Cement concrete shall be Class #100.

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.

12. Location wire splice shall be molded splice enclosure or splice connector with terminal connection.
NOTES

1. For long term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

2. For Hot Mixed Asphalt Pavement, a temporary striping tape shall be installed in conjunction with DO NOT PASS and "PASS WITH CARE" sign locations.

3. Temporary road wide delineation with Channelization Devices is optional. The appropriate taper length shall be L/2. See Standard Plan K-04.20 for minimum taper length (L).

4. For long term projects a channelization/pavement marking plan should be implemented.

5. Temporary Raised Pavement Marker (TRPM) may be used on a pattern spacing 5' O.C. to simulate a solid line.
NOTES
1. For sign installation details, see Std. Plan G - series.
2. In rural areas, the "V" Height can be a minimum of 7 feet for primary signs and 6 feet for the supplemental plaques for greater visibility, as directed by the engineer.
3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

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<th>TO BOTTOM OF SUPPLEMENTAL PLAQUE (WHEN REQUIRED)</th>
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<tr>
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CLASS A CONSTRUCTION SIGNING INSTALLATION
STANDARD PLAN K-80.10-00

EXPIRES AUGUST 9, 2007

APPROVED FOR PUBLICATION
NOTES

1. All fasteners may be zinc plated, galvanized or stainless steel. All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.

2. Install one lightweight Type A Low-Intensity flashing warning light on the traffic side of the barricade. Install two Type A Low-Intensity flashing warning lights per barricade when the barricades are used to close a roadway. Attach the light to the barricade according to the light manufacturer's recommendations or use the details shown on this plan.

3. Stripes on barricade rails shall be alternating orange and white retroreflective stripes (sloping downward at an angle of 45 degrees in the direction traffic is to pass).

4. The Type 3 barricade design shown on this plan meets the crash test requirements of NCHRP 350. Alternative designs may be approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.

5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.

6. When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.
USEABLE TRAFFIC LANE
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
USEABLE TRAFFIC LANE

TYPE 3R BARRICADE

ROAD CLOSURE AT INTERSECTION

BARRICADE PLACEMENT

ROAD CLOSURE AT OTHER LOCATIONS

USEABLE TRAFFIC LANE
AREA CLOSED TO TRAFFIC

TYPE 3L BARRICADE

TYPE 3R BARRICADE

WORK AREA

V

TYPE 3L BARRICADE

TYPE 3R BARRICADE

WORK AREA

V

TYPE 3L BARRICADE

TYPE 3R BARRICADE

WORK AREA

V

TYPE 3L BARRICADE

TYPE 3R BARRICADE
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
NARROW BASE, ALTERNATIVE TEMPORARY CONCRETE BARRIER SEGMEN T

ATTACHMENT "A" DETAIL
ATTACHMENT "B" DETAIL

SECTION VIEW
TYPE 2 ANCHOR: CLASS 1 & 2 ATTACHMENT LOCATIONS

PLAN VIEW
SEGMENT LENGTH = L

ATTACHMENT LOCATION (TYP.) - SEE NOTE 3

PLAN VIEW
SEGMENT LENGTH = L

ATTACHMENT LOCATION (TYP.) - SEE NOTE 3

TEMPORARY CONC. BARRIER ANCHORING ~ NARROW
STANDARD PLAN K-80.37-00
SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
APPROVED FOR PUBLICATION

2/21/2007
EXPRES JULY 24, 2008

NARROW BASE, ALTERNATIVE TEMPORARY CONCRETE BARRI ER SEGMENT
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.
NOTES
1. All concrete post bases shall be 10" minimum diameter.
2. Along the top and bottom, using Hog Rings, fasten the Chain Link Fence Fabric to the Tension Wire within the limits of the first full fabric weave.
3. Details are illustrative and shall not limit hardware design or post selection of any particular fence type.
NOTES
1. Materials shall meet the requirements of Standard Specification 9-16.
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 15d 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.

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M222.
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP
- 48" x 12" (TYP.)

5/8" DIAM. WIRE ROPE

SEEN MOUNTING DETAIL

MIDDLE POST
- REMOVABLE

YELLOW REFLECTIVE TAPE - 3" (TYP.)

PADLOCK (TYP.)
- AGENCY PROVIDED

TOP OF ROADWAY

ELEVATION

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

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
HEX LAG BOLT- 3/8-7UNC X 5" WITH 1" DIAM. FLAT WASHER
(4 SETS TOTAL)

1 1/2" DIAM. HOLE (TYP.)

GALV. SCREW- 3/16" DIAM. W/ FLAT WASHER (TYP.) (2 SETS REQ.)

GALV. STEEL TUBE

COMMERCIAL CONCRETE

SECTION A

SECTION B

SIGN PANEL MOUNTING DETAIL

ACCESS CONTROL DOUBLE GATE

STANDARD PLAN L-70.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JUNE 15, 2028
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

SINGLE-LANE ON-CONNECTION

SINGLE-LANE OFF-CONNECTION

WHITE EDGE LINE
YELLOW EDGE LINE
WIDE LANE LINE
LANE LINE

1/2 MILE MIN.

50' - 1000' ARROW / ONLY
SPACE EVENLY

STOP LINE

TRAFFIC ARROW TYPE MAY VARY - SEE CONTRACT FOR TYPE SPECIFIED

MATCH LINE B
MATCH LINE C

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Hendricks, Paseco
Jan 31, 2014 4:14 PM

364/03
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Hendricks, Paseco
Jan 31, 2014 4:14 PM

364/03
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal 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
SHEET 1 OF 1 SHEET

TWO-LANE ON-CONNECTION

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 herein. See the Standard Plans for RPM supplement and substitution patterns.

2. When weaving section is more than 3/4 of a mile in length, use lane line.

3. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND

L = LANE WIDTH
R = RAMP LANE WIDTH
NOTES

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' spacing is standard, however, for gore areas shorter than 150' use a 25' spacing, and for gore areas greater than 400' a spacing of 100' may be used.

2. The acute angle of the diagonals shall always point in the direction of main line traffic.
NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways, with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 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 width.

Type 2L (SL) Traffic Arrow

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPE A</th>
<th>APPROACH TAPE B</th>
<th>APPROACH TAPE C</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 MPH</td>
<td>360'</td>
<td>60'</td>
<td>720'</td>
</tr>
<tr>
<td>55 MPH</td>
<td>330'</td>
<td>55'</td>
<td>660'</td>
</tr>
<tr>
<td>50 MPH</td>
<td>300'</td>
<td>50'</td>
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<td>360'</td>
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<td>25'</td>
<td>300'</td>
</tr>
<tr>
<td>20 MPH</td>
<td>120'</td>
<td>20'</td>
<td>240'</td>
</tr>
</tbody>
</table>

LEFT-TURN CHANNELIZATION

STANDARD PLAN M-3.10-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pamela Balfour

Washington State Department of Transportation
**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 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four lane undivided highways shall be a double centerline.

6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

---

**LEGEND**

L = 12' Typical Lane Width. See Contract for specified lane widths.

\( \text{Type 2L (SL) Traffic Arrow} \)

- POSTED SPEED
- APPROACH TAPER
- CENTERLINE STRIPE
- OPTIONAL MARKED DECELERATION TAPER

---

**POSTED SPEED**

\[\begin{array}{cccc}
40 \text{ MPH} & 16' & 27' & 329' \\
35 \text{ MPH} & 12' & 21' & 249' \\
30 \text{ MPH} & 9' & 15' & 186' \\
25 \text{ MPH} & 6' & 7' & 123' \\
20 \text{ MPH} & 4' & 7' & 87' \\
\end{array}\]
LEFT-TURN CHANNELIZATION TEE INTERSECTION
WITH ACCELERATION LANE

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.

POSTED APPROACH DIMENSION TAPER SPEED
A
B
60 MPH 360' 45'
55 MPH 330' 50'
50 MPH 300' 55'
45 MPH 270' 60'
40 MPH 240' 65'
35 MPH 210' 70'
30 MPH 180' 75'
25 MPH 150' 80'
20 MPH 120' 85'

LEGEND

Washington State Department of Transportation
LEFT-TURN CHANNELIZATION IN TWO-WAY LEFT-TURN LANE

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 38-13. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

Can be reduced to a minimum of 50' to increase storage capacity.

TWO-WAY LEFT-TURN AND MEDIAN CHANNELIZATION STANDARD PLAN M-3.40-03

Sheet 1 of 1 Sheet
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.

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 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

12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

Type 2R (SR) Traffic Arrow

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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 center line.
6. All Traffic Arrows not required are optional, but recommended. Arrows may be added for longer storage lanes, or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths. *

Type 2R (SR) Traffic Arrow
Type 3L (SL) Traffic Arrow
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.
1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle, (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.
**GENERAL NOTE**

See contract for location and material requirements.

**KEY NOTES**

1. Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" white transverse lines.
2. 24" white transverse line
3. W10-1 Advance Warning Sign (not included in RR Crossing Symbol Bid Item)
4. Place Stop Line 15' from the nearest rail or approximately 8 feet from RR gate, if present.

<table>
<thead>
<tr>
<th>MPH</th>
<th>D*</th>
</tr>
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<tbody>
<tr>
<td>25</td>
<td>50 Ft.</td>
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<tr>
<td>30</td>
<td>50 Ft.</td>
</tr>
<tr>
<td>35</td>
<td>50 Ft.</td>
</tr>
<tr>
<td>40</td>
<td>225 Ft.</td>
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<tr>
<td>45</td>
<td>300 Ft.</td>
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<td>50</td>
<td>375 Ft.</td>
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<tr>
<td>55</td>
<td>450 Ft.</td>
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<tr>
<td>60</td>
<td>550 Ft.</td>
</tr>
<tr>
<td>65</td>
<td>650 Ft.</td>
</tr>
</tbody>
</table>

*DIMENSIONS SHOWN ARE APPROXIMATE. SEE CONTRACT.*

**STANDARD SYMBOL**

- TOTAL MARKING AREA (PER 12' WIDE LANE) = 109.75 SQ FT.

**ALTERNATIVE SYMBOL**

- TOTAL MARKING AREA (PER 12' WIDE LANE) = 111.59 SQ FT.
NOTES

1. See the Contract Plans for locations of crosswalk centerlines.

2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.

3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.

GENERAL NOTE
See Standard Plan M-20.10 for pattern and color requirements.

PROFILED PLASTIC (BROKEN LINE) FOR:
- CENTER LINE & LANE LINE - W = 4" (SOLID OR BROKEN LINE)
- NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE - W = 4" (SOLID OR BROKEN LINE)
- REVERSIBLE LANE LINE - W = 4" (SOLID OR BROKEN LINE)
- WIDE BROKEN LANE LINE - W = 6" (SOLID OR BROKEN LINE)

PROFILED PLASTIC (SOLID LINE) FOR:
- NO-PASS LINE - W = 4" (SOLID OR BROKEN LINE)
- TWO-WAY LEFT-TURN CENTER LINE - W = 4" (SOLID OR BROKEN LINE)
- DOUBLE CENTER LINE & DOUBLE LANE LINE - W = 4" (SOLID OR BROKEN LINE)
- EDGE LINE & SOLID LANE LINE - W = 4" (SOLID OR BROKEN LINE)
- WIDE LANE LINE & WIDE LINE - W = 8" (SOLID OR BROKEN LINE)
- DOUBLE WIDE LANE LINE - W = 8" (SOLID OR BROKEN LINE)
- BARRIER CENTER LINE - W = 20" (SOLID OR BROKEN LINE)

EMBOSSED PLASTIC (SOLID OR BROKEN LINE) FOR:
- CENTER LINE & LANE LINE
- NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE
- REVERSIBLE LANE LINE
- DOUBLE CENTER LINE & DOUBLE LANE LINE
- EDGE LINE & SOLID LANE LINE

PROFILED EMBOSSED PLASTIC (SOLID OR BROKEN LINE) FOR:
- CENTER LINE & LANE LINE
- NO-PASS LINE
- TWO-WAY LEFT-TURN CENTER LINE
- REVERSIBLE LANE LINE
- DOUBLE CENTER LINE & DOUBLE LANE LINE
- EDGE LINE & SOLID LANE LINE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: MARK SUKAN

SECTION A

PROFILING AND EMBOSSED PLASTIC LINES
STANDARD PLAN M-20.20-01
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80' intervals on tangents and on horizontal curves with a radius of 5000' or more, and at 40' intervals on horizontal curves having radii of less than 5000'. Center the RPM's in the gaps between the pavement marking lines.

2. Type 2Y RPM's, when specified, shall be placed outside the left edge line at 80' intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL".

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPM's on multilane one-way roadways, and Type 2YY RPM's on two lane two-way roadways.

4. The Type 2W RPM's placed on multilane one-way roadways and all RPM's set in recesses shall have an abrasion resistant coating.

---

**TYPE 2 RPM RAISED FACE COLORS**

<table>
<thead>
<tr>
<th>Type 2Y</th>
<th>Yellow and Yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2W</td>
<td>White - One Side Only</td>
</tr>
<tr>
<td>Type 2Y</td>
<td>Yellow - One Side Only</td>
</tr>
</tbody>
</table>

---

**LEFT EDGE OF LANE PLACEMENT DETAIL**

SEE NOTE 2

---

**PLAN VIEW**

RECESSED PAVEMENT MARKER DETAILS

FOR USE WHERE SPECIFIED IN CONTRACT

---

**LONGITUDINAL MARKING SUPPLEMENT WITH RAISED PAVEMENT MARKERS**

STANDARD PLAN M-20.30-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
LONGITUDINAL MARKINGSUPPLEMENT WITH RPMs ~
TURN LANESTANDARD PLAN M-20.40-03

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 4, 2014 TO August 2, 2015
NOTE
1. The NO PASS LINE (when required) is applied parallel to the CENTERLINE, 4” away, with the Type 2YY RPM's aligned (similar to TWO-WAY LEFT-TURN LINE).
NOTE
Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher.
NOTE
Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
ROUNDABOUT TRAFFIC ARROWS

STANDARD PLAN M-24.50-00

COMPONENT KEY

- THE LABELED AREAS ABOVE CORRESPOND TO THE PORTIONS NEEDED FOR EACH TYPE OF ROUNDABOUT TRAFFIC ARROW.


- CENTER THE ARROW ON THE LANE CENTERLINE BETWEEN THE LATERAL EXTREMITIES OF THAT ARROW TYPE.

PAVEMENT MARKING - ROUNDABOUT TRAFFIC ARROW

- TYPE TC: 19.56 SQ.FT.
- TYPE LTC: 23.91 SQ.FT.
- TYPE TRC: 20.09 SQ.FT.
- TYPE LTRC: 27.17 SQ.FT.
- TYPE LT: 19.75 SQ.FT.
- TYPE TR: 20.89 SQ.FT.
- TYPE LTR: 25.26 SQ.FT.
- TYPE LC: 18.07 SQ.FT.
NOTE
1. If Rumble Strips are present, install marking outside of the Rumble Strip.
### Grid IS 4" (IN) SQUARE MARKING AREA
- **Access Parking Space Symbol** (Minimum)
  - Marking Area = 1.41 SQ.FT.

### Access Parking Space Symbol (Standard)
- Marking Area = 3.09 SQ.FT.

### Speed Bump Symbol
- Marking Area = 12.08 SQ.FT.

### Symbol Markings
#### Yield Ahead Symbol
<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Use</th>
<th>Marking Area</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>6' - 0&quot;</td>
<td>2' - 0&quot;</td>
<td>13' - 0&quot;</td>
<td>N/A</td>
<td>Less Than 45 MPH</td>
<td>25.90 SQ.FT.</td>
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<tr>
<td>2</td>
<td>6' - 0&quot;</td>
<td>3' - 0&quot;</td>
<td>20' - 0&quot;</td>
<td>N/A</td>
<td>45 MPH or Greater</td>
<td>36.84 SQ.FT.</td>
</tr>
</tbody>
</table>

#### Yield Line Symbol
- Type 1: 1'-0" (4") Less Than 45 MPH: 0.75 SQ.FT.
- Type 2: 2'-0" (8") 45 MPH or Greater: 3.00 SQ.FT.

* Minimum of 4 in Lane

### Miscellaneous
- YIELD LINE SYMBOL (Multiple symbols required for transverse yield line - see contract)

### Standard Plan M-24.60-04
- Sheet 2 of 2 Sheets

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**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**Approved By:**

**Date:**

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**EFFECTIVE:** AUGUST 4, 2014 TO AUGUST 2, 2015
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 Specifcity Intensity:

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Specific Intensity (Gs/ft-c)</th>
<th>Type W</th>
<th>Type WW</th>
<th>Type Y</th>
<th>Type YY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1&quot;</td>
<td>0°</td>
<td>128</td>
<td>WHITE</td>
<td>WHITE</td>
<td>WHITE</td>
<td>WHITE</td>
</tr>
<tr>
<td>0.1&quot;</td>
<td>20°</td>
<td>56</td>
<td>YELLO W</td>
<td>YELLO W</td>
<td>YELLO W</td>
<td>YELLO W</td>
</tr>
</tbody>
</table>

NOTES

1. When the Contract Plans requires a guide post with concurrent guardrail run, the Contractor shall:
   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" (in) x 3/8" (in) lag screws with washers, along centerline of post. Also acceptable is any approved attachment method submitted by the guide post manufacturer.

3. Guide posts shall be fastened to the steel guardrail posts using two galvanized 2" (in) 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(18). Also acceptable is any approved attachment method submitted by the guide post manufacturer.

4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delineators where guide posts are required.
**NOTES**


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

3. "S" dimension shown on Standard Plan M-40.40 or 100’, whichever is smaller.

4. One half of “S” dimension shown on Standard Plan M-40.40 or 50’, whichever is smaller.

5. Two spaces at 100’.

6. Three equal spaces when R < 75’, four equal spaces when R ≥ 75’.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50’ feet maximum.

---

**LEGEND**

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

---

**GUIDE POST PLACEMENT INTERCHANGES**

STANDARD PLAN M-40.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 9, 2009

NOTE 1
NOTE

DIVIDED HIGHWAY

THREE EQUAL SPACES WHEN R < 75'

FOUR EQUAL SPACES WHEN R ≥ 75'

100' DECELERATION TAPER

R

200'

500'

100 (TYP.)

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>G1</td>
<td>WHITE</td>
</tr>
<tr>
<td>G2</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

UNDIVIDED HIGHWAY

WITHOUT ILLUMINATION

GUIDE POST PLACEMENT
GRADE INTERSECTIONS

STANDARD PLAN M-40.30-00

SHEET 1 OF 1 SHEET

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

NOTE

DIVIDED HIGHWAY

THREE EQUAL SPACES WHEN R < 75'

FOUR EQUAL SPACES WHEN R ≥ 75'

100' DECELERATION TAPER

R

200'

500'

100 (TYP.)

REFLECTIVE SHEETING APPLICATIONS

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</tr>
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</tbody>
</table>

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

UNDIVIDED HIGHWAY

WITHOUT ILLUMINATION

GUIDE POST PLACEMENT
GRADE INTERSECTIONS

STANDARD PLAN M-40.30-00

SHEET 1 OF 1 SHEET

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

NOTE

DIVIDED HIGHWAY

THREE EQUAL SPACES WHEN R < 75'

FOUR EQUAL SPACES WHEN R ≥ 75'

100' DECELERATION TAPER

R

200'

500'

100 (TYP.)

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</tr>
<tr>
<td>G2</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

UNDIVIDED HIGHWAY

WITHOUT ILLUMINATION

GUIDE POST PLACEMENT
GRADE INTERSECTIONS

STANDARD PLAN M-40.30-00

SHEET 1 OF 1 SHEET

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

NOTE

DIVIDED HIGHWAY

THREE EQUAL SPACES WHEN R < 75'

FOUR EQUAL SPACES WHEN R ≥ 75'

100' DECELERATION TAPER

R

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500'

100 (TYP.)

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</tr>
<tr>
<td>G2</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

UNDIVIDED HIGHWAY

WITHOUT ILLUMINATION

GUIDE POST PLACEMENT
GRADE INTERSECTIONS

STANDARD PLAN M-40.30-00

SHEET 1 OF 1 SHEET

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

NOTE
GUIDE POST SPACING

<table>
<thead>
<tr>
<th>RADIUS (FEET)</th>
<th>S (FEET)</th>
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</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>
<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>2,300</td>
<td>140</td>
</tr>
<tr>
<td>3,000</td>
<td>160</td>
</tr>
<tr>
<td>3,700</td>
<td>180</td>
</tr>
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<td>4,500</td>
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</tr>
<tr>
<td>5,300</td>
<td>220</td>
</tr>
<tr>
<td>6,500</td>
<td>240</td>
</tr>
<tr>
<td>7,600</td>
<td>260</td>
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<tr>
<td>8,800</td>
<td>280</td>
</tr>
<tr>
<td>10,000</td>
<td>300</td>
</tr>
<tr>
<td>20,000</td>
<td>600</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

GUIDE POST PLACEMENT
HORIZONTAL CURVES

STANDARD PLAN M-40.40-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
NOTES

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

MEDIAN CROSSES

LANE REDUCTIONS

LEGEND

CROSSOVER

TAPER

NOTE
IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START 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.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

SHOULDER RUMBLE STRIP
TYPE 1
FOR DIVIDED HIGHWAYS
STANDARD PLAN M-60.10-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
TYPICAL SHOULDER INSTALLATION

UNIT SECTION A

UNIT SECTION B

SHOULDER

SHOULDER RUMBLE STRIP

SHOULDER

EDGE LINE

SHOULDER

EDGE LINE

SHOULDER RUMBLE STRIP

SHOULDER

EDGE LINE

SHOULDER RUMBLE STRIP

TYPICAL SHOULDER INSTALLATION

ISOMETRIC VIEW

UNIT SECTION

UNIT SECTION

SHOULDER

SHOULDER RUMBLE STRIP

SHOULDER

EDGE LINE

SHOULDER

EDGE LINE

SHOULDER RUMBLE STRIP

PERSPECTIVE VIEW

UNDIVIDED HIGHWAY
(TYPE 4 PATTERN SHOWN)
SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4 FOR UNDIVIDED HIGHWAYS

STANDARD PLAN M-60.20-02

SHOULDER TAPER DETAIL

1) NOT LESS THAN 4" - PROVIDE 5" WHEN BARRIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGE APPROACH SLABS

100' MIN.

60' MIN.

60' MIN.

100' MIN.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

40' MIN.

40' MIN.

TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER.

MAJOR ROAD

TERMINATE SHOULDER RUMBLE STRIPS 40' MINIMUM FROM THE BEGINNING OR END OF EACH RIGHT TURN RADIUS.

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

EDGE OF PAVED SHOULDER - EPS

SHOULDER RUMBLE STRIPS

EDGE Line

EPS

SHOULDER

SHOULDER TAPER DETAIL

STRUCTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH

50' MIN.

40' MIN.

40' MIN.

40' MIN.

40' MIN.
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.
INTERSECTION WITH LEFT TURN CHANNELIZATION

RECESS LENGTH

REFER TO STANDARD PLAN M-20.30 FOR RECESSED PAVEMENT MARKER DETAIL

RECESSED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

RAISED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

INSTALL RUMBLE STRIP AT BEGINNING AND END OF APPROACH OR INTERSECTION

RUMBLE STRIP USAGE AS DIRECTED BY ENGINEER

LONGITUDINAL MARKING (TYP.)

TERMINATE RUMBLE STRIP AT BEGINNING AND END OF APPROACH OR INTERSECTION

RADIUS POINT (TYP.)

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP
STANDARD PLAN M-65.10-02
SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR EVIDENCE OF COMPLIANCE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

LOW-SPEED APPLICATION

TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

LOW-SPEED APPLICATION

NOTE

1. Typically, four times the letter or numeral height = minimum,
   up to ten times = maximum, or according to Plans.

TRAFFIC LETTER AND NUMERAL APPLICATIONS
STANDARD PLAN M-80.10-01
SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

DIAGRAM
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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPRESS AUGUST 5, 2009

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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