Standard Plans

M 21-01

August 3, 2015

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Washington State Department of Transportation
Engineering and Regional Operations
Development Division, Design Office
PO Box 47329
Olympia, WA 98504-7329

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Foreword

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

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

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/s/Jeff Carpenter

Jeff Carpenter
State Design Engineer
Comments

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<td>Longitudinal Marking Substitution with RPM's</td>
<td>6/3/11</td>
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<tr>
<td>M-24.20-02</td>
<td>Symbol Markings ~ Traffic Arrows for High Speed Roadways</td>
<td>4/20/15</td>
<td>3 Sheets</td>
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<tr>
<td>M-24.40-02</td>
<td>Symbol Markings ~ Traffic Arrows for Low Speed Roadways</td>
<td>4/20/15</td>
<td>2 Sheets</td>
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<td>M-24.50-00</td>
<td>Roundabout Traffic Arrows</td>
<td>6/16/11</td>
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<td>M-24.60-04</td>
<td>Symbol Markings Miscellaneous</td>
<td>6/24/14</td>
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<td>M-40.10-03</td>
<td>Guide Posts and Barrier Delineators</td>
<td>6/24/14</td>
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<td>M-40.20-00</td>
<td>Guide Post Placement Interchanges</td>
<td>10/12/07</td>
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<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>
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<td>M-40.50-00</td>
<td>Guide Post Placement Bridges</td>
<td>9/20/07</td>
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<td>M-40.60-00</td>
<td>Guide Post Placement Miscellaneous</td>
<td>9/20/07</td>
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## Contents

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<thead>
<tr>
<th>Plan No.</th>
<th>Plan Title</th>
<th>Publication Approval Date</th>
<th>Approval Date</th>
<th>Pages</th>
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<tr>
<td>M-60.10-01</td>
<td>Shoulder Rumble Strip Type 1 for Divided Highways</td>
<td>6/3/11</td>
<td>4 Sheets</td>
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<td>M-60.20-02</td>
<td>Shoulder Rumble Strip, Types 2, 3, and 4, for Undivided Highways</td>
<td>6/27/11</td>
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<td>Centerline Rumble Strip</td>
<td>5/11/11</td>
<td>2 Sheets</td>
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<td>M-80.10-01</td>
<td>Traffic Letter and Numeral Applications</td>
<td>6/3/11</td>
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<td>M-80.20-00</td>
<td>Traffic Letters and Numerals (High Speed Roadways)</td>
<td>6/10/08</td>
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<td>6/10/08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ALIGNMENT STAKE
STAKE EVERY 100 FEET ON TANGENTS, EVERY 25 FEET ON CURVES

CLEARING/GRUBBING (C&G) LATH
STAKE AT EACH FULL STATION, 100 FEET ON TANGENTS, EVERY 25 FEET ON CURVES. NO HUB NECESSARY.

OFFSET FROM SLOPE STAKE CATCH (10 FEET)
FILL AT RP STAKE (1.2 FEET)
CUT AT CATCH POINT (BACK OF DITCH)
DISTANCE FROM C TO CATCH POINT (27.6 FEET)
SIDE SLOPE RATIO (2H:1V)
BACK OF DITCH

LATH FOR SLOPE REFERENCES

CUT TO BACK OF DITCH (2.2 FEET)
DISTANCE FROM C TO CATCH (BACK OF DITCH) (23.3 FEET)
SIDE SLOPE RATIO (4H:1V)
BACK OF DITCH

SLOPE STAKE

DAYLIGHT CATCH (CUT 0.0 FEET)
FILL (0.1 FEET)
SIDE SLOPE TO A 2% ROADWAY SLOPE (5H:1V)
DISTANCE FROM C (18.2 FEET)

STANDARD PLAN A-10.10-00

SURVEY STAKES

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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).

1/32" SECTION OF GROOVE FOR 1/4" LETTERS

1/32" SECTION OF GROOVE FOR 3/16" LETTERS

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

GROUND LINE

SECTION A

SECTION B

SECTION C

SECTION VIEW

LEDGE ROCK, CONCRETE, OR ASPHALT INSTALLATION

GENERAL INSTALLATION

SURVEY MONUMENT TYPES 1 AND 2

STANDARD PLAN A-10.20-00

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

12/24/07
### CONCRETE BASE

### SOIL

### GROUT

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

### SECTION A

### INSTALLATION

### PLAN VIEW

### 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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 1/2&quot; Diam.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8&quot; Diam.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6&quot; Diam.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 3/4&quot; R.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/4&quot; R.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 3/4&quot; R.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SECTION RISER RING

### SECTION COVER

### SECTION OF LETTER

### APPROXIMATE WEIGHTS

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

### NOTES

1. Dimensions may vary according to manufacturer.
2. Base to be placed on a well compacted foundation.
3. Monument case to be installed by contractor.

### EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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: CUT 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>L = 10.0’</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L = 5.0’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+2:1</td>
<td>0.5’</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+3:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>+4:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>+5:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>+6:1</td>
<td>1.5’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-2:1</td>
<td>0.5’</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>-3:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-4:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-5:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-6:1</td>
<td>1.5’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>1.5:1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>± LEVEL</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>± +6:1</td>
<td>2.0’</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>± -6:1</td>
<td>2.0’</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>± -3:1</td>
<td>3.0’</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>± +3:1</td>
<td>0.5’</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>± +4:1</td>
<td>0.5’</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>± +6:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>± -3:1</td>
<td>1.5’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>± +3:1</td>
<td>0.5’</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>± +4:1</td>
<td>0.5’</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>± +6:1</td>
<td>1.0’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>± -3:1</td>
<td>1.5’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>± +6:1</td>
<td>1.2’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>± -3:1</td>
<td>1.2’</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>± +6:1</td>
<td>1.5’</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

SLOPE TREATMENT NOT REQUIRED
10 GAGE 6" x 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE
(SEE STD. SPEC. 8407)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

BOTTOME EDGE OF SLOPE PROTECTION FOLLOWS BOTTOM OF DITCH

EDGE OF SHOULDER

FOOTING

SECTION A

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

IMBANKMENT SLOPE

EXISTING SOIL

SECTION B

EXTEND SLOPE PROTECTION 8' BEYOND OUTER EXTREMEITY OF BRIDGE

OUTER EXTREMEITY OF BRIDGE

EQUAL SPACING 6' CENTERS MIN. 8' CENTERS MAX.

PLAN

FOOTING

DUMMY JOINT (TYP.)
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>
<thead>
<tr>
<th>Maximum Anchor Spacing (A)</th>
<th>H</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>0' - 100'</td>
<td>50'</td>
<td></td>
</tr>
<tr>
<td>100' - 200'</td>
<td>35'</td>
<td></td>
</tr>
<tr>
<td>200' - 300'</td>
<td>25'</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Length - Top Horizontal Support Rope (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
</tr>
<tr>
<td>50'</td>
</tr>
<tr>
<td>100'</td>
</tr>
<tr>
<td>200'</td>
</tr>
<tr>
<td>300'</td>
</tr>
</tbody>
</table>

SLOPE PROTECTION ANCHOR - SEE STANDARD PLAN A-30.35.

NOTES

- 3/4" Diam. 6x19 IWRC GALVANIZED TOP HORIZONTAL SUPPORT ROPE
- MAXIMUM LENGTH OF TOP HORIZONTAL SUPPORT ROPE = B
- MAXIMUM ANCHOR SPACING = A

SEAM ALTERNATIVES

- 2" FABRIC OVERLAP
- 3" FABRIC OVERLAP
- 3" SPACING
- OVERLAPPED SEAM WITH FASTENERS
- OVERLAPPED SEAM WITH LACING

ELEVATION

SECTION VIEW

WIRE MESH SLOPE PROTECTION

STANDARD PLAN A-30.30-01

WIRE ROPE CLIP (TYP.)

THIMBLE (SEE NOTE 4)

DEAD END (SEE NOTE 3)

LIVE END (SEE NOTE 3)

DISTANCES X, Y, Z AND TORQUE TO COMPLY WITH MANUFACTURER'S SPECIFICATIONS

WIRE ROPE DETAIL

TO BE DETERMINED BY ENGINEER
**TYPE 1**  
**DEADMAN (FOR USE IN SOIL)**

- Ground line  
- Native backfill  
- Reinforced concrete post - 12" x 12" x 66" Place wire rope at center of post  
- #3 Bar (TYP.) - four required  
- Wire rope clip (TYP.)

**TYPE 2**  
**DEADMAN (FOR USE IN SOIL)**

- Ground line  
- Native backfill  
- Reinforced concrete post - 10' - 12" min. Place wire rope at center of post  
- #3 Bar (TYP.) - four required  
- Wire rope clip (TYP.)

**TYPE 3**  
**DRILLABLE - GROUTABLE (FOR USE IN ROCK OR SOIL)**

- Hollow core threaded bar  
- Sacrificial drill bit  
- CEMENT GROUT  
- Wire rope clip (TYP.)

**TYPE 4**  
**MECHANICAL ANCHOR (FOR USE IN SOIL)**

- #3 bar (TYP.) - four required  
- Reinforced concrete post - 12" x 12" x 66" Place wire rope at center of post  
- Wire rope clip (TYP.)

**TYPE 5**  
**MECHANICAL ANCHOR (FOR USE IN SOIL)**

- Hex nut  
- Steel bearing plates  
- Thimble  
- CEMENT GROUT  
- Wire rope clip (TYP.)

**NOTES**

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

**SLOPE PROTECTION ANCHORS**

**STANDARD PLAN A-30.35-00**

**EFFECTIVE:** AUGUST 3, 2015 TO July 31, 2016
NOTES

1. The "U" shape or "V" shape are both acceptable.
2. Wire sizes shown are minimum required.
3. All wire intersections are to be welded.
4. Basket must be firmly attached to existing or new base.
5. Dowels and Tie Bars shall be held firmly in the above welded assembly.
6. Do not clip Spreader Wires.

DOWEL BAR BASKETS

STANDARD PLAN A-40.00-00
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>
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<tbody>
<tr>
<td>A</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>B</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>C</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td>—</td>
<td>&gt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>D</td>
<td>GRATE INLET, CATCH BASIN OR CONCRETE INLET *</td>
<td>—</td>
<td>USE</td>
<td>&lt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>E</td>
<td>GRATE INLET, CATCH BASIN OR CONCRETE INLET *</td>
<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

- **Section A**: ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
- **Section B**: ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER

CONTINUOUS VERTICAL FACE THROUGH THE PAVED SECTION

**PLAN**

**TYPICAL APPLICATIONS**

- ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
- EDGES, FLANGES OR LIPS IN PAVEMENT SECTION
- CONTINUOUS VERTICAL FACE THROUGH THE PAVED SECTION

**PCC PAVEMENT ISOLATION JOINTS**

STANDARD PLAN A-40.15-00

**SHEET 2 OF 2 SHEETS**

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

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

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

3. The Contractor shall avoid sawcutting concrete at all locations. For Details 1 and 2, the construction tolerance to locate the sawcut is 1/4 inch (0 min. to 1/2 inch max.) from the concrete.

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

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

2. Longitudinal joints shall be placed on lane lines and shall be constructed and sealed in accordance with Standard Specification Section 6-05.3(B). Joints may be either a sawcut crack control joint or a construction joint. Sawcut joints shall terminate 1'-0" before reaching edge of slab and must be sawcut as soon as possible after placement of concrete.

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

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

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

LONGITUDINAL SECTION

- Cracked surfacing base course - compacted depth of 0.20 (ft) or match depth of roadway section
- See Dowel Bar Detail for Cement Concrete Pavement or HMA Roadway Joint Detail
- See Standard Plan A-40.20 (Detail 5) for Joint Details

BENDING DIAGRAM

- Varies
- 1'-0"
- 6'-0"
- 7'-3/4"

- = Epoxy coated reinforcing steel
- (All dimensions are out to out)

= Bars shall be placed with the bars along each edge of bridge approach slab having a traffic barrier

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Washington State Department of Transportation

Dec 23 2014 1:57 PM

Bijan Khaleshi

FOR LOCAL AGENCY USE ONLY

Dec 18 2014 5:06 PM
EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

DRAWN BY: PERN LUCIN

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**BRIDGE APPROACH SLAB**

**WIRE ROPE LOOPS**

- SEE STANDARD PLAN C-6

**OMIT TAPERED BARRIER TOE**

**EDGE OF SHOULDER (CURB LINE)**

**CONCRETE BARRIER TRANSITION TYPE 2**

- TO BRIDGE F-SHAPE - SEE STD. PLAN C-8F

**PRECAST CONCRETE BARRIER**

- TYPE 2 (ANCHORED)

**CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER**

**SINGLE SLOPE CONCRETE BARRIER**

- (DUAL FACE)

**THREE #9 (EPOXY COATED) BARS**

- SEE STD. PLAN C-14a

**EDGE OF SHOULDER (CURB LINE)**

**1 1/4" PVC CONDUIT SLEEVE**

**EDGE OF EMBANKMENT WIDENING**

**EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL**

**STANDARD PLAN A-50.20-01**

**PLAN**

- WITH UNRESTRAINED BARRIER

- WITH ANCHORED BARRIER
CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER

EMBANKMENT WIDENING AT BRIDGE END WITH "L" SHAPED ABUTMENT
STANDARD PLAN A-50.30-00
1. Install tie bars across longitudinal joints between new panels (complete and partial) and existing cement concrete pavement lane or shoulder when four or more adjacent panels are replaced. Place new tie bars between existing tie bars. Tie bars are not installed between cement concrete pavement and hot mix asphalt shoulders.

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

3. Place new dowel bars between existing dowel bars. The 1" - 0" dimension from the edge of the panel may be increased by 8" (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).
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.

ELEVATION VIEW

HMA OVERLAY WITHOUT BRIDGE APPROACH SLAB

ELEVATION VIEW

HMA OVERLAY WITH BRIDGE APPROACH SLAB
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'-0" 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.
NOTE
1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.

2. The knockout 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.

FRAME AND VANED GRATE

ONE #3 BAR FOR 6' HEIGHT INCREMENT (SPACED EQUALLY)

RECTANGULAR ADJUSTMENT SECTION

#3 BAR EACH CORNER

#3 BAR HOOP EACH SIDE

#3 BAR EACH WAY

FRAME AND VANED GRATE

PIECE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER</th>
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<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
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<tr>
<td>ALL METAL PIPE</td>
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<td>PROFILE WALL PVC (STD. SPEC. 9-05.20)</td>
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</tr>
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</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

CATCH BASIN TYPE 1

STANDARD PLAN B-5.20-01
### PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
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</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 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 6'.

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

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

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

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

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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PIECE ALLOWSANCES

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<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE PROFILE</th>
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CATCH BASIN TYPE 2

STANDARD PLAN B-10.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**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 6”.

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

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

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

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

7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 26 and ASTM B 275, designation ZG32A; or cast iron in accordance with ASTM A 48, Class 30B.

   - 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.

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

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

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>
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MANHOLE TYPE 1
STANDARD PLAN B-15.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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

MANHOLE DIMENSION TABLE

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MANHOLE TYPE 2
STANDARD PLAN B-15.40-01
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.
3. No steps are required when height is 4' or less.

**MANHOLE DIMENSION TABLE**

<table>
<thead>
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<th>DIAM.</th>
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**MANHOLE TYPE 3**

**STANDARD PLAN B-15.60-01**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE:** AUGUST 3, 2015 TO July 31, 2016
CIRCULAR FRAME (RING) - SEE STANDARD PLAN B-20.70

CIRCULAR GRATE - SEE STANDARD PLAN B-20.80

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

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

ADJUSTMENT SECTION (TYP.)

GROUND LINE

UNDISTURBED SOIL

NATIVE BACKFILL

UNDERGROUND DRAINAGE
GEOTEXTILE, MODERATE
SURVIVABILITY, CLASS A

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

DISTANCE VARIES
SEE CONTRACT

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

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.

PLAN VIEW

DRAWN BY: D. W. LUGDAN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE: 6/30/17

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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 6" 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 18" - 2" use 72" x 8" Alternative Precast Footing.
4. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.
NOTES

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

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

3. Attach the hood to the frame with two 3/4" x 2" hex head bolts, nuts, and oversized 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 05.15(2) for additional requirements.

6. This plan is intended to show the installation details of a manufactured product. This plan is not intended to show the specific details necessary to fabricate the castings depicted in this drawing.
NOTES

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

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

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

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

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

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

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

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

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

3. Refer to Standard Specification 9-05.15(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 \( \frac{5}{8}'' \times 11 \) NC x 2" Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

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

3. Refer to Standard Specification 9-05 (1)(1) 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 capabil ity is requi r ed 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 x 2" Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

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

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

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

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

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

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

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

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

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

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

CIRCULAR FRAME (RING) AND COVER

STANDARD PLAN B-30.70-03

ISOMETRIC VIEW
NOTES
1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-20.20 and B-20.60.
Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 189.

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

1. The Steel Angles shall be set so that each bearing bar of 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.


---

**Detailed Diagram and Table**

**Table: Bar List**

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>QTY.</th>
<th>SIZE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>3</td>
<td>5&quot; - 9&quot;</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>2</td>
<td>12&quot; - 5&quot;</td>
<td>STRAIGHT</td>
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<tr>
<td>③</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
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<td>7&quot; - 2&quot;</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>2</td>
<td>2&quot; - 9&quot;</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>WALL</td>
<td>4</td>
<td>9&quot; - 1&quot;</td>
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<tr>
<td>⑥</td>
<td>SIDE WALL</td>
<td>3</td>
<td>14&quot; - 6&quot;</td>
<td>HOOP</td>
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<tr>
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<td>UNIT H</td>
<td>2</td>
<td>14&quot; - 2&quot;</td>
<td>HOOP</td>
</tr>
<tr>
<td>⑧</td>
<td>UNIT J</td>
<td>2</td>
<td>14&quot; - 2&quot;</td>
<td>HOOP</td>
</tr>
<tr>
<td>⑨</td>
<td>UNIT K</td>
<td>3</td>
<td>6&quot; - 9&quot;</td>
<td>HOOP</td>
</tr>
<tr>
<td>⑩</td>
<td>SIDE WALL</td>
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<td>2&quot; - 8&quot;</td>
<td>STRAIGHT</td>
</tr>
<tr>
<td>⑪</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
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<td>7&quot; - 5&quot;</td>
<td></td>
</tr>
<tr>
<td>⑫</td>
<td>BOTTOM SLAB AND SIDE WALL</td>
<td>3</td>
<td>6&quot; - 0&quot;</td>
<td></td>
</tr>
<tr>
<td>⑬</td>
<td>SIDE WALL</td>
<td>4</td>
<td>14&quot; - 0&quot;</td>
<td>HOOP</td>
</tr>
</tbody>
</table>

**Bending Diagram**

- **5 1/2" x 3 3/8" STEEL ANGLES (3 BOTH ENDS)**
- **4" x 3" x 3/8" STEEL ANGLES (3 BOTH ENDS)**
- **4" x 3" x 3/8" STEEL ANGLES (3 BOTH ENDS)**
- **5 1/2" x 1 1/2" x 14" STEEL ANGLES (3 BOTH ENDS)**

---

**Effective Dates:**

- Effective: August 3, 2015 to July 31, 2016

---

**Contractor:**

- Matthew J. Winning

**Date:**

- Expires July 1, 2007

---

**Approval for Publication:**

- 6-8-06
WELDED GRATES
FOR GRATE INLET

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)
1. The Contract may specify a rotated inlet installation. Orient the Grates in the Frame so they intercept flow.

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

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

4. Frame and Grates shall be Ductile Iron.
NOTES
1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median.
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 with 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 34 1/2" Steel Plate (Typ.)

Optional 1" max. VENT holes on bottom for Galvanizing

Optional 3 1/2" x 1/2" x 34 1/2" Steel Plate (Typ.)

Grind Top and Bottom flush after welding

Grates for drop inlet

Standard Plan B-50.20-00

Type 1

Type 2

Type 3

Effective: August 3, 2015 to July 31, 2016
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.

Pennsylvania Department of Transportation

CLEARANCE BETWEENPIPES FOR MULTIPLE INSTALLATIONS

<table>
<thead>
<tr>
<th>PIPE</th>
<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCULAR PIPE (DIAMETER)</td>
<td>12&quot; to 24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td></td>
<td>30&quot; to 96&quot;</td>
<td>DIAM./2</td>
</tr>
<tr>
<td></td>
<td>102&quot; to 180&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>PIPE ARCH (SPAN)</td>
<td>18&quot; to 36&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>METAL ONLY</td>
<td>43&quot; to 142&quot;</td>
<td>SPAN/3</td>
</tr>
<tr>
<td></td>
<td>148&quot; to 200&quot;</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

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

EXPRES JUL 1, 2007

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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.
COUPLING BAND DIMENSION TABLE

<table>
<thead>
<tr>
<th>BAND</th>
<th>CORRUGATION PITCH x DEPTH</th>
<th>PIPE DIAM.</th>
<th>MIN. W</th>
<th>GASKET TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>2 2/3 x 1/2 OR 3 x 1</td>
<td></td>
<td></td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
<td>12 - 84</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>90 - 144</td>
<td></td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2 OR 3 x 1</td>
<td></td>
<td></td>
<td>O-RING</td>
</tr>
<tr>
<td></td>
<td>REFORMED TO 2 2/3 x 1/2</td>
<td></td>
<td>12 - 84</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BUTYL</td>
</tr>
<tr>
<td>J</td>
<td>2 2/3 x 1/2</td>
<td>12 - 48</td>
<td>2 3/4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>2 2/3 x 1/2</td>
<td>12 - 48</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>* 3 x 1</td>
<td>54 - 144</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2 2/3 x 1/2</td>
<td>36 - 60</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>* 3 x 1</td>
<td>66 - 108</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2</td>
<td>12 - 48</td>
<td>10 1/2</td>
<td>O-RING</td>
</tr>
<tr>
<td></td>
<td>* 3 x 1</td>
<td>54 - 96</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

* PIPE ARCH ONLY

EXPIRED JUN 1, 2007

COUPLING BANDS FOR CORRUGATED METAL PIPE

STANDARD PLAN B-60.40-00

SHEET 1 OF 1 SHEET
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.

**Notes**

**Allowable Heights of Cover**

<table>
<thead>
<tr>
<th>Span</th>
<th>Rise</th>
<th>12-Gage Thick Corrugated Metal</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>MAX</td>
<td></td>
</tr>
<tr>
<td>6'-8&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>
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</table>

**Rise**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>HEIGHT OF CORNER PLATE</td>
<td>R = 26 1/4</td>
</tr>
<tr>
<td>R = 50 3/8'</td>
<td>R = 26 1/4</td>
</tr>
</tbody>
</table>

**Section**

**Notes**

**Effective:** August 3, 2015 to July 31, 2016

**ANIMAL UNDERPASS**

**Standard Plan B-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.

### HEADWALL - BOTH ENDS

- SEE STD. SPEC. 7-03.3(4)

### ALLOWABLE HEIGHTS OF COVER

<table>
<thead>
<tr>
<th>CORRUGATED METAL THICKNESS</th>
<th>12 GAGE</th>
<th>10 GAGE</th>
<th>8 GAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN.</td>
<td>MAX.</td>
<td>MIN.</td>
<td>MAX.</td>
</tr>
<tr>
<td>12' - 2&quot;</td>
<td>3'</td>
<td>14'</td>
<td>3'</td>
</tr>
<tr>
<td>12' - 11&quot;</td>
<td>3'</td>
<td>13'</td>
<td>3'</td>
</tr>
<tr>
<td>13' - 10&quot;</td>
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<td>4'</td>
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<td>14' - 1&quot;</td>
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<td>4'</td>
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<tr>
<td>14' - 10&quot;</td>
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<td>15' - 9&quot;</td>
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<tr>
<td>20' - 9&quot;</td>
<td>4'</td>
<td>8'</td>
<td>4'</td>
</tr>
</tbody>
</table>

### EQUIPMENT UNDERPASS

**STANDARD PLAN B-65.40-00**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))

THERMOPLASTIC PIPE

CONCRETE PIPE

METAL PIPE

4H:1V OR STEEPER

4" MAX.

4H:1V OR STEEPER

4" MAX.

NOTES
1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4H:1V. When slopes are between 4H:1V and 6H:1V, shape the slope in the vicinity of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.
2. Field cutting of culvert ends is permitted when approved by the Engineer. All field-cut culvert pipe shall be treated with treatment as shown in the Standard Specifications or General Special Provisions.

FOR CULVERTS 30" DIAMETER OR LESS

EXPIRES JULY 1, 2007

BEVELED END SECTIONS

STANDARD PLAN B-70.20-00
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".

HEADWALLS FOR CULVERT PIPE AND UNDERPASS

STANDARD PLAN B-75.20-01

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
HEADWALL
SEE DETAIL

STEEL PLATE
SEE DETAIL

FIELD CUT CULVERT TO MATCH BLOCKOUT IN HEADWALL

TOP VIEW
CULVERT IS PERPENDICULAR TO ROADWAY

1" X 4" SLOT WITH 2" HOLE AT BOTTOM
(TYP.)

CULVERT PIPE OR PIPE ARCH
SEE NOTE 3

PLACED RESIN BONDED ANCHORS
IN FULL DEPTH CONCRETE
(TYP.)
SEE NOTE 4

SLOPE TO MATCH SIDE SLOPE
HEADWALL - COMMERCIAL CONCRETE

STEEL PLATE DETAIL

STEEL PLATE
SEE DETAIL

ISOMETRIC VIEW

NOTCH BOTTOM OF CULVERT PIPE TO ALLOW ANCHOR/Socket
PLACEMENT (TYP.)

CULVERT DIAM.
NUMBER OF BARS
REQUIRED

UP TO 36"
NONE

42" - 60"
1

66" - 90"
2

96" - 120"
3

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

2. Safety Bars shall be 4" extra strong steel pipe (4 1/2" O.D.), or 4 1/2" O.D. (250"
wall thickness) steel tubing. Length (20' maximum) shall be the minimum re-
quired 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.
FINISHED GROUND

CULVERT CROWN

FIELD CUT PIPE BEVEL

CULVERT INVERT

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.

[Diagram showing the front view, side view, isometric view, and sections A, B, and C of the culvert installation.]
**NOTES**

1. All pipes or pipe arches shall be attached as shown in CONNECTOR DETAIL.

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

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

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

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

---

**METAL END SECTIONS FOR CIRCULAR PIPES**

<table>
<thead>
<tr>
<th>PIPE DIAM (INCHES)</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
<th>OVERALL WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>0.109</td>
<td>A H W</td>
<td>L L</td>
</tr>
<tr>
<td>42</td>
<td>0.109</td>
<td>12 12 9 46</td>
<td>66 124 156</td>
</tr>
<tr>
<td>48</td>
<td>0.109</td>
<td>12 16 12 48 80</td>
<td>66 152 228</td>
</tr>
<tr>
<td>54</td>
<td>0.109</td>
<td>12 16 12 60 92</td>
<td>92 176 264</td>
</tr>
<tr>
<td>60</td>
<td>0.109</td>
<td>12 16 12 66 98</td>
<td>98 200 300</td>
</tr>
</tbody>
</table>

**METAL END SECTIONS FOR ARCHED PIPES**

<table>
<thead>
<tr>
<th>EQUIV. SPAN (IN)</th>
<th>PIPE ARCH DIMENSIONS</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
<th>OVERALL WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>1.35</td>
<td>0.079</td>
<td>A H W</td>
<td>L L</td>
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<tr>
<td>36</td>
<td>1.35</td>
<td>0.079</td>
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<td>66 124 156</td>
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<td>92 176 264</td>
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<td>1.35</td>
<td>0.079</td>
<td>12 16 12 66 98</td>
<td>98 200 300</td>
</tr>
<tr>
<td>60</td>
<td>1.35</td>
<td>0.079</td>
<td>12 16 12 66 98</td>
<td>98 200 300</td>
</tr>
</tbody>
</table>

*SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36".*
**NOTES**

1. As an alternative connection on 15" through 24" pipe, a 1" wide strap of 16 gage or 12 gage galvanized steel, fastened with a 1/2" diam., 6" long galvanized bolt and square head nut, may be used.

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

**METAL END SECTIONS FOR CIRCULAR PIPES**

<table>
<thead>
<tr>
<th>Pipe Dia. (Inches)</th>
<th>Overall Width</th>
<th>Min. Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>L</td>
</tr>
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<td>15</td>
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<td>0.64</td>
<td>16</td>
</tr>
<tr>
<td>21</td>
<td>0.64</td>
<td>16</td>
</tr>
<tr>
<td>24</td>
<td>0.64</td>
<td>16</td>
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<tr>
<td>30</td>
<td>1.09</td>
<td>12</td>
</tr>
<tr>
<td>36</td>
<td>1.09</td>
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<tr>
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<td>48</td>
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</tr>
<tr>
<td>60</td>
<td>1.09</td>
<td>12</td>
</tr>
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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>Min. Thickness</th>
<th>Overall Width</th>
<th>Dimensions (Inches)</th>
<th>L</th>
</tr>
</thead>
<tbody>
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<td>16</td>
<td>8</td>
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<td>71</td>
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<tr>
<td>72</td>
<td>83</td>
<td>57</td>
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<td>16</td>
</tr>
</tbody>
</table>
CONCRETE SIDEWALK

PLANTING STRIP

CONCRETE CURB

ROADWAY

INVERT OF DRAIN SHALL BE AT OR ABOVE GUTTER LINE

CONCRETE CURB TYPE MAY VARY

WIRE MESH REINFORCEMENT

4" x 4" W4.0 x W4.0 (4 GAGE)

4" x 4" W2.9 x W2.9 (6 GAGE)

(SEE STD. SPEC. 9-07.7)

1/2" MINIMUM COVER

WIRE MESH

4" DRAIN PIPE CAPPED AT EDGE OF RW

4" DRAIN PIPE

DUMMY JOINT

PLANTING STRIP

CONCRETE SIDEWALK

SECTION A

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

24" RAW LINE

24' RAW LINE

CONCRETE SIDEWALK

(REINFORCEMENT NOT SHOWN)

(EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016)

RESIDENTIAL STORM DRAIN, UNDER SIDEWALK

STANDARD PLAN B-82.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

6/1/06

EXPIRES JULY 1, 2007

MATTHEW J. WICKEL

STATE HIGHWAY ENGINEER

6/1/06

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
45° BEND

4" OR 6" SEWER PIPE
(SEE CONTRACT)

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

SEWER MAIN

TEE

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

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

1/2" RAISED SQUARES, 3/4" APART, 1/8" HIGH

PLAN

SECTION A
CAST IRON RING AND COVER

FOR SANITARY SEWER USE

8 INCH SEWER CLEAN-OUT

STANDARD PLAN B-85.40-00

SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**SECTION A**

**SECTION B**

---

**Ductile Iron Drop Connection**

**Concrete Encased Drop Connection**

- **D.I.P. Tee Clearance 2"**
- **Flexible Joint**
- **Backfill with compacted material as directed by Engineer**
- **Commercial Concrete Block - poured in place**
- **D.I.P. 90° Bend Clearance 2"**
- **1/2 Blind Flange as Dam**
- **Mortar Dam or Plug as required by Engineer**

---

**FOR SANITARY SEWER USE**

**STANDARD PLAN B-85.50-01**

**Sheet 1 of 1 Sheet**

**Approved for Publication**

**Washington State Department of Transportation**

**Effective: August 3, 2015 to July 31, 2016**
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**

**PROPERTY LINE**

**36” MIN. (UNLESS DIRECTED OTHERWISE)**

**LENGTH OF LOWER BARREL TO SUIT TRENCH DEPTH**

**15 POUND ASPHALTIC FELT**

**6 CUBIC FEET MIN. GRAVEL POCKET**

**12” X 12” X 4” MIN. CONCRETE BLOCK**

**MECHANICAL JOINT WITH TIE ROD LUGS**

**12” X 12” X 4” MIN. CONCRETE BLOCK**

**ELEVATION**

**TYPE A**

**ELEVATION**

**TYPE B**

**HYDRANT SETTING TYPES A AND B**

**STANDARD PLAN B-90.10-00**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

**June 8, 2006**

**EXPRES JULY 1, 2007**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
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.
GALVANIZED OUTLET PIPE SHALL BE SAME SIZE AS INLET PIPE WITH BEEHIVE STRAINER AND OUTLET

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

<table>
<thead>
<tr>
<th>SIZE</th>
<th>TEST PRESSURE (PSI)</th>
<th>THRUST AT FITTINGS IN POUNDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>TEE AND DEAD ENDS</td>
<td>90° BEND</td>
<td>45° BEND</td>
</tr>
<tr>
<td>4&quot;</td>
<td>250</td>
<td>3,140</td>
</tr>
<tr>
<td>6&quot;</td>
<td>250</td>
<td>7,070</td>
</tr>
<tr>
<td>8&quot;</td>
<td>250</td>
<td>12,565</td>
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</table>

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>SAFE BEARING LOAD (PSF)</th>
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</thead>
<tbody>
<tr>
<td>MUCK, PEAT, ETC.</td>
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<tr>
<td>SOFT CLAY</td>
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</tr>
<tr>
<td>SAND</td>
<td>2,000</td>
</tr>
<tr>
<td>SAND AND GRAVEL</td>
<td>3,000</td>
</tr>
<tr>
<td>SAND AND GRAVEL CEMENTED WITH CLAY</td>
<td>4,000</td>
</tr>
<tr>
<td>HARD SHALE</td>
<td>10,000</td>
</tr>
</tbody>
</table>

**NOTES**

**CONCRETE THRUST BLOCK**

*STANDARD PLAN B-90.40-00*

*WASHINGTON STATE DEPARTMENT OF TRANSPORTATION*
TWO TIE RODS WITH TURNBUCKLES

THREAD 6"

BLOCKING FOR 11.25° OR 22.5° VERTICAL BENDS

FOUR TIE RODS WITH TURNBUCKLES

THREAD 6"

BLOCKING FOR 45° VERTICAL BENDS

<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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</thead>
<tbody>
<tr>
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<td>250</td>
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<td>5/8&quot;</td>
<td>17&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.5°</td>
<td>12</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>45°</td>
<td>22</td>
<td>2.8</td>
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<td></td>
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<tr>
<td>6&quot;</td>
<td>250</td>
<td>11.25°</td>
<td>14</td>
<td>2.4</td>
<td>5/8&quot;</td>
<td>17&quot;</td>
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<td></td>
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<td>3.0</td>
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<tr>
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<td>2.9</td>
<td>5/8&quot;</td>
<td>17&quot;</td>
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<tr>
<td></td>
<td></td>
<td>22.5°</td>
<td>48</td>
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</tr>
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<td>89</td>
<td>4.5</td>
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<td></td>
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<tr>
<td>10&quot;</td>
<td>250</td>
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<td>38</td>
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<tr>
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<tr>
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<td></td>
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<td>5.8</td>
<td>7/8&quot;</td>
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<tr>
<td></td>
<td></td>
<td>45°</td>
<td>355</td>
<td>7.1</td>
<td>1 1/8&quot;</td>
<td>30&quot;</td>
</tr>
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</table>

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

- **Median Barrier (Single Slope Concrete Barrier Shown)**
  - See Section Below for Use with Concrete Barrier Type 2

- **Precast Cement Concrete Adjustment Sections (Typ.)**
  - As Required

- **Pipe (Typical)**
  - See Contract

- **Finished Grade**

**Concrete Barrier Type 2**

---

**Section B**

- **Median Barrier**

- **Grate Inlet Type 2 (Typ.)**
  - See Standard Plan B-38.40

- **Frame and Dual Vane Grates (Typ.)**
  - See Standard Plan B-40.40

---

**Plan View**

- **Median Barrier Drainage Installation Standard Plan B-95.20-01**

---

**Effective:** August 3, 2015 to July 31, 2016

---

**Approved for Publication:** [Signature]

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**Date:** [Signature Date]
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.

MINIMUM CURB LENGTH ~ SEE NOTE 5

PLAN

BEAM GUARDRAIL BLOCKS AND RAIL ELEMENTS NOT SHOWN FOR CLARITY

SECTION A

BEAM GUARDRAIL

PAVEMENT

CURB

POST

12 MIN.

BRIDGE APPROACH SLAB

BEAM GUARDRAIL TRANSITION SECTION

FACE OF CURB SHALL NOT EXCEED THE FACE OF GUARDRAIL

INLET PLACEMENT AT BRIDGE END

STANDARD PLAN B-95.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER
Washington State Department of Transportation
FACE OF GUARDRAIL

FACE OF GUARDRAIL

FACE OF GUARDRAIL

FACE OF GUARDRAIL

FACE OF GUARDRAIL

PRE-DRILLED HOLES FOR FUTURE GUARDRAIL RAISING

INITIAL INSTALLATION

RAIL ELEMENT RAISED

TYPE 1

TYPE 1 ALTERNATIVE

TYPE 2

TYPE 3

TYPE 4

C6 x 0.2 x 12 - 5 3/4" MIN. LENGTH

C6 x 0.2 x 12 - 5 3/4" MIN. LENGTH

C6 x 0.2 x 12 - 5 3/4" MIN. LENGTH

C6 x 0.2 x 12 - 5 3/4" MIN. LENGTH

C6 x 0.2 x 12 - 5 3/4" MIN. LENGTH

5/8" CARRIAGE BOLT W/ HEX NUT & POST BOLT WASHER IN 3 3/4" HOLE

5/8" CARRIAGE BOLT W/ HEX NUT & POST BOLT WASHER IN 3 3/4" HOLE

5/8" CARRIAGE BOLT W/ HEX NUT & POST BOLT WASHER IN 3 3/4" HOLE

5/8" CARRIAGE BOLT W/ HEX NUT & POST BOLT WASHER IN 3 3/4" HOLE

5/8" CARRIAGE BOLT W/ HEX NUT & POST BOLT WASHER IN 3 3/4" HOLE

RAISED GUARDRAIL BLOCK

FIELD DRILL NEW 3/4" HOLE FOR 5/8" BUTTON HEAD BOLT

EXISTING GUARDRAIL POST

BEAM GUARDRAIL RAISING FOR HMA OVERLAYS

BEAM GUARDRAIL RAISING FOR HMA OVERLAYS

SEE NOTE 6

SEE NOTE 6

SEE NOTE 6

SEE NOTE 6

SEE NOTE 6

1 3/4" POST BOLT WASHER

1 3/4" POST BOLT WASHER

1 3/4" POST BOLT WASHER

1 3/4" POST BOLT WASHER

1 3/4" POST BOLT WASHER

FOR TYPES 1 & 2 ONLY

FOR TYPES 1 & 2 ONLY

FOR TYPES 1 & 2 ONLY

FOR TYPES 1 & 2 ONLY

FOR TYPES 1 & 2 ONLY

TIMBER BLOCK FOR STEEL POST

TIMBER BLOCK FOR STEEL POST

TIMBER BLOCK FOR STEEL POST

TIMBER BLOCK FOR STEEL POST

TIMBER BLOCK FOR STEEL POST

1/4" x 9 OR 1/4" x 15

1/4" x 9 OR 1/4" x 15

1/4" x 9 OR 1/4" x 15

1/4" x 9 OR 1/4" x 15

1/4" x 9 OR 1/4" x 15

STEEL POST

STEEL POST

STEEL POST

STEEL POST

STEEL POST

ALL MOUNTING AND SPICE HARDWARE SAME AS FOR TIMBER POST EXCEPT AS NOTED

ASSEMBLY DETAIL

ASSEMBLY DETAIL

ASSEMBLY DETAIL

ASSEMBLY DETAIL

ASSEMBLY DETAIL

NOTES

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

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

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

4. Timber blocks shall be toe-nailed to the post with a 1½ 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", high and 1/4" 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.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

1. Type 10 post shall be 6' x 8' timber, or either W6 x 9, or W6 x 8.5 steel. Type 11 post shall be 10' x 10' timber or W8 x 16.
   For additional details see Standard Plan C-1b.

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

3. Spacing may vary depending on application. See Standard Specification Section 9-16.3(1) for rail element requirements.
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 8.5 or 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" (in) min. high and 3/4" (in) wide at the location where the letter "H" is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4" (in). For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor's responsibility to ensure the stamped numbers remain visible.

6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.
NOTES
1. For post details see Standard Plan, "Beam Guardrail Posts and Blocks".

DETAIL A

$\frac{1}{8}$" 01A x 1 1/2" hex head bolt with hex nut and 1 1/2" square x .135" washer

DETAIL B

$\frac{1}{8}$" 014 x 1 1/2" Hex head bolt with hex nut. Guardrail rests on top of bolt.

TYPE 20

See Detail A

2'- 3" H x 2'- 6" W

See Detail B

G-2 Post
(See Note 1)

TYPE 21
INTERMEDIATE GUARDRAIL POST CONNECTION DETAILS
(Type A shown)

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

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

THRIE BEAM GUARDRAIL REDUCER SECTION
TYPE B
NOTES

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

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

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

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

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

6. When Beam Guardrail Flared Terminals are used on both ends a minimum of 25'-0" of Beam Guardrail shall be installed.
BEAM GUARDRAIL TRANSITION SECTION
PAY LIMIT - SEE NOTE 3

TERMINAL PAY LIMIT (SRT SHOWN)
SEE NOTE 1

CASE 4

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

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE</th>
</tr>
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<tbody>
<tr>
<td>70</td>
<td>15:1</td>
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<tr>
<td>60</td>
<td>14:1</td>
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<td>55</td>
<td>12:1</td>
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<tr>
<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>

CASE 5

GUARDRAIL PLACEMENT

STANDARD PLAN C-2a

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOTES

1. Varying flare rates and structure widths may require a length of Beam Guardrail Type 1 or 2 between the Beam Guardrail Type 3 or 4 and the Transition on one side, and the Beam Guardrail Type 10 on the other. For Beam Guardrail Type 2 or 3, terminate the rub rail (channel rail) at the first 8'-0" post of the Beam Guardrail Transition Section Type 16, and by lapping it behind the second 6'-0" post on the Beam Guardrail Type 10 side, or as approved by the Engineer.

2. Use the minimum number of nested 12'-0" thrie beam sections needed to span the structure. This run may extend past the end of the structure, and an excess of 6'-0" maximum is acceptable. If the last 12'-0" section extends more than 6'-0" (but less than 12'-0"), use a nested 6'-0" thrie beam section in its place.

3. The Beam Guardrail Transition Section Type 16 on this end shall terminate at a 10+10 post. Place nested thrie beam with 10+10 posts at 3'-0" 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'-0".

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE</th>
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<tbody>
<tr>
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<td>15 : 1</td>
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<tr>
<td>50</td>
<td>14 : 1</td>
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<td>12 : 1</td>
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<tr>
<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>

GUARDRAIL PLACEMENT

STANDARD PLACEMENT

SEE PAGE 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WP design engineering

REVISION RT

EXPRES JULY 31, 2016
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.

CASE 10A

CASE 10B

CASE 10C

GUARDRAIL PLACEMENT

STANDARD PLAN C-2d

EXPRES JULY 24, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

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

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

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

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

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

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

1. See Contract for guardrail connection to bridge rail and concrete barrier.

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

3. Attach to rail with ¾” x 9” long bolt, nut and ⅛” washer on back of post.

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

5. Radius dimensions shall be etched into plate replacing the letters “HH”, shown on the Identification Plate Detail. Digits shall be ½” MIN height and ¾” MAX width. The plate shall be galvanized after etching.

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

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

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

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

**GUARDRAIL PLACEMENT**

**WEAK POST INTERSECTION**

**DESIGN (8’ - 6’ MAX RADIUS)**

**IDENTIFICATION PLATE**

(see Note 5)
### REQUIREMENTS

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>NUMBER OF CRT POSTS (SEE NOTE 3)</th>
<th>CLEAR AREA</th>
<th>L</th>
<th>W</th>
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<tr>
<td>17'-0&quot;</td>
<td>6</td>
<td>30' 19'</td>
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<td></td>
</tr>
<tr>
<td>25'-6&quot;</td>
<td>6</td>
<td>40' 20'</td>
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<tr>
<td>35'-0&quot;</td>
<td>11</td>
<td>50' 20'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

1. See Contract Plans for guardrail connection to bridge rail and concrete barrier.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Fewer CRT posts are required for smaller radii; include CRT Post at Point B. Attach guardrail to post with a 5/16" x 9" long bolt, a 3/8" I.D. x 7 1/2" snug fitting insert, and a 1 1/2" washer with nut on back of post.
4. For terminal type and details, see Contract and applicable Standard Plan(s).
5. Radius dimensions shall be etched into plate replacing the letters “HH”, shown on the GUARDRAIL RADIUS IDENTIFICATION PLATE DETAIL. Digits shall be 1 1/2" minimum height and 3/4" maximum width. Plate shall be galvanized after etching.
6. The guardrail radius Identification Plate shall be mounted on the back side of the rail element using the lowest splice bolt nearest the PC of the guardrail radius (See View A).
7. The first letter of the Case Designation indicates the end treatment on the side road. The second letter indicates the end treatment on the main road. For example, a Type 5 Anchor on the side road with a bridge connection on the main road would be Case 13 AC, the combination shown.
8. For CRT post details, see Standard Plan C-1b.

### GUARDRAIL PLACEMENT WEAK POST INTERSECTION DESIGN (35' MAX. RADIUS)

**STANDARD PLAN C-2g**

EXPIRES: MAY 3, 2002

Effective: August 3, 2015 to July 31, 2016
NOTES

1. For Service Level 1, Weak Post Bridge Roll System, see Contract.

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

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

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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

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

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

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

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

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

---

FLARE RATE TABLE

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<td>10:1</td>
<td>45</td>
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<tr>
<td>9:1</td>
<td>40 or less</td>
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</table>

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GUARDRAIL PLACEMENT

STANDARD PLAN C-2J

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
CASE 19 A
SPICE IN CENTER

CASE 19 B
SPICE AT POSTS

G UARDRAIL PLACEMENT
12'-6" SPAN
STANDARD PLAN C-2k

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

APPROVED FOR PUBLICATION

July 22, 2016
Washington State Department of Transportation
SECTION 0

SINGLE W-BEAM RAIL ELEMENT

NESTED W-BEAM RAIL ELEMENTS

GROUND LINE

ELEVATION

CASE 20

GUARDRAIL PAY LIMIT

37'-6" NESTED W-BEAM

6'-3" TYP.

18'-9"

6'-3" TYP.

2'-3"

EXPIRES MAY 3, 2002

GUARDRAIL PLACEMENT 18'-9" SPAN
STANDARD PLAN C-2n

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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

ONE-WAY TRAFFIC LAYOUT

ELEVATION

PLAN

GUARDRAIL PLACEMENT
25' SPAN
STANDARD PLAN C-2o

EXPRESSED MAY 3, 2002

APPROVED FOR PUBLICATION
Washington State Department of Transportation

NOTE

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

CRT POSTS WITH TWO BLOCKS (SEE NOTE 2)

CRT POSTS WITH TWO BLOCKS

NESTED W-BEAM RAIL ELEMENTS

6"x6"x14" WOOD BLOCKS

2" MIN

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

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.
NOTE

1. Install Extruded Curb at face of Guardrail. See Standard Plan F-10.40 for details.
BEAM GUARDRAIL TRANSITION SECTION TYPE 2 - PAY LIMIT
SEE CONTRACT PLANS FOR SPECIFIED CONNECTION
12'-6" NESTED W BEAM (12 GAGE)
6'-6" POST WITH STANDARD BLOCK (TYP.)

TYPE 2

BEAM GUARDRAIL TRANSITION SECTION TYPE 5 - PAY LIMIT
SEE CONTRACT PLANS FOR SPECIFIED CONNECTION
FOUR SPACES @ 1' - 6 3/4", TWO SPACES @ 3' - 1 1/2"
TOTAL LENGTH = 6' - 3"
TOTAL LENGTH = 6' - 3"

TYPE 5

BEAM GUARDRAIL TRANSITION SECTION TYPE 6 - PAY LIMIT
SEE STD. PLAN C-1b
6'-0" POST SPACING
EIGHT SPACES @ 3' - 1 1/2" MAX.
TOTAL LENGTH = 25' - 0"

TYPE 6

BEAM GUARDRAIL TRANSITION SECTION TYPE 4 - PAY LIMIT
SEE CONTRACT PLANS FOR SPECIFIED CONNECTION
12'-6" NESTED W BEAM (12 GAGE)
3'-0" POST SPACING EIGHT SPACES @ 3' - 1 1/2"
6'-0" LONG, 6x8 POST WITH STANDARD BLOCK (TYP.)

TYPE 4

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

G-2 POST (TYP.)
SEE STD. PLAN C-1b
6'-0" LONG, 6x8 POST WITH STANDARD BLOCK

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

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

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

NOTES:

1. See Standard Plan C-3b for design details. See Limitation of Use Table.

2. For Transition Sections, see Plan F-10.39 for details.

3. See CONTRACT PLANS FOR QUANTITY.
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 a FLEAT 350 as manufactured by Road Systems Inc., shall be installed per manufacturer's recommendations. If specified in the Contract, the FLEAT TL2 as manufactured by Road Systems, Inc. shall be installed per manufacturer's recommendations.

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

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

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

ELEVATION VIEW

FLEAT OPTION

SRT OPTION

ELEVATION VIEW

FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)

PLAN VIEW

FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)

PLAN VIEW
NOTES

1. An SKT-350 as manufactured by Road Systems, Inc. shall be installed according to manufacturer’s recommendations. When a TL2 terminal is specified in the Contract an SKT-TL2 as manufactured by Road Systems, Inc. shall be installed according to the manufacturer’s recommendations.

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

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

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

5. Length for SKT-350 is 50’ (ft). Length for SKT-TL2 is 25’ (ft).
NOTE

1. For W-Beam applications extend the rail from the bullnose terminal by using a "Reducer Element Type C" followed by a standard Post and Block, spaced at 3' - 1 1/2". Continue runs with standard 6' - 3" post spacing. For additional Details see Standard Plans C-20.10 and C-25.20.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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

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

SLOTTED THRIE BEAM RAIL ELEMENT #3
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
6x8 Timber posts to match beam guardrail

Anchor cable (see Detail 11)

End section Design C (see Note 2)

PLAN

Anchor plate (see details)

Cable eye (see Note 3)

Two 1" nuts and washers (see Note 5)

Standard 2" ID pipe sleeve (2½" OD)

Two 1" nuts and washers (see Note 5)

Anchor post assembly (see Note 3)

NOTES
1. Anchor plate may be constructed from 1/4" plates welded to equal strength and dimensions as shown.
2. For end section details, see Standard Plan "Beam Guardrail End Sections".
3. For post details, see Standard Plan "Beam Guardrail Posts and Blocks".
4. Eight 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. Toenail bearing plate with 10d nail at corners to prevent turning.
7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.
**ELEVATION**

- **ANCHOR PLATE**
  - (See Note 1)

- **ELEVATION**
  - 3/8" Hole (left required)
  - 3" x 2½" x ½" End plate

**SECTION B-B**

- **BEARING PLATE**
  - 3/8" x 1" x 8" plate
  - tack welded to 3/8" plate

- **ANCHOR CABLE**
  - 1/2" Cable
  - Swage
  - 1" x 3" Stud
  - threaded full length (Typ)
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.
NOTES

1. Attach W-beam to steel pipe with ¾" x 1½" 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.

Tack weld 2½" x 2½" x ¼" steel plate with ½" hole to tubular steel

END SECTION DESIGN B

BEAM GUARDRAIL ANCHOR

TYPE 5 ANCHOR

2" x 2½" x 2½" x ¼" x 8"

STANDARD PIPE SLEEVE (2½" OD)

2"

Two 1" Nuts and washers (see Note 5)

Anchor Post Assemblies (see Note 4)

IV Cable clips (6 required)

Torque nuts to 50 ft/lbs.

Bearing plate (see Note 3)

See Note 1

DETAIL B

BEAM GUARDRAIL ANCHOR

TYPE 5

STANDARD PLAN C-6d

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

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

2. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. 9-06.6(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 an anchor rail washer shall be placed under the splice bolt heads.
NOTES

1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. B-98.6(4), with thin slab female 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.
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).
I.D. LOOP PLATE WASHER 1/8" THICK

WIRE ROPE LOOP DETAIL

2" MIN. 2 1/2" MAX.

PLATE WASHER 1/8" THICK

CONNECTING PINS AND DRIFT PINS

SEE NOTE 1

5/8" WIRE ROPE

WIRE SEIZING - SHALL BE EIGHT WRAPS OF 16 GAGE WIRE WITH THE ENDS TWISTED TOGETHER, OR EQUIVALENT FASTENING.

SIDE VIEW

2" MIN. 2 1/2" MAX.

1" O.DAM. PIN WITH ROUNDED BOTTOM EDGES

SEE NOTE 3

WIRE ROPE LOOP DETAIL

TOP VIEW

HOLE FOR DRIFT PIN

PIN &

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

SIDE VIEW

SEE NOTE 4

BARRIER TERMINAL

WIRE ROPE LOOPS - SEE NOTE 1

3/4" CHAMFER

3 1/4" Diam.

SIDE VIEW

HOLE FOR DRIFT PIN

PIN &

2" CUR (TYP.)

2" CUR (TYP.)

SIDE VIEW

BARRIER TERMINAL

REINFORCING STEEL BENDING DIAGRAM

CONCRETE BARRIER TYPE 2

BARRIER TERMINAL REINFORCING STEEL BENDING DIAGRAM

BARRIER SECTION REINFORCING STEEL BENDING DIAGRAM

CONCRETE BARRIER TYPE 2

STANDARD PLAN C-8

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTE
1. For details on wire rope loop, connecting pin and end notches see Standard Plan "Concrete Barrier Type 2."

CONCRETE BARRIER TYPE 4
AND TRANSITION SECTION
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

MARK | LOCATION | QTY | SIZE | LENGTH
--- | --- | --- | --- | ---
1 | FOOTING - DOWEL | 28 | 4'-7" | 4'-7"
2 | FOOTING | 18 | 4'-8" | 4'-8"
3 | FOOTING | 9 | 8'-0" | 8'-0"
4 | BARRIER | 4 | 21'-0" | 21'-0"
5 | BARRIER | 4 | 21'-0" | 21'-0"
6 | BARRIER | 30 | 6'-0" | 6'-0"

BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)
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.

PRECAST CONC. BARRIER TYPE 2

NOTES
CONCRETE BARRIER TYPE 2 (NJ-SHAPE)

END VIEW

CONCRETE BARRIER TYPE 2 (NJ-SHAPE)

SECTION

REINFORCING STEEL BENDING DIAGRAM

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

CONNECTING PIN - SEE STD. PLAN C-8

TYPICAL - BOTH ENDS

NOTE

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

CONCRETE BARRIER TYPE 2 (NJ-SHAPE)

SECTION A

(BELOW LIMIT OF TRANSITION)

BRIDGE F-SHAPE TRAFFIC BARRIER

SECTION B

(BELOW LIMIT OF TRANSITION)

TRANSPORTATION

TRANSITION SECTION

- MIRROR IMAGE OF PLAN

TRANSITION SECTION - AS SHOWN IN PLAN

CONCRETE BARRIER TYPE 2

ISOMETRIC VIEW

F-SHAPE CONCRETE TRAFFIC BARRIER

ON BRIDGE

NOTE

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

CONCRETE BARRIER TRANSITION

TYPE 2 TO BRIDGE F-SHAPE

STANDARD PLAN C-8f

EXPIRES JULY 24, 2004

CONCRETE BARRIER

TRANSITION

CONCRETE BARRIER TYPE 2 (NJ-SHAPE)

TOP VIEW

WIRE ROPE LOOP (TYP.)

SEE STD. PLAN C-8

1 1/2" CHAMFER

1 1/2" CHAMFER

2" CLR.

2" CLR.

2" CLR.

CROWN

CROWN

2' - 5/8"

6" FLAT

48 48 1

1 1 1/16" 11 1/16" 7 1/16"

2'-0"

2'-0"

10'-4"

10'-4"

7 1/2"

7 1/2"

1 1/4" (TYP.)

1 1/4" (TYP.)

F-SHAPE CONCRETE TRAFFIC BARRIER

ON BRIDGE

NOTE

The vertical locations of the Wire Rope Loops at one end compose a set that shall not vary; however, which set is applied to an end is determined by the end to which it is being connected. A set with loops 1'-5" apart connects to a set with loops 1'-8" apart. See Standard Plan C-8, BARRIER CONNECTION DETAIL.
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.
SHOULDER 4.0' MIN.

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

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

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

2. The additional width for shy distance may be less than 2.0' when it, combined with the existing shoulder width, totals 8.0' or more.

3. For W-Beam Type 31 shoulder application, see Standard Plan C-28.40.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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 two (2) to achieve the actual 1/2" (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.
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.
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.

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>15 : 1</td>
</tr>
<tr>
<td>60</td>
<td>14 : 1</td>
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<td>12 : 1</td>
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<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

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

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

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

4. Timber or steel post. Steel post shown.

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

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

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

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

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

2. Attach the standard wood block to the rail using two 5/8" (in) x 4" (in) lag bolts.

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

4. For details, see Standard Plan C-25-20.

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

6. Timber or steel post. Steel post shown.

BEAM GUARDRAIL TYPE 31 PLACEMENT (CASES 11A-31, 11B-31 & 11C-31)

STANDARD PLAN C-20.19-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
May 3, 2014

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

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

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

1. 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.
NOTES

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

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

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

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

5. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
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 (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 \( g = (\text{Elevation}_{S} - D \times 0.1) + 27 \)
4. Timber or steel post shown.

FLARE RATE TABLE

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<td>45</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 OR LESS</td>
</tr>
</tbody>
</table>
NOTES
1. This terminal is FHWA accepted at Test Level Three (TL-3) and may be used for all posted speeds.
2. 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 this terminal does 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 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 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. While this terminal does 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 the SKT-MGS (TL-3).
5. This terminal is FHWA accepted at Test Level Three (TL-3) and may be used for all posted speeds.
6. For terminal details, see WSDOT approved manufacturer’s drawings.
NOTES

1. This terminal is FHWA accepted at Test Level Two (TL-2) and may be used in applications with speeds of 40 MPH or less.
2. An SKT-SP-MGS (TL-2) 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 this terminal does 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 the SKT-SP-MGS (TL-2), with a maximum offset of 24" (in) over 50' (ft).
6. For terminal details, see WSDOT-approved manufacturer's drawings.
BEAM GUARDRAIL (TYPE 31) 
ANCHOR TYPE 10

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-1b.
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 at 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.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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 attach tapered block and/or rubrail.

6. Posts 1 and 2 are 10 x 10 timber posts, or W8 x 15 steel posts: 7" - 6" long. Posts 3 through 9 are 6 x 8 timber posts, or either W6 x 8.5 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).
NOTES

1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety-shape barrier. The toe of the single slope and the safety-shape 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


2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.

3. For additional alternatives not shown, see Contract Plans,
NOTES

1. Refer to Standard Plans C-1 and C-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) blackouts 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.
BEAM GUARDRAIL BULL NOSE TERMINAL (DESIGN 1)

BEAM GUARDRAIL TYPE 10

BEAM GUARDRAIL BULL NOSE TERMINAL (DESIGN 1)

PAY LIMIT

PAY LIMIT

DIRECTION OF TRAFFIC

DIRECTION OF TRAFFIC

CLEAR AREA - SEE STANDARD PLAN C-41

HIGH TENSION CABLE BARRIER

EDGE OF SHOULDER

EDGE OF TRAVELED WAY

EXISTING REDIRECTIONAL LANDFORM

MAX. DEFLECTION AS SHOWN IN CONTRACT PLANS

LENGTH OF NEED

CABLE BARRIER TERMINAL

EDGE OF SHOULDER

EDGE OF TRAVELED WAY

PLAN VIEW

CASE 9A

LEGEND

Design Layout Line

PLACEMENT DETAIL

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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: FERN LIDELL

7/2/2012

APPROVED FOR FABRICATION

Pam B. Bell

SUPERINTENDENT OF ENGINEERING

1/OF 1 SHEET

SHEET 1 OF 1 SHEET
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 - FOR PERMANENT INSTALLATION (SEE DETAIL)
#8 BAR (TYP.)
#8 BAR (TYP.)
3/8" (IN) PREMOLDED JOINT FILLER - FOR PERMANENT INSTALLATION

BARRIER TRANSITION DETAIL
PREPARED GRADED BASE
HYPOTHETICAL GRADE DIFFERENTIAL

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; (TYP.)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>
| 4'-0" (TYP.)   | 1"| 2"| 2"| 2"| 2"| 1"| 7"
| 4'-6" (TYP.)   | 1"| 2"| 2"

REINFORCING STEEL BENDING DIAGRAM
SEE STD. SPEC. 9-07.12 FOR BENDING DIAMETERS

ISOMETRIC VIEW

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

APPROVED FOR PUBLICATION
Washington State Department of Transportation

SINGLE-SLOPE CONCRETE BARRIER (PRECAST)
STANDARD PLAN C-70.10-01
SECTION A
3'-6" BARRIER SHOWN LEVEL

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

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

SECTION B
4'-6" BARRIER FOR USE WITH A
GREATER THAN 7" (IN) TO 10" (IN) MAX.
GRADE SEPARATION

STANDARD MOUNTING HEIGHT
HIGH-PERFORMANCE BARRIER

SECTION A
4'-0" BARRIER SHOWN LEVEL

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

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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

SINGLE-SLOPE CONCRETE BARRIER (PRECAST)
STANDARD PLAN C-70.10-01
SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION
Washington State Department of Transportation

May 19, 2014 8:26 AM

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

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

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

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

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

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

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

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

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

5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions
   given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of
   3' - 6" and a minimum embedment of 3" (in).
SINGLE-SLOPE CONCRETE BARRIER (BID ITEM)

10 1/2"

1. SEE STANDARD PLAN C-70.10 DIRECTION OF TRAVEL

PREMOLDED JOINT FILLER FOR PERMANENT INSTALLATION

3/8" (IN)

DIRECTION OF TRAVEL

PLAN

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

NOTE:

8' - 0"

4 - 5 SPACES @ 6"

2'-0"

2 - 0"

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

NOTE:

3'-6" 8" 2'-0" 3'-2" 2'-0" 4' - 0"

3'-8" 2'-2 1/4" 4' - 0"

NOTE:

8' - 0"

4 - 5 SPACES @ 12"

4" - 0"

1 1/2" CL. (TYP.)

REBAR GRID

SEE NOTE 3

TOP OF ROADWAY

SECTION A

SECTION B

NOTE:

STEEL WELDED WIRE REINFORCEMENT DEFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 6-16.3

REINFORCING STEEL BENDING DIAMETER

SEE STD. SPEC. 9-07-1/2 FOR BENDING DIAMETERS

DUAL-FACED

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

STANDARD PLAN C-75.30-01

SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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

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

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

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

5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HIP row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 6" and a minimum embedment of 3" (in).
1. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slipform construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" (in) and adjust the rebar dimensions as required.

2. When connecting between cast-in-place and precast single-slope barrier, provide a Blackout, 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.
3/4" (IN) CHAMFER (TYP.)

SECTION A

3'-0" BARRIER SHOWN LEVEL

SECTION A

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

SECTION A

4'-0" BARRIER FOR USE WITH A
GREATER THAN 6" (IN) TO 7" (IN) MAX. GRADE SEPARATION
(SEE NOTE 3)

STANDARD MOUNTING HEIGHT
NOTES
1. The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
2. See Standard Plan C-80.10, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details.
3. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3" (in).
1. The Transition Section is used in the configurations shown in Standard Plans C-85.10 and C-85.11.

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

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

4. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3'- 0" and a minimum embedment of 3" (in).
1. The Vertical Back barrier is used only in the configurations shown in Standard Plans C-85.10 and C-85.11, and when placed against a retaining wall.

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

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

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

STEEL WELDED WIRE FABRIC - COMPLY WITH STANDARD SPEC 9-07.7
6'' W2.1 • W2.1 (8 GAGE)
6'' W2.9 • W2.9 (6 GAGE)
6'' W4.0 • W4.0 (4 GAGE)
4'' W1.4 • W1.4 (10 GAGE)
4'' W2.1 • W2.1 (8 GAGE)
4'' W2.9 • W2.9 (6 GAGE)
1 1/2" CLEARANCE ON ALL SURFACES

SELECT BORROW INCL. HAUL

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-79's (precast) or C-80's (cast-in-place).

SINGLE-SLOPE CONCRETE BARRIER PLACEMENT (SPLIT)
STANDARD PLAN C-85.10-00

SECTION A

SECTION B

ISOMETRIC VIEW (CAST-IN-PLACE SHOWN)
NOTES:
1. Use the barrier type, precast or cast-in-place, as specified in the Contract.
2. For Single-Slope Concrete Barrier details, see Standard Plan series C-70's (precast) or C-80's (cast-in-place).
ALL DIMENSIONS ARE OUT TO OUT
ALL BENDS ARE 2° (IN) RADIUS

BAR LIST

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>SIZE</th>
<th>QUANTITY</th>
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</thead>
<tbody>
<tr>
<td>①</td>
<td>BARRIER - TOP VERTICAL</td>
<td>#4</td>
<td>28</td>
</tr>
<tr>
<td>②</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td>#4</td>
<td>12</td>
</tr>
<tr>
<td>③</td>
<td>FND. &amp; BARRIER - VERTICAL</td>
<td>#4</td>
<td>16</td>
</tr>
<tr>
<td>④</td>
<td>BARRIER - HORIZONTAL</td>
<td>#5</td>
<td>2</td>
</tr>
<tr>
<td>⑤</td>
<td>FOUNDATION</td>
<td>#5</td>
<td>9</td>
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<td>⑥</td>
<td>FOUNDATION</td>
<td>#5</td>
<td>32</td>
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T A B L E

<table>
<thead>
<tr>
<th>GRADE SEPARATION</th>
<th>BARRIER SEPARATION</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Q</th>
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<tbody>
<tr>
<td>0 TO 5&quot;</td>
<td>3&quot; - 12&quot;</td>
<td>6&quot;</td>
<td>2&quot;</td>
<td>0&quot;</td>
<td>3&quot;</td>
<td>3&quot; MIN.</td>
<td>5&quot;</td>
<td>1&quot; - 2&quot;</td>
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<tr>
<td>UP TO 7&quot;</td>
<td>4&quot; - 9&quot;</td>
<td>9 1/8&quot;</td>
<td>2&quot; - 2 1/4&quot;</td>
<td>3&quot; - 6 1/4&quot;</td>
<td>7&quot; MIN.</td>
<td>5&quot;</td>
<td>10&quot;</td>
<td>12</td>
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<tr>
<td>UP TO 10&quot;</td>
<td>4&quot; - 6&quot;</td>
<td>10 1/4&quot;</td>
<td>2&quot; - 4 1/2&quot;</td>
<td>3&quot; - 8 1/2&quot;</td>
<td>10&quot; MIN.</td>
<td>6&quot;</td>
<td>7&quot;</td>
<td>14</td>
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</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:
   i) Service limit state = 6 ksf
   ii) Strength limit state = 24 ksf
   iii) Extreme limit state = 48 ksf
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. 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.

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

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

SHAFT REINFORCEMENT
ELEVATION
SEE THE CONTRACT PLANS FOR CONDUIT PLACEMENT

DIMENSIONS "W" AND "Z"

<table>
<thead>
<tr>
<th>SIGN BRIDGE SPAN LENGTH</th>
<th>W</th>
<th>Z</th>
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</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>4'-0&quot;</td>
<td>11'-6&quot;</td>
</tr>
<tr>
<td>61' TO 90'</td>
<td>5'-0&quot;</td>
<td>13'-6&quot;</td>
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<tr>
<td>91' TO 120'</td>
<td>6'-0&quot;</td>
<td>15'-0&quot;</td>
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<tr>
<td>121' TO 160'</td>
<td>7'-0&quot;</td>
<td>15'-6&quot;</td>
</tr>
</tbody>
</table>

SHAFT DEPTH "Z" IS BASED ON ALLOWABLE LATERAL BEARING PRESSURE IN EXCESS OF 1000 PSF WITH β = 28 DEGREES OR GREATER.

NOTES

EXPANSION JOINT WITH 3/4" (IN) PREMOLDED JOINT FILLER (TYP.)
SHAFT REINFORCEMENT ELEVATION
SEE SECTION "C" SHEET 2, FOR GROUNDING CONDUCTOR DETAILS (SEE NOTE 2)

Zeldenrust, Richard
Jun 10 2014:10:20 AM

Washington State Department of Transportation

STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION

SEAL:

STATE ONLY ON SHEET 1 OF 2 SHEETS

SINGLE-SLOPE CONCRETE BARRIER SIGN BRIDGE FOUNDATION
STANDARD PLAN C-85.16-01

JEFFREY R. ZELDENRUST P.E.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

SHEET 1 OF 2 SHEETS

DRAWN BY: ASA CYCHYK

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.

2. All concrete shall be class 4000.

3. This barrier transition section is designed for an allowable soil bearing pressure of 2500 psf or better.

(SEE NOTE 1)

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

(SEE NOTE 2)

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

EXPANSION JOINT WITH 3/4\(\text{in}\) PREMOLDED JOINT FILLER (TYP.)

TOP OF ROADWAY

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

BAR LIST

<table>
<thead>
<tr>
<th>MARK NO.</th>
<th>LOCATION</th>
<th>SIZE</th>
<th>QTY</th>
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<tr>
<td>1</td>
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<td>BARRIER - BOTTOM VERTICAL</td>
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<td>3</td>
<td>BARRIER - HORIZONTAL</td>
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<td>0</td>
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</tbody>
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NOTE: ALL BENDS ARE 2\(\text{in}\) RADIUS

SEE DIMENSION TABLE - NOT COUNTING SPACERS

ALL DIMENSIONS ARE OUT TO OUT

VARIES 5\(\text{3/4}\)" TO 5 - 3"
SINGLE-SLOPE CONCRETE BARRIER FOUNDATION

24' - 0" TAPER

4' - 0"

24' - 0" TAPER

12' - 0"

1' - 7 1/2"

EXPANSION JOINT (TYP.)

EXPANSION JOINT

DUMMY JOINT (TYP.)

PLAN

CANTILEVER SIGN STRUCTURE - SEE STD. PLAN C-60.10

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

1" (IN) STEEL CONDUIT OR AS PER CONTRACT - WHEN REQUIRED, CAP EACH END

ELEVATION

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>SHAFT CONCRETE</th>
<th>CLASS 4000P</th>
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<td>ALL OTHER CONCRETE</td>
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<tr>
<td>STEEL REINF. BAR</td>
<td>AASHTO M 31 GRADE 60</td>
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<td>ANCHOR RODS</td>
<td>ASTM F 1654 GRADE 40</td>
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<td>ANCHOR NUTS</td>
<td>AASHTO M 291</td>
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<tr>
<td>ANCHOR WASHERS</td>
<td>AASHTO M 293</td>
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<tr>
<td>ANCHORAGE GALVANIZED</td>
<td>AASHTO M 232</td>
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<tr>
<td>STEEL PLATE</td>
<td>ASTM A 36</td>
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SHAFT DEPTH

<table>
<thead>
<tr>
<th>Z</th>
<th>TOTAL SIGN AREA (SF)</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
<th>FRICTION ANGLE (DEGREE)</th>
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<tr>
<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>26 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>26 MIN.</td>
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</table>

SEE SECTION "A", SHEET 2, FOR GROUNDING CONDUCTOR DETAILS (SEE NOTE 4)

SEE SECTION "A", SHEET 2, FOR SHAFT REINFORCEMENT DETAILS

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.
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.
FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

JOINT AND CORNER DETAIL

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

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

Sheet 2 of 2 sheets

Effective: August 3, 2015 to July 31, 2016

Expires August 25, 2018

Approved for publication

Washington State Department of Transportation

Drawn by: Anna Cochran

Transverse bars not shown

5\' 0" MIN (Typ)

Bar 'A' (Typ)

Footing

\( t_1 \)

\( t_2 \)

\( 2'' \) (Typ)

\( 3/4'' \) chamfer (Typ)

\( 1/2'' \) noise sealer (Typ)

Reinforced pier listed wall height reinforcement table

Traffic side

Bar 'D'

Corner panel

Angle point

W12

W12

Q footing

\( t_1 \)

\( t_2 \)
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.

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

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

R.W. Bolt, P.E.
Washington State Department of Transportation

DRAWN BY: ADAM COCHRAN
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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

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

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

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

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

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

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOISE BARRIER WALL TYPE 4

STANDARD PLAN D-2.08-00

SHEET 1 OF 2 SHEETS

APPROVED FOR CONSTRUCTION

Washington State Department of Transportation

Harold Kittlaus 11/10/06

EXPIRES AUGUST 23, 2006

(Continued on back)
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.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOTES

1. Wall to be designated Noise Barrier Wall Type 6SSA, 6SSB, 6SSC or 6SSD. The Contract specifies actual wall designations.

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

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

4. Construction joints in the foundation shall be spaced at 120 feet maximum.
1. Wall to be designated Noise Barrier Wall Type 7A, 7B, 7C or 7D. The Contract specifies actual wall designations.

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

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

4. The Contract specifies actual foundation requirements 01 or 02.

NOTES

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

SOIL TYPE

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<th>SOIL TYPE</th>
<th>ANGLE OF INTERNAL FRICTION (DEGREES)</th>
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<tbody>
<tr>
<td>D1</td>
<td>32</td>
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<tr>
<td>D2</td>
<td>38</td>
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WIND EXPOSURE & VELOCITY

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<th>NOISE BARRIER TYPE</th>
<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
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</thead>
<tbody>
<tr>
<td>7A</td>
<td>A1</td>
<td>80</td>
</tr>
<tr>
<td>7B</td>
<td>B1</td>
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<td>7C</td>
<td>B2</td>
<td>80</td>
</tr>
<tr>
<td>7D</td>
<td>B2</td>
<td>90</td>
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BENDING DIAMON

RIGHT-OF-WAY

SEE CONTRACT

EXTEND SHAFT REINFORCEMENT INTO BARRIER AND BEND AS REQUIRED AT FACE OF BARRIER (TYP.)
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOTES
1. Wall to be designated Noise Barrier Wall Type 7SSA, 7SSB, 7SSC or 7SSD. The Contract specifies actual wall designs.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. The Contract specifies actual foundation requirements D1 or D2.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

PRECAST CONCRETE WALL ON SPREAD FOOTING

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

NOISE BARRIER WALL TYPE 9

STANDARD PLAN D-2.32-00

Sheet 1 of 2 Sheets

EXPRESS AUGUST 23, 2006

The Contract specifies the actual wall designation.

For intermediate wall heights, use the next higher H.

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

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

All joints shall be in full contact and sealed.
JOINT AND CORNER DETAIL

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

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

PRECAST CONCRETE WALL ON SPREAD FOOTING

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

EXPRESS AUGUST 23, 2006

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 100 feet maximum.
5. All joints shall be in full contact and sealed.

### Bending Diagram

- **Wind Exposure & Velocity**
  - **Noise Barrier Type**
  - **Wind Exposure**
  - **Wind Velocity (MPH)**
  - 10A
    - B1: 80
  - 10B
    - B1: 90
  - 10C
    - B2: 80
  - 10D
    - B2: 90

### Elevation

**Panel Width** 15' - 0" Max.

**Level (Typ.)**

**Noise Sealer** 1/2" (Typ.)

**See Joint Detail**

**Final Ground Line**

**SEE DETAIL**

**2' - 0" Joint Hole for Dowel Bar**

**RIGHT-OF-WAY**

**Surface Treatment As Required**

**Reinforcing Steel Bar "O" - Centered on Wall**

**Precast Panel - To Be Placed Vertically**

**3' - 0" Min.**

**2" - 0" Max.**

**Bar "H"**

**Groin Pad - Set Panel Immediately After Placing Groin**

**Bar "O" (Typ.)**

**Splice Extending Through Construction Joint (Typ.)**

**Construction Joint** (See Note 4)

**ELEVATION**

**UNDISTURBED SOIL**

**BARS "D"**

**PRECAST CONCRETE WALL ON OFFSET SPREAD FOOTING**

### Effective Dates

- **Effective:** August 3, 2015 to July 31, 2016

---

**Design by Adam Coughlin**
Joint and Corner Detail

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

Pre-Cast Concrete Wall
On Offset Spread Footing

Noise Barrier Wall
Type 10

Footing Width Transition Detail
For locations without footing step.
1. All rods "A" and Anchor bolts shall be per ASTM F1554 grade 105.
2. Anchor Bolts, Nuts, Washers and Rod "A" shall have a protective coating of either Hot Dipped Galvanizing per AASHTO M222 for hardware or AASHTO M111 for Washers and Plates.
3. For intermediate wall heights, use the next higher H.
4. Panels shall have at least 3 feet of level ground on each side.
5. The Contract specifies actual foundation requirements for D1 or D2 and location of Western WA and Eastern WA.
6. Maximum panel length shall be 12 feet.
7. Materials shall meet the requirements of Standard Specification Section 6-12 and Special Provisions Section 6-12.
CONSTRUCTION JOINTS
SEE DETAIL

EQUAL AND
SEE CONTRACT
"""

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

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

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

NOTES

1. Wall to be designated Noise Barrier Wall Type 13A, 13B,
13C or 13D. The Contract specifies actual wall designations.

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

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

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

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

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

Preventive measures to address construction joints include:

- **Type 13A**: 3.00 to 5.00 feet
- **Type 13B**: 6.00 to 6.00 feet
- **Type 13C**: 7.00 to 7.00 feet
- **Type 13D**: 8.00 to 8.00 feet

**NOTES**

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

**PREVENTIVE MEASURES TO ADDRESS CONSTRUCTION JOINTS**

- **Type 13A**: 3.00 to 5.00 feet
- **Type 13B**: 6.00 to 6.00 feet
- **Type 13C**: 7.00 to 7.00 feet
- **Type 13D**: 8.00 to 8.00 feet

**NOTES**

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

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

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

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

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

5. Anchor Bolts, Nuts, Washers, Base Plate, and Bar B shall have a Protective Coating of one of the following: Hot Dipped Galvanizing AASHTO M 232 for Hardware, AASHTO M 111 for Washers and Plates. Mechanical Galvanizing AASHTO M 298 CL 55, or Zinc Rich Paint. Paint threads and nuts after installation.

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

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

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

NOISE BARRIER WALL
TYPE 14SS

STANDARD PLAN D-2.48-00

SHEET 1 of 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**Noise Barrier Wall**

**Type 14SS**

**Standard Plan D-2.48-00**

**Effective**: August 3, 2015 to July 31, 2016

---

**Angle Point Plan**

Adjust reinforcement as necessary to accommodate angle point.

**TYPICAL INTERMEDIATE AND END PANEL**

- Noise sealer: 1/2" (Typ.)
- Limits of transverse barrier reinforcement: 1" (Typ.)
- 1 1/2" (Typ.)

**Bar "B"**

Wedge head shall be held firmly and uniformly against base plate. 1/4" "B" shall be held secure during concrete placement to prevent gaps between wedge head and base plate.

**Defomed Reinforcement**

Bar "B" shall be held secure during concrete placement to prevent gaps between wedge head and base plate.

**BASE PLATE DETAIL**

- Base plate detail: 2" (Typ.)
- 1/2" (Typ.)
- 1/4" anchor bolt

---

**Noise Barrier Wall**

**Type 14SS**

**Effective**: August 3, 2015 to July 31, 2016
NOTES
1. Wall to be designated Noise Barrier Wall Type 16A, 16B, 16C or 16D. The Contract specifies actual wall designs.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. Construction joints in the trench footing shall be spaced at 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
9. The Contract specifies actual foundation requirements D1 or D2.

DRAWN BY: ADAM COCHRAN

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

PLAN VIEW

TYPICAL EXPANSION JOINT

#5 (TYP.)

SEE DETAIL A

TRAFFIC SIDE

8" CMU

10" CMU

PLAN VIEW

EXPANSION JOINT AT WIDTH STEP

#5 (TYP.)

SEE DETAIL A

TRAFFIC SIDE

8" OR 10" CMU

BOND BEAM DETAIL

#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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

8' or 10' CMU

#5 (TYP.)

See Detail A

Typical Expansion Joint

Traffic Side

Traffic Side

Bond Beam Units

Bond Beam Grouting Limit

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

BOND BEAM

Expansion Joint at Width Step

3" CLR. (TYP.)

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

3' CLR. (TYP.)

Traffic Side

Traffic Side

Footing Width Transition Detail

(For locations without footing step)

Note: Transverse bars not shown

Footing Width Transition Detail

Bar "A" (TYP.)
NOTES

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

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

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

4. All masonry is to be specially inspected.

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

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

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

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

MASONRY WALL ON OFFSET SPREAD FOOTING

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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

EXPANSION JOINT AT WIDTH STEP

BOND BEAM DETAIL

10" CMU

8" CMU

TRAFFIC SIDE

TRAFFIC SIDE

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

BACKER ROD

POLYURETHANE SEALANT

1/2" JOINT

DETAIL A

TYPICAL BOTH SIDES OF WALL

MASONRY WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL

TYPE 18

STANDARD PLAN D-2.64-01

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

NOTE: TRANSVERSE BARS NOT SHOWN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

DIAGRAM BY: BILL WERNER

DATE: 12/31/08
### Wall Dimensions

#### CMU Width

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<th>Wall Height</th>
<th>X</th>
<th>BAR &quot;D&quot;</th>
<th>BAR &quot;CC&quot;</th>
<th>DIAM.</th>
<th>BAR &quot;P&quot;</th>
<th>DEPTH</th>
<th>TYPE 19A</th>
<th>DEPTH</th>
<th>TYPE 19B</th>
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<tr>
<td>6' - 0&quot;</td>
<td>8&quot;</td>
<td>8&quot; @ 48&quot;</td>
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<td>12&quot;</td>
<td>6 - @ 5&quot;</td>
<td>5' - 3&quot;</td>
<td>4' - 9&quot;</td>
<td>6' - 0&quot;</td>
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<tr>
<td>8' - 0&quot;</td>
<td>8&quot;</td>
<td>8&quot; @ 48&quot;</td>
<td>8&quot; @ 48&quot;</td>
<td>12&quot;</td>
<td>6 - @ 5&quot;</td>
<td>5' - 3&quot;</td>
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<td>4' - 9&quot;</td>
<td>24&quot; - 0&quot;</td>
<td>12&quot;</td>
</tr>
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#### NOTES

1. Wall to be designated Noise Barrier Wall Type 19A, 19B, 19C, or 19D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells have the vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. Construction joints in the shaft cap shall be spaced 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
9. The Contract specifies actual foundation requirements D1 or D2.

### Expansion Joints

Expansion joints @ 24'- 0" MAX. CENTERS. See Contract for locations.

### Wind Exposure & Velocity

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<thead>
<tr>
<th>Soil Type</th>
<th>Angle of Internal Friction (Degrees)</th>
<th>Noise Barrier Type</th>
<th>Wind Exposure</th>
<th>Wind Velocity (MPH)</th>
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<td>D2</td>
<td>38</td>
<td>19C, 19D</td>
<td>30</td>
<td>80</td>
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</tbody>
</table>

### Masonry Wall on Shaft

**W/ Grade Beam Foundation**

**Typical Section**

- CMU (see Note 5)
- Reinforcing Steel Bar "D" (Centered)
- @ "D" @ 48 MAX. (Typ.)
- 2'- 0" MIN.
- Three Blocks Max.
- Beam Extension at Top
- See Contract for locations.

**Level (Typ.)**

- Shaft Spacing 15'- 0" MAX.
- Shaft @ 6'- 0" MAX.
- 1/2 Adjacent Shaft Spacing Max.

**Expansion Joints**

- See Contract for locations.
BOND BEAM DETAIL

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

TRAFFIC SIDE

#5 (TYP.)

SECTION B

TYPICAL EXPANSION JOINT

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

TRAFFIC SIDE

#5 (TYP.)

PLAN VIEW

EXPANSION JOINT AT WIDTH STEP

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

BOND BEAM UNITS

BOND BEAM GRUTING LIMIT

BACKER ROD

POLYURETHANE SEALANT

1/2" JOINT

CONCRETE SHAFT

W 3/4 SPIRAL @ 6" PITCH

2" CLR

135° HOOK (TYP.)

#4 @ 1'-0"

3'-0"

5" OR 10" CMU

6" OR 10" CMU

#5 (TYP.)

PLAN VIEW

TYPICAL BOTH SIDES OF WALL

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

No. 1" AT EQUAL SPACING FOR TOTAL NUMBER SEE REINFORCEMENT SCHEDULE

1'-5" MIN. LAP

DETAIL B

SECTION A

NOISE BARRIER WALL
TYPE 19

STANDARD PLAN D-2.66-00

APPRISED FOR PUBLICATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

MASONRY WALL ON SHAFT
W/ GRADE BEAM FOUNDATION
SECTION D
TYPICAL EXPANSION JOINT

1- 1/2" GREASED OR TAPED ENDS, PENETRATING PIPE SLEEVE 8" MIN.

3/4" DIAM. x 1'- 0" SCHED. 40 PIPE WITH 80 x 10" GRADE 40 WELDED TAIL AS SHOWN LAPPED WITH AND SPACED PER BAR "C"

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 SPLICED AND AT THE TOP AND BOTTOM OF SHAFT.

SECTION A

TRAFFIC SIDE

1- 4# FULL HEIGHT
BAR "C"

1 1/2" CLEARANCE TO FACE SLEEVE

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

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

SECTION B

TYPICAL EXPANSION JOINT

TRAFFIC SIDE

CAP ABOVE

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

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 SPLICED AND AT THE TOP AND BOTTOM OF SHAFT.

1'- 0" FULL HEIGHT
BAR "B" WITH POLYURETHANE SEALANT - BOTH WALL FACES

SECTION C

MASONRY WALL ON SHAFT FOUNDATION

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

SECTION D
TYPICAL EXPANSION JOINT

TRAFFIC SIDE

CAP ABOVE

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

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 SPLICED AND AT THE TOP AND BOTTOM OF SHAFT.

1- 1/2" GREASED OR TAPED ENDS, PENETRATING PIPE SLEEVE 8" MIN.

3/4" DIAM. x 1'- 0" SCHED. 40 PIPE WITH 80 x 10" GRADE 40 WELDED TAIL AS SHOWN LAPPED WITH AND SPACED PER BAR "C"

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 SPLICED AND AT THE TOP AND BOTTOM OF SHAFT.

SECTION A

TRAFFIC SIDE

1- 4# FULL HEIGHT
BAR "C"

1 1/2" CLEARANCE TO FACE SLEEVE

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

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

SECTION B

TYPICAL EXPANSION JOINT

TRAFFIC SIDE

CAP ABOVE

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

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 SPLICED AND AT THE TOP AND BOTTOM OF SHAFT.

1'- 0" FULL HEIGHT
BAR "B" WITH POLYURETHANE SEALANT - BOTH WALL FACES

SECTION D
TYPICAL EXPANSION JOINT

TRAFFIC SIDE

CAP ABOVE

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

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

SECTION A

TRAFFIC SIDE

1- 4# FULL HEIGHT
BAR "C"

1 1/2" CLEARANCE TO FACE SLEEVE

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

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

SECTION B

TYPICAL EXPANSION JOINT

TRAFFIC SIDE

CAP ABOVE

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

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

SECTION C

MASONRY WALL ON SHAFT FOUNDATION

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

SECTION D
TYPICAL EXPANSION JOINT

TRAFFIC SIDE

CAP ABOVE

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

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

SECTION A

TRAFFIC SIDE

1- 4# FULL HEIGHT
BAR "C"

1 1/2" CLEARANCE TO FACE SLEEVE

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

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

SECTION B

TYPICAL EXPANSION JOINT

TRAFFIC SIDE

CAP ABOVE

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

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

SECTION C

MASONRY WALL ON SHAFT FOUNDATION

NOTE
GROUT ALL CELLS BELOW GRADE SOLID MIN. TWO COURSES (TYP.)
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

CONCRETE SLAB DETAIL
FOR CAST-IN-PLACE WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
ACCESS DOOR TYPE 1
STANDARD PLAN D-2.80-00

EXPRESS AUGUST 3, 2015 TO July 31, 2016

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES
1. All rebar shall have a minimum 1-1/2" cover.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
NOTES

1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.68 for wall reinforcement not shown.
ANCHOR PIN = 1/2" x 9" STEEL WELDED TO REINFORCEMENT PLATE

REINFORCEMENT PLATE = 6" x CHANNEL WIDTH x 1/8"
W/ 1/2" x 9" ANCHOR PIN

6" x 10" S.S. PLATE W/ 10" x 1" Diam. S.S. Handle

NOTE
All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.
APPROXIMATE FINAL BATTER FOR FACE OF GEOSYNTHETIC LAYERS

FINISHED GRADE AFTER CONSTRUCTION OF WALL FACING

KEY NOTES

- 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. "As" is the peak seismic ground acceleration as defined and applied in the AASHTO LRFD Bridge Design Specifications, Articles 3.10.4.1 and 11.6.5.
4. The long-term geosynthetic design strength "Ta" shall be determined in accordance with WSDOT Standard Practice T925. See Qualified Products List (QPL), Appendix "D," for products in which "Ta" has been determined. "H" and "Z" are graphically defined.
5. "L," the geosynthetic reinforcement length behind the wall face, is graphically defined. The maximum factored bearing stress acts in the vertical direction at the base of the wall. The load factors used are as specified in the AASHTO LRFD Bridge Design Specifications for each specified limit state.
6. Fascia or facing type shall be selected from Standard Plans D-3.10 or D-3.11 and called out in the Contract Plans. Region is to coordinate with the Geotechnical Services and Bridge & Structures offices.

PERMANENT GEOSYNTHETIC WALL
STANDARD PLAN D-3.09-00

SHEET 1 OF 4 SHEETS

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

5/15/16
# PERMANENT GEOSYNTHETIC WALL - GEOSYNTHETIC REINFORCEMENT DESIGN

## WALL GEOMETRY AND REINFORCEMENT LAYER LOCATION

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<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 TYPE 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 seismic design for large earthquake: A_x 0.15g)

#### TOTAL WALL HEIGHT, H (ft)
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**Note:** See General Note 5, sheet 1.

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### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

(Includes seismic design for large earthquake: A_x 0.25g)

#### TOTAL WALL HEIGHT, H (ft)
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#### MAX. FACTORED BEARING STRESS (psf)

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**Note:** See General Note 5, sheet 1.
1. Set form on completed lift.

2. Unroll geosynthetic and position it so that a 4'-0" wide "tail" drapes over the form. If a geogrid is used for the geosynthetic reinforcement, position geotextile to prevent backfill from spilling through geogrid openings.

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

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

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

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

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

NOTES(SHEET)

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

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

GEOSYNTHETIC WALL CONSTRUCTION SEQUENCE
(SECTION VIEW)
NOTES
1. All bars shown on this plan shall be ASTM A706 unless otherwise specified in the Contract.
2. Safety cable or fence required where "H" ≥ 10'-0".
3. All cast-in-place concrete shall be class 4000.

CAST-IN-PLACE PERMANENT GEOSYNTHETIC WALL FASCIA AND FACING

STANDARD PLAN D-3.10-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

ASSOCIATE IN ENGINEERING

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

ASSOCIATE IN ENGINEERING

TYPICAL SECTION

PERMANENT GEOSYNTHETIC RETAINING WALL WITH CAST-IN-PLACE CONCRETE FASCIA

KEY NOTES

1. "W" ROWS OF (1) #4 DOWEL REINFORCEMENT PLACED BETWEEN GEOSYNTHETIC LAYERS AT 2'-0" O.C. HORIZONTAL SPACING, SEE TABLE. VERTICAL SPACING BETWEEN ROWS TO BE EQUAL, AS MULTIPLES OF 3'-0" ALLOW. ROWS MAY BE STAGGERED. SEE STD. PLAN D-3.09 FOR "W".
2. INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES AND FINISH.
3. CONSTRUCTION JOINT WITH ROUGHENED SURFACE
4. 3/16 PVC PIPE FOR DEEP HOLE IN WALL FACING. PLACE BETWEEN GEOSYNTHETIC LAYERS APPROX. 3' DEEP AT 2'-0" HORIZONTAL SPACING. LENGTH TO EXTEND TO LOWER SURFACE OF SPECIFIED WALL. DEEP HOLES SHALL BE KEPT CLEAN PRIOR TO CAST-IN-PLACE CONCRETE. SEE STANDARD PLAN D-3.09, FOR DETAILS NOT SHOWN.
5. VERTICAL CONSTRUCTION JOINTS IN FASCIA @ 2'-0" O.C. WITH 1/2" PREMOLDED JOINT FILLER (SEE STANDARD PLAN D-18.48, "SPUT ELEVATION")
6. VERTICAL CONSTRUCTION JOINTS IN FOOTING @ 12'-0" O.C. MAX (SEE STANDARD PLAN D-18.48, "ELEVATION"), IF THE FOOTING IS STEPPED, PROVIDE 2'-0" NON-CONTACT LAP SPACES FOR THE (1) #4 BARS AT EACH STEP.
7. COORDINATE WALL FINISH AND CONFIGURATION WITH STATE BRIDGE AND STRUCTURES ARCHITECT PER WSDOT DESIGN MANUAL 730.463.
8. THE (1) BARS AND INTERIOR (1) BARS SHALL BE USED ONLY IF THE FACE IS VERTICAL.

TYPICAL SECTION

PERMANENT GEOSYNTHETIC RETAINING WALL WITH SHOTCRETE FACING

DESIGN HEIGHT (ft.) ROWS OF #4 DOWEL BARS REQUIRED FASCIA FOOTING WIDTH (in.)
UP TO 5 7 1'-0"
6 8 1'-0"
7 9 1'-0"
8 10 1'-0"
9 11 1'-0"
10 12 1'-0.5"
11 13 1'-0.5"
12 14 1'-0.5"
13 15 1'-0.5"
14 16 1'-0.5"
15 17 1'-0.5"
16 18 1'-0.5"
17 19 1'-0.5"
18 20 1'-0.5"
19 21 1'-0.5"
20 22 1'-0.5"
21 23 1'-0.5"
22 24 1'-0.5"
23 25 1'-0.5"
24 26 1'-0.5"
25 27 1'-0.5"
26 28 1'-0.5"
27 29 1'-0.5"
28 30 1'-0.5"
29 31 1'-0.5"
30 32 1'-0.5"
31 33 1'-0.5"
32 34 1'-0.5"
33 35 1'-0.5"
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.

TYPICAL SECTION
PRECAST CONCRETE FASCIA PANEL

KEY NOTES

1. 7/8" (IN) DIAMETER THREADED ANCHOR ROD (STANDARD SPECIFICATION SECTION 5.06.3-4) GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO M232. ANCHOR RODS SHALL BE THREADED A MINIMUM OF 1'-0" AT ENDS. PLACE LEVEL AND NORMAL TO WALL. ENCLOSE ANCHOR RODS WITH PVC SLEEVE. EMBED PVC ENDS INTO GRADE BEAM AND EDGE BEAM.

2. BACKFILL VOID BEHIND WALL WITH SAND CONFORMING TO STANDARD SPECIFICATION SECTION 4-03.13(1) TO 6" ABOVE FINISHED GRADE ON FRONT FACE OF WALL.

3. LEVELING PAD, EDGE BEAM, AND GRADE BEAM ARE CAST-IN-PLACE CONCRETE PLACED AT 0'-1" 1/4' MAX. SLOPE AND THE VERTICAL CONSTRUCTION JOINTS SHALL BE SPACED AT 120" MAXIMUM.

4. ONE 3" (IN) DIAMETER WEEP HOLE PER FASCIA PANEL. HORIZONTAL LOCATION AT THE CENTERLINE FASCIA PANEL.

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

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

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

8. CONTACT BRIDGE OFFICE FOR ROADWAY CROSS SLOPES GREATER THAN 0.0625.

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

10. MAY BE EXTENDED IN LIEU OF CABLE FENCE, 3'-0" MAX.

11. SAFETY CABLE OR FENCE REQUIRED WHEN "N" = 10'-0".

12. CONTACT BRIDGE DESIGN OFFICE.

SEE STANDARD PLAN D-3.09

FILL MATERIAL SPECIFIED ELSEWHERE IN CONTRACT

PRECAST CONCRETE FASCIA PANEL

NOTE: SEE BRIDGE PLANS OR PERMANENT GEOSYNTHETIC WALL BARRIER - SEE STANDARD PLANS D-3.15 OR D-3.16

TRAFFIC BARRIER ON BRIDGE APPROACH SLAB (SEE BRIDGE PLANS)

PERMANENT GEOSYNTHETIC WALL BARRIER - SEE STANDARD PLANS D-3.15 OR D-3.16

MEANS OF SUPPORT AND BACKFILL IN CONTRACT (TYP.

FACE OF RETAINING WALL

CONSTRUCTION LIMITS OF STRUCTURE EXCAVATION CLASS B

PRECAST CONCRETE FASCIA PANEL FOR ROADWAY CROSS SLOPES GREATER THAN 0.0625.

SEE PRECAST FASCIA TABLE, SHEET 2 OF 2.

CONCRETE FASCIA PANEL

FACE OF RETAINING WALL

SAFETY CABLE OR FENCE REQUIRED WHEN "N" = 10'-0"

CONTACT BRIDGE DESIGN OFFICE.

PRECAST CONCRETE FASCIA PANEL

FACE OF RETAINING WALL

SAFETY CABLE OR FENCE REQUIRED WHEN "N" = 10'-0".

CONTACT BRIDGE DESIGN OFFICE.

PRECAST CONCRETE FASCIA PANEL

FACE OF RETAINING WALL

SAFETY CABLE OR FENCE REQUIRED WHEN "N" = 10'-0".

CONTACT BRIDGE DESIGN OFFICE.
CAST-IN-PLACE CONCRETE BARRIER

PRECAST CONCRETE BARRIER

EXPANSION JOINT

1/2" PREMOLDED JOINT FILLER
IN EXPANSION JOINT

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

PVC CAP (TYP.)

SECTION H

FOR CAST-IN-PLACE TO PRECAST BARRIER CONNECTION

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

EXPANSION JOINT DETAIL

FOR DETAILS NOT SHOWN – SEE TYPICAL SECTION
STANDARD PLAN D-3.15 OR D-3.16

NOTE

1. Ensure that no concrete enters the PVC conduit during concrete placement.

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.

BACKFILL AND DRAINAGE FOR RETAINING WALLS
STANDARD PLAN D-4

CONDITION A OR CONDITION B WITH GEOTEXTILE

CONDITION A

CONDITION B

ALTERNATE DETAIL
TYPICAL FOR CONSTRUCTION WITH SHORING
TYPICAL GABION

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

Cross-Connecting Wire Placement, End Cells

Cross-Connecting Wire Placement, Interior Cells of Front Gabions

LACING DETAIL

FASTENING ADJACENT BASKETS

WELDED FABRIC

TWISTED FABRIC

Six independent wires encompassed

Three vertical and two horizontal wires encompassed
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

SHEET 1 OF 2 SHEETS

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**FOOTING REINFORCEMENT**

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**REINFORCEMENT NOTES**

1. **If Traffic Barrier Is Used**, add 0.10 cu yd of concrete Class 4000 for Barrier Alternate 1.
2. Add 0.125 cu yd of concrete Class 4000 for Barrier Alternate 2. Reference Standard Plan D-15.10
3. Add 20 lbff of reinforcing steel for Barrier Alternate 1 or 19 lbff of reinforcing steel for Barrier Alternate 2. Reference Standard Plan D-15.10

**MAXIMUM SOIL PRESSURE (PSF)**

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**DRAWN BY:** BILL REITERS

**EFFECTIVE:** AUGUST 3, 2015 TO JULY 31, 2016

**WALL HTH**

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<th>BAR F</th>
<th>BAR G</th>
<th>BAR H</th>
<th>FOOTING REINFORCEMENT</th>
<th>STEM REINFORCEMENT</th>
<th>MATERIAL QUANTITY</th>
<th>MAXIMUM SOIL PRESSURE (PSF)</th>
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**REINFORCED CONCRETE RETAINING WALL**

**TYPE 1 AND 15W STANDARD PLAN D-10.10-01**

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

**MIN. SPACING**

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**EFFECTIVE:** AUGUST 3, 2015 TO JULY 31, 2016
### TYPICAL SECTION

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<td>WALL HEIGHT (ft)</td>
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<tr>
<td>≤ 12</td>
<td>5</td>
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<td>12 - 16</td>
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<tr>
<td>28 - 35</td>
<td>11</td>
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<tr>
<td>BOTTOM OF FOOTING</td>
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<tr>
<td>≤ 12</td>
<td>5</td>
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<td>12 - 16</td>
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<td>22 - 28</td>
<td>9</td>
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<td>28 - 35</td>
<td>11</td>
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</table>

1. OFFSET - SET TOP OF WALL BACK:
   - H ≤ 20: OFFSET = 1/2 (H ≤ 30)
   - Offset = 2H / 10,000
2. WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE CUTTER SHALL BE PLACED 6" MIN. FROM THE TOP OF THE WALL

### NOTES

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

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

### REINFORCED CONCRETE RETAINING WALL TYPE 2 AND 2SW

**STANDARD PLAN D-10.15-01**

*Approved for Publication*

*SHEETS 1 OF 2 SHEETS*

*Washington State Department of Transportation*
**REINFORCEMENT NOTES**

1. If TRAFFIC BARRIER IS USED, ADD 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1.

2. ADD 0.152 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN 3-15-10

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

**REINFORCED CONCRETE RETAINING WALL TYPE 2 AND 25W STANDARD PLAN D-10.15-10**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
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 internorms through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.

VERTICAL FACE WALL DESIGN
WITH 2:1 BACKSLOPE

REINFORCED CONCRETE
RETAINING WALL
TYPE 3 AND 3SW
STANDARD PLAN D-10.20-00
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 \((0.003 \times H)\) CY/LF.

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

6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.51 g.
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<thead>
<tr>
<th>WALL HT</th>
<th>M</th>
<th>DIMENSIONS</th>
<th>FOOTING REINFORCEMENT</th>
<th>STEM REINFORCEMENT</th>
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<td>A</td>
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**REINFORCED CONCRETE RETAINING WALL**

**TYPE 4 AND 4SW**

**STANDARD PLAN D-10.25-00**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DATE:**

**SHEET:**

**DRAWN BY:** W.L. WIENS

**RATIOS:**

**VERTICAL FACED WALL DESIGN WITH 21" BACKSLOPE**
### Vertical Face Wall Design with 2:1 Backslope

**Reinforcing Concrete Retaining Wall**

**Type 5 Standard Plan D-10.30-00**

**Sheet 2 of 8 Sheets**

**Approved for Publication**

**State Engineer**

**Washington State Department of Transportation**

**Effective: August 3, 2015 to July 31, 2016**

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### Table of Dimensions

<table>
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<th>BAR (F)</th>
<th>RARR</th>
<th>BAR (K)</th>
<th>BAR (M)</th>
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<th>MATERIAL/QUANTITY</th>
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<td>8</td>
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<td>1 - 1 1/2''</td>
<td>3 - 1/2'</td>
<td>2 - 3'</td>
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<td>4</td>
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<td>10</td>
<td>4, 10</td>
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<td>18</td>
<td>4 - 3'</td>
<td>1 - 1 1/2''</td>
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<td>6</td>
<td>4</td>
<td>8</td>
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<td>4, 10</td>
</tr>
</tbody>
</table>

**Service Stress**

- **BARS (E)** are used for centers.
- **RADIUS** (See Table).

**Cartesian Coordinates**

- **EFFECTIVE: August 3, 2015 to July 31, 2016**

---

**Additional Details**

- Dimensions and reinforcement details are provided for various wall heights and configurations.
- Table includes specific dimensions, reinforcement requirements, and soil pressure calculations.
- Highlighted sections indicate critical areas for reinforcement and design considerations.

---

**Design Reference**

- Drawn by: Bill Berge

---

**Effective Dates**

- **Effective: August 3, 2015 to July 31, 2016**
**NOTES**

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

**TYPICAL SECTION**

<table>
<thead>
<tr>
<th>BAR #4</th>
<th>WALL HEIGHT (in)</th>
<th>QTY</th>
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<td>30</td>
<td>11</td>
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<tr>
<td>BOTTOM OF FOOTING</td>
<td>14</td>
<td>4</td>
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<td>30</td>
<td>11</td>
</tr>
</tbody>
</table>
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

STEM REINFORCEMENT

FOOTING REINFORCEMENT

EFFECTI
VE: AUGUST 3,2015 TO Jul
y 31,2016

WALL
HT
H

DIMENSIONS
B

Cy

BAR@#4

D

hk

A

LENGTH

N/A
N/A
N/A
N/A
N/A
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N/A
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N/A
N/A
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N/A

1' -11/2"
1'- 3"
1'- 4"
1'- 5"
1' -61/2"
1'- 7 1/2"
1'- 8 1/2"
1'- 10"
1' - 11"
2'- 0"
2'- 1"
2' - 2"
2'- 3"
2'- 4 1/2"
2'- 5"
2'- 6"

3'- 4"
3'- 4"
3'- 4"
3'- 4"
3'- 4"
3'- 4"
3' - 7"
3'- 7"
3'- 7"
3'- 7"
3'- 10"
3'- 10"
4 1"
4'- 1"
4'- 4"
41-711

2'2'2'2'2'2'3'3' 3' 3' 3' 3'3' 3'3'4' -

2'-71/2"
2'- 8 1/2"
2' - 9 1/2"
2'- 10 1/2"
2' - 11 1/2"
3'- 1"
3'- 2"
3'- 3"
3'- 4"
3' - 5"
3'- 6"
3' - 7"
3'- 7 1/2"
3' - 9"
3' - 10"

4'- 7"
4' - 7"
4'- 10"
4'- 10"
5'- 1"
5'- 1"
5'- 1"
5'- 4"
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5'- 7"
5'- 10"
6'- 1"
6'- 4"
6'- 4"
6' -7"

4'4'4' 4'4'4'4'4'4' 5'5'5'5'5'6' -

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4'- 3"
4' - 3"
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4' - 9"
5'- 6"
6' - 0"
6'- 6"
7'- 3"
7'- 9"
8'- 3"
9'- 0"
9'- 9"
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1'- 3"
1'- 6"
1'- 611
1'- 9"
1'- 9"
2'- 0"
2'- 3"

21'
22'
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11'- 0"
12'- 0"
12'- 3"
13'- 0"
13'- 9"
13'- 9"
14'- 3"
14'- 9"
15'- 6"
16'- 6"
16'- 9"
17' - 3"
17'- 9"
18'- 9"
19'- 3"

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SPA.

LENGTH SIZE
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4'- 0"
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4'- 0"
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4' - 0"
#4
4' - 0"
#4
4'- 6"
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5'- 3"
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5'- 9"
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6'- 3"
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7' - 0"
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8'- 0"
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10'- 9"
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12'- 9"
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13'- 6"
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13' - 6"
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14'- 0"
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14'- 6"
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15'- 3"
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16'- 3"
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16'- 6"
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17'- 0"
#4
17' - 6"
#4
18'- 6"
#4
19'- 0"

BAR@

BAR@
SPA.
1'- 6"
1'- 6"
1'- 6"
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7'- 0"
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10'- 0"

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10'- 9"
11'- 9"
12'- 0"
12'- 9"
13'- 6"
13'- 6"
14'- 0"
14'- 6"
15'- 3"
16'- 3"
16'- 6"
17'- 0"
17'- 6"
18'- 6"
19' - 0"

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BAR

BAR@

SPA.

LENGTH

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1'- 6"
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5' - 1 1/2"
6' - 1 1/2"
7' - 1 1/2"
8' - 1 1/2"
9' - 1 1/2"
10' - 1 1/2"
11' -11/2"
12'- 1 1/2"
13'- 1 1/2"
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15'- 1 1/2"
16'- 2 1/2"
17' - 2 1/2"
18'- 2 1/2"
19'- 4"
20' - 4"

4'- 7"
5'- 7"
6' - 7"
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10'- 3 1/2"
9' - 3 1/2"
10'- 5"
10'- 0 1/2"
11'- 1 1/2"
14' - 5 1/2"
15'- 5 1/2"
15'- 7"
15'- 4"
13'- 5 1/2"
14' - 6 1/2"
16'- 3"
15'- 5 1/2"
16'- 4"
16'- 2 1/2"

9' - 4 1/2"
8' - 4 1/2"
9' - 6"
9'- 1 1/2"
10'- 3"
13'- 5"
14' - 5 1/2"
14' - 6 1/2"
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13'- 4"
14' - 10 1/2"
14'- 1"
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1'- 8"

SIZE SPA.
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6' - 2"
1'- 0"
6'- 2"
1'- 0"
6'- 5"
10"
6'- 5"
6'- 8"
10"
1'- 4"
7'- 9"
1' - 4"
7'- 9"
1'- 2"
8'- 0"
8'- 0"
1'- 0"
10"
9'- 7"
10"
9' - 10"
1'- 0" 11'- 51/2"
10"
11'- 81/2"
10"
11'- 81/2"
11' -111/2"
9"

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5' - 2"
5'- 2"
5'- 5"
5'- 511
5'- 8"
6'- 8"
6'- 8"
6'- 11"
6'- 11"
8'- 3"
8' - 6"
10'- 0"
10' - 3"
10'- 3"
10'- 6"

CD

MATERIAL MAXIMUM SOIL PRESSURE (PSF)
QUANTITY

@#4

SERVICE STRENGTH

EXTREME
EVENT 1

b
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
N/A
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N/A

SIZE
N/A
N/A
N/A
N/A
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SPA.
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N/A
N/A

LENGTH

CONC.
CY/LF

STEEL
LBS/LF

3'- 9"
4'- 9"
5'- 9"
6'- 9"
7'- 10 1/2"
8'- 9 1/2"
9' - 6 1/2"
10'- 6 1/2"
11'- 6 1/2"
12'- 6 1/2"
13' - 3 1/2"
14'- 3 1/2"
15'- 0 1/2"
16'- 1"
16'- 10"
17'- 7"

0.30
0.34
0.39
0.44
0.50
0.56
0.67
0.77
0.86
0.96
1.12
1.22
1.39
1.52
1.73
1.93

20.5
23.0
24.1
26.6
27.7
31.5
36.8
38.8
46.2
54.5
62.7
72.1
80.1
93.9
110.7
123.5

591
709
815
887
998
1145
1368
1540
1664
1875
1987
2202
2348
2441
2556
2702

771
925
1061
1146
1354
1580
1892
2125
2305
2604
2754
3058
3265
3391
3545
3752

733
871
992
1066
1236
1412
1686
1899
2049
2310
2450
2716
2894
3010
3153
3331

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1'- 4"
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1'- 0"
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1'- 4"
1'- 4"
1'- 2"
1' - 0"
10"
10"
1'- 0"
10"
10"
9"

18'- 6"
19'- 6"
20' - 3"
21' - 3"
22'- 0"
23' - 0"
24'- 0"
24'- 9"
25'- 9"
26'- 6"
27'- 3"
28'- 0"
28'- 9"
29'- 9"
30' - 6"

18'- 7"
19'- 7"
20' - 4"
21'- 4"
22' - 1"
23'- 1"
24' - 1 1/2"
24'- 10 1/2"
25'- 10 1/2"
26' - 7 1/2"
27' - 4 1/2"
28' - 1 1/2"
28'- 10 1/2"
29'- 10 1/2"
30' - 7 1/2"

2.09
2.27
2.48
2.66
2.94
3.27
3.44
3.71
3.92
4.28
4.56
4.88
5.21
5.50
5.86

125.5
153.1
160.1
184.9
197.0
194.2
201 .9
222.8
255.3
341.4
353.0
387.7
442.0
471 .7
516.0

2800
2876
3046
3147
3190
3248
3298
3450
3556
3591
3760
3910
4060
4072
4221

3886
3983
4229
4368
4424
4543
4620
4832
4976
5010
5254
5464
5675
5680
5889

3454
3552
3756
3883
3933
3997
4054
4238
4370
4414
4616
4799
4982
4997
5179

#8
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SLOPING FACE WALL DESIGN
WITH 2 :1 BACKSLOPE

RADIUS
(SEE TABLE)

--~_1

~- b -~
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BAR@
1'- 6" CENTERS

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#5
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BAR
#4

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

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

BARS@ AND@

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

MIN. SPLICE
2'- 0"
2'- 0"
2' - 0"
2'- 6"
3'- 3"
4'- 2"
5'- 3"

REINFORCED CONCRETE
RETAINING WALL
TYPE&
STANDARD PLAN D-10.35-00
SHEET 2 OF 2 SHEETS

....

VI

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

DATE

Washington State Depar1ment of Transpor1ation

EFFECTI
VE: AUGUST 3,2015 TO Jul
y 31,2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016


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.

VERTICAL FACE WALL DESIGN 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

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

### Vertical Face Wall Design with 720 psi Surcharge

**Reinforcement Details**

1. **Reinforcement Notes:**
   - Add 0.004 CVU of Concrete Class 400 for Barrier Alternatives 1 or 10.

2. **Dimensions:**

<table>
<thead>
<tr>
<th>Bar</th>
<th>Type</th>
<th>Size</th>
<th>Spacing</th>
<th>Length</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>#5</td>
<td>1/2&quot;</td>
<td>1'-6&quot;</td>
<td>2'-7&quot;</td>
<td>12'</td>
</tr>
<tr>
<td>C</td>
<td>#6</td>
<td>3/4&quot;</td>
<td>1'-6&quot;</td>
<td>2'-7&quot;</td>
<td>12'</td>
</tr>
</tbody>
</table>

**Footing Reinforcement**

- Bar @#4 Bar® @ HT
- Footing reinforcement
- @ADD

**Stem Reinforcement**

- Bar @#4 Bar® @ HT
- Stem reinforcement
- @ADD

**Material**

- Bar @#4 Bar® @ HT
- Material
- @ADD

**Volume Calculation**

- Bar @#4 Bar® @ HT
- Volume calculation
- @ADD

---

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
250 PSF EQUIVALENT LIVE LOAD SURCHARGE WHEN SPECIFIED IN CONTRACT

FACE OF WALL

FRONT

250 PSF LOTUS EQUIVALENT LIVE LOAD SURCHARGE WHEN SPECIFIED IN CONTRACT

12 1/2'

1 1/2'

3' CLR.

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

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

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

#4 @ 1'-6" CENTERS

DRAIN

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

SURFACE TREATMENT

NOTE:

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.

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

REINFORCED CONCRETE RETAINING WALL TYPE 8

STANDARD PLAN D-10.45-01

SPLIT ELEVATION VIEW

(SHOWING SEPARATE REBAR LAYERS)

TYPICAL SECTION

BAR #4

LOCATION WALL HEIGHT (ft) QTY.

TOP OF FOOTING

≤ 12' 5

13' ≤ 16' 6

17' ≤ 22' 7

23' ≤ 30' 9

≤ 20' 11

BOTTOM OF FOOTING

13' ≤ 16' 6

17' ≤ 22' 7

23' ≤ 30' 9

20' ≤ 35' 11

OFFSET = SET 3/4" OF WALL BACK:

H ≤ 24' OFFSET = 1/2"

H > 24' OFFSET (inches) = (H/3) - 2

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

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

CONSTRUCTION JOINTS IN FOOTING AT 12" CENTERS MAX.
### Reinforcement Notes

1. **Traffic Barrier is Used:** Add 0.110 CY of Concrete Class 4000 for Barrier Alternate 1. Add 0.152 CY of Concrete Class 4000 for Barrier Alternate 2. See Standard Plan D-15-10.

2. **Add 16 Lbf of Reinforcing Steel for Barrier Alternate 1 or 23 Lbf of Reinforcing Steel for Barrier Alternate 2.** See Standard Plan D-15-10.

---

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

**REINFORCED CONCRETE RETAINING WALL TYPE 8**

**STANDARD PLAN D-10.45-01**

**APPROVED FOR EDUCATION**

**Sheet 1 of 4 Sheets**

**Washington State Department of Transportation**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

---

**WALL HT**

**DIMENSIONS**

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<thead>
<tr>
<th>SIZE</th>
<th>SPA. LENGTH</th>
<th>SIZE</th>
<th>SPA. LENGTH</th>
<th>SIZE</th>
<th>SPA. LENGTH</th>
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<td>6'</td>
<td>3'-0&quot;</td>
<td>7'</td>
<td>3'-1&quot;</td>
<td>8'</td>
<td>3'-2&quot;</td>
<td>9'</td>
<td>3'-3&quot;</td>
<td>10'</td>
<td>3'-4&quot;</td>
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</table>

**FOOTING REINFORCEMENT**

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<th>SIZE</th>
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<th>SIZE</th>
<th>SPA. LENGTH</th>
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<tr>
<td>5'</td>
<td>1'-6&quot;</td>
<td>6'</td>
<td>3'-0&quot;</td>
<td>7'</td>
<td>3'-1&quot;</td>
<td>8'</td>
<td>3'-2&quot;</td>
<td>9'</td>
<td>3'-3&quot;</td>
<td>10'</td>
<td>3'-4&quot;</td>
</tr>
</tbody>
</table>

**STEM REINFORCEMENT**

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

---

**REINFORCEMENT NOTES**

1. **Traffic Barrier is Used:** Add 0.110 CY of Concrete Class 4000 for Barrier Alternate 1. Add 0.152 CY of Concrete Class 4000 for Barrier Alternate 2. See Standard Plan D-15-10.

2. **Add 16 Lbf of Reinforcing Steel for Barrier Alternate 1 or 23 Lbf of Reinforcing Steel for Barrier Alternate 2.** See Standard Plan D-15-10.

---

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

**REINFORCED CONCRETE RETAINING WALL TYPE 8**

**STANDARD PLAN D-10.45-01**

**APPROVED FOR EDUCATION**

**Sheet 1 of 4 Sheets**

**Washington State Department of Transportation**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS

STANDARD PLAN D-15.10-01

F-SHAPE TRAFFIC BARRIER ON RETAINING WALL

BEAM GUARDRAIL TRANSITION TYPE 20 CONNECTION

BEAM GUARDRAIL TRANSITION TYPE 21 CONNECTION

PERSPECTIVE VIEW

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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

PLAN VIEW
FRACTURED FIN FINISH DETAIL

DUMMY JOINT DETAIL

VARIES

NOTE
SEE ELEVATION FOR LAP SPICE REQUIREMENTS

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

1 1/2"±1/4" 
1/4" TO 1/2" DEEP IRREGULAR FRACTURE

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.10-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.20-02

ELEVATION

ATTACH GUARDRAIL TO CONCRETE TRAFFIC BARRIER WITH 3/8" DIA. HIGH STRENGTH BOLTS (STANDARD SPECIFICATION A-295/1A) WITH THIN SLAB FERRULE INSERTS OR RESIN BONDED ANCHORS. SEE THE CONTRACT PLANS.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

RETAINING WALL.png
REINFORCING STEEL BENDING DIAGRAM

NOTE
SEE ELEVATION FOR LAP SPLICE REQUIREMENTS

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

VARIES

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

NOTE
SEE ELEVATION FOR LAP SPLICE REQUIREMENTS

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

PLAN VIEW
FRACTURED FIN FINISH DETAIL

DUMMY JOINT DETAIL

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
DUMMY JOINT - SEE DETAIL
DUMMY JOINT TO BE OMITTED ON BACK FACE OF BARRIER

8' - 0" SPACING BETWEEN JOINTS (TYPICAL)

BRIDGE RAILING TYPE BP

SIDEWALK
CURB LINE

PLAN

2 (#5) @ 8" SPACING
2 (#5) @ 8" SPACING
2 (#4) @ 7" - 4" SPACING

2 (#5) CONTINUOUS
2 (#5) CONTINUOUS

8' - 0"

1 1/2" CLR

SIDEWALK PLAN

CURB LINE

8' - 0"

ELEVATION

DUMMY JOINT DETAIL

FRACTURED FIN FINISH DETAIL

1/10" TO 1/2" DEEP IRREGULAR FRACTURE

PLAN VIEW

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS

STANDARD PLAN D-15.30-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
BRIDGE RAILING TYPE BP
TOP OF SIDEWALK

FOR GUARDRAIL TRANSITION TYPE 21 CONNECTION, THIS SHEET
ATTACH GUARDRAIL TO CONCRETE TRAFFIC BARRIER WITH 7/8" DIAM.
HIGH STRENGTH BOLTS (STANDARD SPECIFICATION 9-06.5(4)) WITH
THIN SLAB FERRULE INSERTS OR RESIN BONDED ANCHORS.
SEE THE CONTRACT PLANS.

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

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.

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

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

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

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

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

ATTACH GUARDRAIL TO CONCRETE TRAFFIC BARRIER WITH 7/8" DIAM.
HIGH STRENGTH BOLTS (STANDARD SPECIFICATION 9-06.5(4)) WITH
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SEE THE CONTRACT PLANS.

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

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HIGH STRENGTH BOLTS (STANDARD SPECIFICATION 9-06.5(4)) WITH
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SEE THE CONTRACT PLANS.

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

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

NOTES
1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.
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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.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

DECK FRAMING PLAN - SINGLE LANE

DECK FRAMING PLAN - TWO LANE

ELEVATION - PILE TRELLIS

ELEVATION - FRAME TRELLIS

5-22-98

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

STANDARD PLAN E-2

SHEET 1 OF 2 SHEETS

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES
1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be 2-8 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 2-8 spikes, number 1 or larger.
7. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
8. Overlay thickness must be sufficient to cover bolts.

SECTION A-A

BASE PLATE DETAIL

DISTRIBUTION PLATE DETAIL

BACKING PLATE DETAIL

SECTION B-B

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

EFFECTIVE: AUGUST 3, 2015 TO JULY 31, 2016

STANDARD PLAN E-2 SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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 E-4.

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'.

PILE TO PILE-CAP CONNECTIONS

PILE BUNKING AND SHIPPING SUPPORT DIAGRAMS

PILE HANDLING DIAGRAMS
DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

DEPRESSED CURB SECTION AT CURB RAMPS AND DRIVEWAY ENTRANCES

NOTE


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

CEMENT CONCRETE PEDESTRIAN CURB

FACE OF CURB

VARI E 12" TO 24" (SEE CONTRACT)

1 1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1 1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1 1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1 1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.

ROADWAY

MATCH ROADWAY SLOPE

1/2" (IN) R.
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.
EXTRUDED CURB

STANDARD PLAN F-10.42-00

NOTE

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

<table>
<thead>
<tr>
<th>CURB RADIUS</th>
<th>DIMENSION A</th>
<th>DIMENSION B</th>
<th>DIMENSION C</th>
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<tr>
<td>3'</td>
<td>12&quot;</td>
<td>2&quot;</td>
<td>8&quot;</td>
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<td>4' TO 5'</td>
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<td>1 1/2&quot;</td>
<td>9&quot;</td>
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<tr>
<td>6'</td>
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<td>1/4&quot;</td>
<td>29 1/2&quot;</td>
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<tr>
<td>OVER 60'</td>
<td>USE TANGENT BLOCK, SEE SHEET 1</td>
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<td></td>
</tr>
</tbody>
</table>

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

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


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

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 Grassings, 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 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 is 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 remain as flat as feasible.

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 on any part of the curb ramp or landing.

5. See the Contract Documents for the curb design specified. See Standard Plan F-10.12 for Curb, Curb and Gutter, Depressed Curb and Gutter Pedestrian Curb details.


7. The bid item "Cement Concrete Curb Ramp Type ..." does not include the adjacent Curb or (Curb and Gutter), 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. The Detectable Warning Surface (DWS) shall extend the full width of the curb ramp (exclusive of flares) or the landing.
2. The Detectable Warning Surface shall be placed at the back of curb, and need not follow the radius.
3. The rows of truncated domes shall be aligned to be perpendicular to the grade break at the back of curb.
4. The rows of truncated domes shall be aligned to be parallel to the direction of travel.
5. If curb and gutter are not present, such as a shared-use path connection, the Detectable Warning Surface shall be placed at the pavement edge.
7. If a curb ramp is required, the location of the Detectable Warning Surface must be at the bottom of the ramp and within the required distance from the rail.
8. When the grade break between the curb ramp and the landing is less than or equal to 5 ft. from the back of curb at all points, place the Detectable Warning Surface on the bottom of the curb ramp.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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 flat.

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.
CEMENT CONCRETE SIDEWALK

BUFFER STRIP (TYP.)

1/2" (IN) R. (TYP.)

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

MATCH SIDEWALK WIDTH

MATCH SIDEWALK WIDTH

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

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

MATCH SIDEWALK WIDTH (SEE CONTRACT)

MATCH SIDEWALK WIDTH (SEE CONTRACT)

CEMENT CONCRETE CURB & GUTTER (SEE NOTE 2)

CEMENT CONCRETE CURB & GUTTER (SEE NOTE 2)

BROOMED FINISH (TYP.)

BROOMED FINISH (TYP.)

Cement Concrete DriveWAY ENTRANCE Type 3 Pay Limits

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

(SEE NOTE 7)

(SEE NOTE 7)

Driveway Entrance Type 3 Pay Limits

Driveway Entrance Type 4 Pay Limits

Driveway Entrance Type 4 Pay Limits

Driveway Entrance Type 4 Pay Limits

DEPRESSED CURB & GUTTER (SEE NOTE 3)

DEPRESSED CURB & GUTTER (SEE NOTE 3)

Driveway Entrance Type 3 Pay Limits

Driveway Entrance Type 3 Pay Limits

Driveway Ramp

Driveway Ramp

SECTION E

SECTION E

SECTION F

SECTION F

TYPE 3

TYPE 4*

* THIS ENTRANCE TYPE SHALL NOT BE USED ALONG A PEDESTRIAN ROUTE

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

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

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

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

STANDARD PLAN F-80.10-03 SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
Washington State Department of Transportation

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES


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

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

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

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

---

**TYPICAL INSTALLATION FOR SINGLE-FACED SIGNS**

- Shoulder not less than 8.0'
- 12.0' min. - 18.0' max.
- Bolt and post centerline
- D10-1, D10-2, & D10-3 Milepost Sign Panel
- 4x4 (nom.) timber sign post or 2"x2" steel sign post
- Varies - see Note 3

---

**TYPICAL INSTALLATION FOR DOUBLE-FACED SIGNS**

- Shoulder not less than 8.0'
- 12.0' min. - 18.0' max.
- Bolt and post centerline
- D10-101, D10-201, & D10-301 Milepost Sign Panel
- 4x4 (nom.) timber sign post or 2"x2" steel sign post

---

**SUPPLEMENTAL PLAQUE - MOUNTING DETAIL**

- Install plaque on both sides
- Single-Faced Sign
- Double-Faced Sign

---

**MILEPOST STANDARD PLAN G-10.10-00**

- Effective: August 3, 2015 to July 31, 2016
- Approved for publication
- Expires August 9, 2009

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**Diagram Details**

- Timber Post
- Steel Post
- Back Equation Plaque (D10-401)
- Spur Route Plaque (D10-501)
- 1/4" diam. x 1 1/2" lag bolt and washer
- 1/4" diam. x 3" hex head bolt, nut & washer (used for single-face installations also)
NOTES
1. Notch is only required with multiple post installations.
2. 6x10, 8x10, and 8x12 Timber Sign Posts cannot be made breakaway and do not have holes or notches. These posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.
3. For "X", "Y", "H1", "H2", "H3", and "H4" refer to the Sign Specification Sheet in the Contract.
4. For 6x6 posts and larger, 7' (ft) minimum spacing is required between posts.
5. All materials shall meet the requirements of Standard Specification 9-28.

POST INSTALLATION TABLE

<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>DEPTH</th>
<th>HOLE DIAMETER</th>
<th>NOTCH DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x4</td>
<td>3'-0&quot;</td>
<td>NOT REQUIRED</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>4x6</td>
<td>4'-0&quot;</td>
<td>1 1/8&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>6x6</td>
<td>4'-0&quot;</td>
<td>2&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>6x8</td>
<td>5'-0&quot;</td>
<td>SEE NOTES 3 &amp; 4</td>
<td>SEE NOTES 3 &amp; 4</td>
</tr>
<tr>
<td>6x10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
<tr>
<td>8x10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
<tr>
<td>8x12</td>
<td>7'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
</tbody>
</table>
**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 Foundation, see Standard Plan G-25.10.

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

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

---

**STEEL SIGN SUPPORT TYPE AP INSTALLATION DETAILS STANDARD PLAN G-24.10-00**

---

**Washington State Department of Transportation**

**EFFECTIVE:** AUGUST 3, 2015 TO July 31, 2016
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.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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-35.10.

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

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

5. Do not tighten any slip plate bolt to the recommended torque before 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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PLAN G-24.30-01

SHEET 1 OF 2 SHEETS

DRAWN BY: LISA CYRNO

ELEVATION
TYPE PL SIGN SUPPORT

ELEVATION
TYPE PL-T SIGN SUPPORT

DETAIL C

EXPLODED VIEW
PIPE CLAMP AND U-BOLT

EXPLODED VIEW
TYPE PL SIGN SUPPORT

ISOMETRIC VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PLAN G-24.30-01

SHEET 1 OF 2 SHEETS

DRAWN BY: LISA CYRNO
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 foundations shall be smooth, dense and uniform to finished grade line.
5. Slip Base and all other materials shall meet the requirements of Standard Specification 9-06.
6. When a 2 1/4" (in) insert is used, the insert shall be a minimum of 7 feet.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3
INSTALLATION DETAILS
STANDARD PLAN G-24.40-05

SHEET 1 OF 4 SHEETS

APPROVED 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.

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

STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3
INSTALLATION DETAILS
STANDARD PLAN G-24.40-05

EXPLODED VIEW
TYPE SB-1
SLIP BASE ASSEMBLY

EXPLODED VIEW
TYPE SB-2
SLIP BASE ASSEMBLY

EXPLODED VIEW
TYPE SB-3
SLIP BASE ASSEMBLY

STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3 ~ 8" (IN)
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.
**Effectiveness:** August 3, 2015 to July 31, 2016

---

**Steel Sign Support Foundation Details**

**Standard Plan G-25.10-04**

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


**Key Notes**

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

---

**Notes**

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


---

**Steel Sign Support Foundation Details**

**Standard Plan G-25.10-04**

**Effectiveness:** August 3, 2015 to July 31, 2016

---

**Steel Sign Support Foundation Details**

**Standard Plan G-25.10-04**

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


**Key Notes**

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

---

**Steel Sign Support Foundation Details**

**Standard Plan G-25.10-04**

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


**Key Notes**

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

1. Mounting brackets with stainless steel straps shall be a 3/16" (6.35 mm) wide and 0.030" (0.762 mm) 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" (0.3048 m) 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' (914 mm); signs larger than 36 square feet require a special design mast arm and signal pole.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

NOTE:
Any Lane Use Sign greater than 7.5 sq ft.
requires a Special Design Mast Arm and Signal Pole.

MOUNTING BRACKET AND STEEL STRAP (SEE NOTE 1)

LEVEL
BACK OF SIGN PANEL

SECTION B

SIGN OR LIGHT STANDARD (REFER TO APPROVED SHOP DRAWINGS FOR MAXIMUM ALLOWED SQUARE FOOTAGE)

3/16" (IN) ALUMINUM RIVET (TYP.) - 4" (IN) MAX. SPACING

ALUMINUM WINDREEM

LEVEL
BACK OF SIGN PANEL
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOTES

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

2. Sign braces are required for sign widths of 48" (in) or greater. For sign widths of 36" (in), the sign braces are only installed when specified in the contract.

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

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type III, IV, VIII or IX sheeting.

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

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

SIGN BRACING

STANDARD PLAN G-50.10-02

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
L. P. B.
Jan 23, 2015 7:48 AM

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" (in) wide and 0.030" (in) thick.

2. Sign braces are required for sign widths of 48" (in) or greater. For sign widths of 36" (in), the sign braces are only installed when specified in the contract.

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

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type III, IV, VIII or IX sheeting.

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

6. For signs installed back to back on a single post, no bracing is required.
### SIGN BRACE DIMENSIONS

<table>
<thead>
<tr>
<th>SIGN TYPE</th>
<th>YIELD</th>
<th>DIAMOND-SHAPED</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1/3 SIGN WIDTH - 1 3/4&quot;</td>
<td>1/2 SIGN WIDTH - 1 1/4&quot;</td>
<td>1/3 SIGN WIDTH - 1&quot;</td>
</tr>
<tr>
<td>B</td>
<td>5 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>4 3/4&quot;</td>
</tr>
</tbody>
</table>

### SIGN POST TYPE

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x8 OR 6x8 TIMBER POST</td>
<td>6x8 TIMBER POST</td>
</tr>
</tbody>
</table>

### NOTE

1. For sign installations on round steel posts, see Standard Plan G-30.10, sheet 2 of 2.

---

## SIGN BRACE DETAIL

- **A**
- **B**
- **TOP**
- **SIDE**

### YIELD SIGN

- 1/8" (IN) GALV. STEEL OR S.S. STRAP
- 1/2" (IN) DIAM. HOLE

### DIAMOND-SHAPED SIGN

- 5/16" (IN) DIAM. X 1" LONG SLOT (TYP.)

### NO PASSING ZONE SIGN BRACE DETAIL

- 1/8" (IN) GALV. STEEL OR S.S. STRAP
- 1/2" (IN) DIAM. HOLE

### SCHOOL ZONE SIGN

- NO PASSING ZONE SIGN BRACE - SEE DETAIL

---

### EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
100% UT

1 2 1/2

1/4" (IN) BACK-UP BAN
3/16" WELD

SECTION B

POST BASE DETAILS

STEP WELD DETAIL

1/2" (IN) DIAM. STEEL BOLT, 1 1/2" (IN) LONG,
WITH (2) WASHERS AND (2) NUTS
FOR GROUND

INSIDE EDGES SHALL BE ROUNDED AND SMOOTH
ALL AROUND

CANTILEVER
SIGN STRUCTURE
(TRUSS TYPE)
STANDARD PLAN G-60.10-03

VIEW C

1/4" (IN) BACK-UP BAN
3/16" WELD

DETAIL "G"

PIECE O.D.

BACK-UP RING

100% UT SEE WELD
DETA"G"

SCREEN DETAIL

SCREEN = SEE STD PLAN 2-78.40,
SHEET 1 FOR DETAILS

TOP OF SCREEN

TOP OF FRAME

TOP OF FOUNDATION

TOP OF BASE PLATE

1/4" (IN) BACK-UP BAN
3/16" WELD

DETAIL "G"

PIECE O.D.

BACK-UP RING

100% UT SEE WELD
DETA"G"

SCREEN DETAIL

SCREEN = SEE STD PLAN 2-78.40,
SHEET 1 FOR DETAILS

TOP OF SCREEN

TOP OF FRAME

TOP OF FOUNDATION

TOP OF BASE PLATE

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

VALUES OF Z

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 SF OR LESS</td>
<td>200 SF - 400 SF</td>
<td></td>
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<tr>
<td>Z</td>
<td>Z</td>
<td></td>
</tr>
<tr>
<td>13 - 0'</td>
<td>18 - 0'</td>
<td>1500 AND UP</td>
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<tr>
<td>16 - 0'</td>
<td>22 - 0'</td>
<td>1000 - 1499</td>
</tr>
</tbody>
</table>

CONSTRUCTION JOINT W/ ROUGHENED SURFACE

GROUNDED CONDUCTOR SHALL ATTACH TO VERTICAL REINFORCING STEEL 1" - 2" MIN. BELOW ANCHOR BOLT ASSEMBLY

NOTES:
1. See Standard Specification 8-21.3(9) for construction requirements.
2. Use a template to locate and secure bolts in place during foundation installation.

STANDARD PLAN G-60.20-02

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Jan 18 2015 7:51 AM

Washington State Department of Transportation

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

**COLUMN AND SHAFT SPIRAL OPTIONS**

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<thead>
<tr>
<th>Deformed Bar</th>
<th>Plain Steel Bar</th>
<th>Cold Drawn Wire</th>
<th>Deformed Wire AASHTO M 225</th>
<th>Weld Dimensions [inches]</th>
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<tbody>
<tr>
<td>#4</td>
<td>1/2&quot; DIAM.</td>
<td>W20</td>
<td>D20</td>
<td>1/4 x 1/8 x 4</td>
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<tr>
<td>#5</td>
<td>9/16&quot; DIAM.</td>
<td>W31</td>
<td>D31</td>
<td>9/16 x 3/16 x 6</td>
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<tr>
<td>#6</td>
<td>3/4&quot; DIAM.</td>
<td>W44</td>
<td>D44</td>
<td>3/8 x 3/16 x 8</td>
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**MATERIAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Shaft Concrete</td>
<td>CLASS 4000P</td>
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<tr>
<td>All Other Concrete</td>
<td>CLASS 4000</td>
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<tr>
<td>Steel Reinforcement</td>
<td>AASHTO M 31 Grade 60</td>
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<tr>
<td>Anchor Rods</td>
<td>ASTM F 1554 Grade 100</td>
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<td>Anchor Nuts</td>
<td>ASTM A 583 Grade DH</td>
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<td>Anchor Washers</td>
<td>ASTM F436</td>
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<tr>
<td>Anchor Galvanizing</td>
<td>AASHTO M 232</td>
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<tr>
<td>Anchor Plate</td>
<td>AASHTO A 38</td>
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</table>

**CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1**

**STANDARD PLAN G-60.20-02**

**SHEET 2 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**City, State**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

CONCRETE SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH, WITHOUT THE USE OF WOOD FORMS. ALL FORMWORK SHALL BE REMOVED TO ALLOW CONCRETE TO ATTACH TO VERTICAL REINFORCING STEEL 1'-0" MIN. BELOW ANCHOR BOLT ASSEMBLY.

ANCHOR PLATE (TYP.) – SEE STANDARD PLAN G-60.20 SHEET 2 FOR DETAILS
CLAMP STEEL REINFORCING BAR WITH CONNECTOR SUITABLE FOR USE EMBEDED IN CONCRETE.

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPES 2 & 3
STANDARD PLAN G-60.30-02

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**BAR LIST - TYPES 2 AND 3**

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>TOTAL SIGN AREA</th>
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<tbody>
<tr>
<td></td>
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<td>200 SF OR LESS</td>
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<tr>
<td></td>
<td></td>
<td>QTY.</td>
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<tr>
<td>①</td>
<td>PEDESTAL HOOP</td>
<td>5</td>
</tr>
<tr>
<td>②</td>
<td>FOUNDATION WALL TIES</td>
<td>6</td>
</tr>
<tr>
<td>③</td>
<td>FOUNDATION VERTICALS</td>
<td>14</td>
</tr>
<tr>
<td>④</td>
<td>PEDESTAL VERTICALS</td>
<td>16</td>
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<tr>
<td>⑤</td>
<td>FOUNDATION WALL HORIZONALS AT SLOPE</td>
<td>2</td>
</tr>
<tr>
<td>⑥</td>
<td>FOUNDATION WALL HORIZONALS</td>
<td>VARIOUS SEE PLANS</td>
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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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<tr>
<td>① Z</td>
<td>9' - 0&quot;</td>
<td>2500 OR GREATER</td>
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<tr>
<td>② Z</td>
<td>11' - 0&quot;</td>
<td>NOT LESS THAN 1500</td>
</tr>
<tr>
<td>③ Z</td>
<td>13' - 0&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**BENDING DIAGRAM**

**MATERIAL SPECIFICATIONS**

- CONCRETE: CLASS 4000P
- STEEL REBAR: AASHTO M 31 GRADE 60
- ANCHOR RODS: ASTM F 1554 GRADE 105
- ANCHOR NUTS: ASTM A 563 GRADE DH
- ANCHOR WASHERS: ASTM F436
- ANCHORAGE DOWELING: AASHTO M 232
- ANCHOR PLATE: ASTM A 35

**CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPES 2 & 3 STANDARD PLAN G-60.30-02**

**Sheet 2 of 2 Sheets**

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Logan, MT
Jun 18 2015 7:52 AM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
**Typical Joint Detail**

Chord shown - end post similar.

**Alternate Joint Detail**

*Not for connections between vertical diagonals and chords.*

- **Span Length**
  - 60’ OR LESS: 2.5’ 1/4” 3/4”
  - 65’ TO 90’: 3’ 1/2” 7/8”
  - 95’ TO 120’: 3’ 1/2” 7/8”
  - 125’ TO 150’: 3 1/2” 1 3/4” 1”

**Dead Load Camber**

Fabricate trusses with chords curved to provide camber.

Do not Camber by using shims between chords at splices.

**End Post or Chord Shop Splice**

No post splices permitted in lower third of height nor closer than 3’ to bottom of chord. No chord shop splices permitted in middle third of span. Maximum of one splice in each end post.
Concrete below finished ground line shall be placed directly against undisturbed earth, or alternately, backfill placed around foundation shall be compacted in conformance with Standard Specification 2-05.3(1)a, 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**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**PACIFIC REGION**

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTE:
1. Install Sign Lighting Luminaires (and Brackets) only when required in the Contract.
2. Windbeam and 3" Z-Bar are aluminum. All nuts, bolts, washers, and other hardware shall be stainless steel, except as noted.
3. See Standard Plan G-90.20 (Monotube), or G-90.30 (Truss) for additional Overhead Sign Mounting details.
4. Galvanize all non-stainless steel parts.
NOTES
1. U-Bolts, Washers and Nuts shall be stainless steel, except as noted.
3. Galvanize all non-stainless steel parts.
4. For VMS mounting, the contractor may substitute W6 x 12 Steel or W8 x 13 Steel sections for the Vertical Brace W4 x 13 Steel.
5. 3' - 0" MAX. Vertical Brace spacing for Walk-In Cabinet Type VMS Installation.
6. An acceptable alternative to a Locknut with Nylon insert shall be as follows:
   Nylock Blue Nylon Torque-Patch
   Nylock Precote 30
   NO Patch 360
   Ring Patch
   All products shall be applied the full length of the bolt threads with 360 degrees coverage.

OVERHEAD SIGN MOUNTING (TRUSS STRUCTURE)
STANDARD PLAN G-90.30-02
SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

1. 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.

2. 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-95.35.**
3. **FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE SIGN BRIDGE, SEE STANDARD PLAN G-95.36.**
4. **LOCATION OF RAILING SPLICES TO BE DETERMINED BY FABRICATOR. SEE "RAILING SPLICE DETAIL."**

---

**MATERIAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
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</thead>
<tbody>
<tr>
<td>PIPE</td>
<td>ASTM A 36 OR ASTM A 53 GRD B, TYPE E OR S, OR ASTM A 500 GRD B</td>
</tr>
<tr>
<td>PLATES AND SHAPES</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 500 GRD B</td>
</tr>
<tr>
<td>GALVANIZED FOR PIPE</td>
<td>AASHTO M 111</td>
</tr>
<tr>
<td>PLATES AND SHAPES</td>
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</tr>
<tr>
<td>MSAH STRENGTH BOLTS</td>
<td>STD SPEC. 9-06.9(2)</td>
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<tr>
<td>MOUNTING BOLTS</td>
<td>STD SPEC. 9-06.9(1)</td>
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<tr>
<td>ALL OTHER BOLTS</td>
<td>AASHTO M 232</td>
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<tr>
<td>FASTENERS GALVANIZED</td>
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<tr>
<td>STEEL GRATING</td>
<td>ASTM A 36</td>
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**MAINTENANCE WALKWAY FOR SIGN BRIDGES**

**STANDARD PLAN G-95.10-01**

**EFFECTIVE:** AUGUST 3, 2015 TO July 31, 2016

---

**ELEVATION MAINTENANCE WALKWAY**

**END VIEW A**

MODIFY DIMENSION AS REQUIRED FOR PROPER FIT-UP WITH THE VMS DOOR OPENING.

---

**PLAN MAINTENANCE WALKWAY**

**END VIEW B**

INSTALL 2 HINGES W/ 1/4" S.S. SCREWS

**MAINTENANCE WALKWAY GATE**

2" STD. PIPE (TYP.)

HAND RAIL AND POST (TYP.)

W4x13 (TYP.)

TOE PLATE SEE DETAIL

SPlice (TYP.)

(SEE NOTE 4)

2" STD. PIPE (TYP.)

(SEE DETAIL "B")

GRATING FASTENER
(TYP.} SEE DETAIL

SPAN (DIRECTION OF BEARING BARS)

W4x13 (TYP.)

1/4" TOE PLATE

EVERY FOURTH BEARING BAR AND NEAR ALL TOE PLATE CORNERS

GRATING FASTENER SEE DETAIL

CROSS BAR (TYP.)

BEARING BAR

SECTION F

1/4" TOE PLATE

1/8" 1-1/2

GRATING FASTENER SEE DETAIL

CROSS BAR

BEARING BAR

SECTION G

PLAN

STEEL GRATING DETAIL

(RAILING NOT SHOWN FOR CLARITY)

W4x13 (TYP.)

1/4" TOE PLATE

1/8" MIN. THICKNESS (TYP.)

BEARING BAR, 3/16" MIN. THICKNESS (TYP.)

3/16" CLEARANCE BETWEEN ENDS OF CROSS BARS

INSTILL AND ARRANGE THE GRATING FASTENERS ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
MAINTENANCE WALKWAY INSTALLED ON MONOTUBE SIGN BRIDGE

(WALKWAYS MAY BE USED WITH OTHER LAYOUTS THAN THAT 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-95.10.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. 3/8" DIA. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCLE.
5. HANDRAIL FIT-UP WITH VMS DOOR OPENING IS THE RESPONSIBILITY OF THE CONTRACTOR.
PROVIDE A 3/4" DRAIN HOLE FOR GALVANIZING, TOP & BOTTOM (TYP.).

FABRICATED FROM L4x4 x 3/8

1 1/8" DIAM. HOLE (TYP.)

FIELD LOCATE 1 1/8" DIA. HOLE @ FRONT AND BACK OF MONOTUBE (TYP.)

3 3/8" X 1/8" PLATE

ELEVATION VIEW

FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN BRIDGE

FABRICATED FROM TS6x4 x 5/16

1/8" COVER PLATE TOP & BOTTOM

3/4" H.S. BOLT W/ NUT & 2 WASHERS, GALV. (TYP.)

STRUCTURAL LUG (INTERMEDIATE SUPPORT) SEE DETAIL "A" (SEE NOTE 3)

MONOTUBE BEAM

MONOTUBE

MONOTUBE

MONOTUBE

ELEVATION VIEW

FALL RESTRAINT BRACKET INSTALLATION ON EXISTING MONOTUBE SIGN BRIDGE

ELEVATION VIEW

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

5/16/11

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MAINTENANCE WALKWAY INSTALLED ON TRUSS-TYPE SIGN BRIDGE
(WALKWAYS MAY BE USED WITH OTHER LAYOUTS THAN THAT SHOWN ABOVE)

MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE SIGN BRIDGE
STANDARD PLAN G-95.30-02

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PIPE</th>
<th>ASTM A 36 OR ASTM A 53 Grade B, TYPE E OR 5, OR ASTM A 500 Grade B</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLATES AND SHAPES</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 500 Grade B</td>
</tr>
<tr>
<td>GALVANIZING FOR PIPE PLATES AND SHAPES</td>
<td>AASHTO M 111</td>
</tr>
<tr>
<td>HIGH STRENGTH BOLT, NUTS, &amp; WASHERS, INCL. MOUNTING BEAM BOLTS</td>
<td>STD SPEC. 9-06.5(2)</td>
</tr>
<tr>
<td>ALL OTHER BOLTS</td>
<td>STD SPEC. 9-06.5(1)</td>
</tr>
<tr>
<td>FASTENER GALVANIZING</td>
<td>AASHTO M 232</td>
</tr>
<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>
</tr>
</tbody>
</table>

NOTES

1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOP PLATE DETAILS, SEE STANDARD PLAN G-95.10.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. 3/8" 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 TURNBUCKLE.
5. HANDRAL, FIT-UP WITH VMS DOOR OPENING IS THE RESPONSIBILITY OF THE CONTRACTOR.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

5/16/11

MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE SIGN BRIDGE
STANDARD PLAN G-95.30-02

APPROVED FOR PUBLICATION

R. B. ZELENKA, PE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
SHRUB, TREE AND GROUND COVER PLANTING DETAIL

MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

Existing Soil

BREAK UP ROOTBALL OF CONTAINER PLANTS, PRUNE CIRCLING ROOTS

SECTION

BULB PLANTING DETAIL

MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT DRIPLINE OF EACH PLANT

SEE NOTE

Existing Soil

SLOPE PLANTING DETAIL

(INCLUDES ALL PLANTS ON SLOPES)

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

Existing Soil

TUBER OR RHIZOME PLANTING DETAIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

Existing Soil

EMERGENT PLANTING DETAIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

Existing Soil

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

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

Existing Soil

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

EMERGENT PLANTING DETAIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

SEE NOTE

Existing Soil

SPREAD ROOTS OUT

PLANTING HOLE 3 TIMES THE ROOT SPREAD

BREAK UP ROOTBALL OF CONTAINER PLANTS, INCLUDING PLUGS, PRUNE CIRCLING ROOTS

NOTE

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

SEE NOTE

EXISTING SOIL

3 TIMES THE ROOT SPREAD

EXISTING SOIL

INSTALL PLANT VERTICALLY

EQUALLY SPACE BULBS - DEPTH VARIES BY SPECIES

PLAN

12" DIAM.

SEE NOTE

ROOT DEPTH

EXISTING SOIL

3 TIMES

EXISTING SOIL

PLAN RHIZOME WITH CROWN / GROWTH POINTS AT FINISHED GRADE

FINISHED GRADE

SEE NOTE

EXISTING SOIL

STAKES

STAKES SHALL BE FLUSH WITH GROUND SURFACE OR JUST BELOW

STATE OF WASHINGTON

REGISTERED LANDSCAPE ARCHITECT

CERTIFICATE NO. 000372

G-30-08

TREET AND SHRUB PLANTING DETAILS

STANDARD PLAN H-10.10-00

SHEET 1 OF 1 SHEET

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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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.

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

MIN. 6" BURIAL INTO EXISTING SOIL

EXISTING SOIL

LIVE STAKE INSTALLATION ON SLOPES

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

EXISTING SOIL

TYPICAL LIVE STAKE INSTALLATION

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

EXISTING SOIL

EXISTING SOIL

LIVE STAKE INSTALLATION IN QUARRY SPALLS

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

MIN. 6" BURIAL INTO EXISTING SOIL

EXISTING SOIL

LIVE STAKE INSTALLATION ON SLOPES

CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

EXISTING SOIL
0" CAP 1/4" DIAM. HOLE (1) FOR AIR EXCHANGE

1/4" STEEL STRAP

1/4" x 6' FIBERGLASS ROD

T-ADAPTER - SEE NOTE 2

WATER LEVEL - SEE NOTE 5

SOIL SURFACE

1/4" x 6' FIBERGLASS ROD

EXTENSION SPLIT PIPE CLAMP

WATER INTAKE PIPE

PVC CAP

1" I.D. X 6' PVC WATER INTAKE PIPE - SEE NOTE 4

CAP

WATER INTAKE AND CLEANOUT ASSEMBLY - DETAIL (B)

SECTION A

Crest Gage

Steel Angle Iron 8" X 2" X 2"

3/8" - 16 X 2" HEX BOLT, STEEL WITH 1" WASHER

3/8" - 16 HEX NUT WITH 1" WASHER

Extension Split Pipe Clamp

1/4" X 6" FIBERGLASS ROD

Steel Strap (Typ.)

Angle Iron Extension - SEE NOTE 3

1/2" DIAM. HOLE (Typ.)

3/8" - 16 X 3/4" HEX BOLT WITH LOCK NUT (Typ.)

Steel Strap (Typ.) - SEE DETAIL

Angle Iron

Cut Point on Both Legs

Angle iron and steel straps shall be galvanized in accordance with AASHTO M 232.

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.

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.

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.

Water level may vary, depending on season.

Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.

Notes

1. All Angle Irons and Steel Straps shall be galvanized in accordance with AASHTO M 232.
2. Pipe, Caps, and T-Adapter shall be 1" I.D. white PVC or Primed Steel. Except the water intake pipe shall be white PVC. Pipe shall be Sch. 40. All pipe joints shall be threaded.
3. Gage assembly pipe, fiberglass rod, and angle iron can be extended as needed to fit site requirements. Extra Pipe Clamps shall be added for security.
4. Score the water intake pipe 1/4" deep, 1/32" wide (width of saw blade), every 1/2", alternating cuts on top and bottom for drainage. Place at lowest water level.
5. Water level may vary, depending on season.
6. Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
CONCRETE FOOTING - COMMERCIAL CONCRETE
6" x 1/4" DIA. STEEL BAR

FINISHED GRADE

SECTION A

POST

CONCRETE FOOTING - COMMERCIAL CONCRETE
6" x 1/4" DIA. STEEL BAR

FINISHED GRADE

NOTE

This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

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)

POST

BOLLARD TYPE 2

STANDARD PLAN H-60.20-01

PLAN VIEW

ROUND FOOTING

SQUARE FOOTING

NOTE

This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

STEEL CAP PLATE

1/8"

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)

POST

BOLLARD TYPE 2

STANDARD PLAN H-60.20-01

PLAN VIEW

ROUND FOOTING

SQUARE FOOTING

NOTE

This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

STEEL CAP PLATE

1/8"

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)

POST
1. A socket and wedge anchoring system that meets the NCHRP 350 crash test criteria may be substituted in lieu of the anti-twist plate designs shown. Anti-twist plates are not required for wood post installations.

2. The platform design shown on this plan features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this design, but it must fit the bracket design shown on this plan. Brackets are required for all single-post installations. Field drilling may be necessary.

3. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners (see ALIGNMENT DETAIL, Sheet 2). Spacing of mailbox mounting holes varies among manufacturers. Alignment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

4. Attach a newpaper box to a steel post with two 1 1/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Use 2 1 1/2" x 1/4" lag bolts to attach newspaper boxes to wood posts. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

5. A Type 1 Support (Standard Plan H-70.20) is required when 2 or more mailboxes are to be installed on one support.
NOTES

1. The anchoring system shall meet NCHRP 350 crash test criteria. Use a socket and wedge system or the anchoring system supplied by or recommended by the Type 2 Support manufacturer.

2. A maximum of five mailboxes may be installed on a Type 2 Support.

3. The Platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.10, Sheet 2. The design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this platform design. Adjustable platforms must fit the 1 7/8" M-Clamp.

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

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

MAILBOX = 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.

SNOW GUARD = WHEN REQUIRED - SEE DETAIL, SHEET 2

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

ALIGNMENT DETAIL

SEE NOTE 4

MAILBOX, PLATFORM & SUPPORT

MAILBOX SUPPORT

TYPE 2

STANDARD PLAN H-70.20-01

SEE SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
MAILBOX SUPPORT

TYPE 2

STANDARD PLAN H-70.20-01

SHEET 2 OF 2 SHEETS

ANCHORING SYSTEM - SOCKET AND WEDGE SHOWN (SEE NOTE 1)

5' MIN. BETWEEN MAILBOXES

MAILBOX SUPPORT TYPE 1
(WOOD POST SHOWN)

FOR DETAILS, SEE STANDARD PLAN H-70.10

MAILBOX SUPPORT TYPE 2

NEWSPAPER BOX - SEE NOTE 5

SNOW GUARD - WHEN REQUIRED, PLACE ON LEADING END OF SUPPORT (SEE DETAIL)

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

-SEE NOTE 1 - 1A, SHEET 2

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 (THREADED ONE END)

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

1 3/4" MUFFLER CLAMP (1 3/4" M-CLAMP), 2 WASHERS AND 2 LOCKNUTS (TYP.)

1 1/4" PIPE X 2 3/4" LONG (THREADED ONE END)

VERTICAL SUPPORT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD BOTH ENDS)

HORIZONTAL MOUNT - 1 1/4" PIPE, LENGTH AS REQUIRED (THREAD ONE END)

INSTALL PLASTIC CAP OR PLUG

ASSEMBLY DETAIL ISOMETRIC VIEW

PLATFORM - SEE NOTE 2

ADD LATIONAL WASHERS - AS REQUIRED TO FILL GAP (TYP.)

1 3/4" MUFFLER CLAMP (1 3/4" M-CLAMP), 2 WASHERS AND 2 LOCKNUTS (TYP.)

1 1/4" PIPE X 2 3/4" LONG (THREADED ONE END)

MATCH END OF PIPE

PLATFORM - SEE NOTE 6

ASSEMBLY DETAIL ISOMETRIC VIEW

MAILBOX & PLATFORM

MAILBOX MOUNTING HOLE (TYP.)

MATCH END OF PIPE

SPACE PROVIDED ON BOTH ENDS TO ALLOW ACCESS TO FASTENERS

NEWSPAPER BOX - ATTACHMENT DETAIL

ELEVATION VIEW

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 A153.

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.

NEWSPAPER BOX - ATTACHMENT DETAIL
VERTICAL SUPPORT

1 1/4" PIPE (.)

VERTICAL SUPPORT OR TURNOUT

7/16" DIAM. HOLES THROUGH PIPE & CHANNEL (TYP.)

3/8" X 2 1/2" HEX HEAD BOLT, NUT & WASHER (TYP.)

U-CHANNEL POST 3 LF

PLACEMENT DETAIL

SECTION VIEW

VERTICAL SUPPORT

U-CHANNEL BASE

U-CHANNEL POST 3 LF

3/8" DIAM. X 2 1/2" HEX HEAD BOLT, NUT & WASHER (TYP.)

DITCH FLOWLINE

COUPLING

CONCRETE BASE

COMMERICAL CONCRETE

1 1/4" DIAM. + 2 3/4" PIPE (THREAD ONE END)

1/4" GRIND

45° ELBOW

1" NOM. DIAM. SCHED. 40 PIPE + 8" LONG - SEE NOTE 4

1 1/4" PIPE + 8" LONG (THREAD ONE END)

1 1/4" PIPE

PIPE FITTING ANGLES

PIPE BENDING ANGLES

SECTION A

DETAILED VIEW

MAILBOX SUPPORT TYPE 3

STANDARD PLAN H-70.30-02

SHEET 2 OF 2 SHEETS

APPROVED FOR CONSTRUCTION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTE

1. Post shall have sufficient strength and durability to support the fence through the life of the project.
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.
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(16).

3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.

4. Install silt fencing parallel to mapped contour lines.

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL SILT FENCE WITHOUT BACKUP SUPPORT
(ISOMETRIC)
(STEEL POSTS SHOWN)

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(16).

3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.

4. Install silt fencing parallel to mapped contour lines.

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL SILT FENCE WITHOUT BACKUP SUPPORT
(ISOMETRIC)
(STEEL POSTS SHOWN)
ATTACH IN A MANNER THAT ASSURES FABRIC IS FIRMLY HELD BY THE BACKUP SUPPORT IN A WAY THAT REDUCES THE POTENTIAL FOR FABRIC TEARING.

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

BACKUP SUPPORT

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

NOTE

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

SEE NOTE 1

TYPICAL HIGH VISIBILITY SILT FENCE WITH BACKUP SUPPORT
ISOMETRIC
(STEEL POSTS SHOWN)

POST - WOOD OR STEEL (TYPICAL)

BACKUP SUPPORT (TYPICAL)

GEOTEXTILE FOR HIGH VISIBILITY SILT FENCE COLOR - ORANGE - SEE STANDARD SPECIFICATION SECTION 9-33.2(1), TABLE 6

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
ANDY RICHARDS
CERTIFICATE NO. 030516
MARCH 11, 2013

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

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

SPlice DETAIL
(STEEL POSTS SHOWN)

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.
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(18).

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.

HIGH VISIBILITY SILT FENCE
STANDARD PLAN I-30.17-00
SHEET 1 OF 1 SHEET

SPLED BENDS 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.

SPICE DETAIL
(WOOD POSTS SHOWN)

POST - WOOD OR STEEL (TYPICAL)

FABRIC (GEOTEXTILE) (TYPICAL)
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

COMPOST BERM DESIGN

GEO Textile for temporary silt fence - see Spec. 9-33.2(1), table 6

NOTE

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

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
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<tbody>
<tr>
<td>1H : 1V</td>
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<tr>
<td>2H : 1V</td>
<td>20'-0&quot;</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>30'-0&quot;</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>48'-0&quot;</td>
</tr>
</tbody>
</table>

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

THIS PLAN IS NOT A LEGAL DOCUMENT ANNUAL DUTY IN WA SHINGTON STATE DEPARTMENT OF TRANSPORTATION FOR PUBLIC USE, IS SUBJECT ONAPPROPRIATE FOR USE IN PUBLIC OR PRIVATE CONSTRUCTION FOR PUBLIC OR PRIVATE CONSTRUCTION.

Washington State Department of Transportation

EFFECTIVE: AUGUST 3, 2015 TO JULY 31, 2016
ALLOWABLE ALTERNATIVE TIE-DOWN METHOD

ANGLE TERMINAL END UPHILL 24" to 48" TO PREVENT FLOW AROUND SOCK (TYP.)

CONTOR LINE (TYP.)

CONTOUR LINE (TYP.)

DISTURBED AREA

PLAN VIEW

SPACING VARIES (TYP.)

SEE COMPOST SOCK SPACING TABLE

8" DIAMETER COMPOST SOCK SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H:1V</td>
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</tr>
<tr>
<td>2H:1V</td>
<td>20 - 0&quot;</td>
</tr>
<tr>
<td>3H:1V</td>
<td>30 - 0&quot;</td>
</tr>
<tr>
<td>4H:1V</td>
<td>40 - 0&quot;</td>
</tr>
</tbody>
</table>

COMPOST SOCK SPACING TABLE

COMPOST SOCK DETAIL

ISOMETRIC VIEW

CATCH BASIN INSTALLATION

NOTES

1. Compost Sock shall be in accordance with Standard Specification 9-14.6(6).

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.

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
APPROVED FOR PIBJUCA TJCN. IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

COMPOST SOCK
STANDARD PLAN 1-30.40-01
SHEET 1 OF 1 SHEET
NOTES
1. Coir logs shall be installed starting at the bottom of the slope and working uphill.
2. Excavated material shall be spread evenly along the uphill slope and compacted by hand tamping or other methods approved by the Engineer.
3. Overlap Coir log ends by 12" to prevent water from moving between logs.
4. Always install Coir log perpendicular to slope along contour lines. Ends shall angle uphill to prevent flow around the Coir log.
5. Use an adequate number of stakes to ensure logs are secure.
7. Perform maintenance in accordance with Standard Specification 8-01.3(15).

PLAN VIEW
PLACEMENT ON SLOPE

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

TOP OF STAKES FLUSH WITH TOP OF LOG

RECESS APPROX. 1/3 OF LOG INTO SLOPE

ELEVATION VIEW
COIR LOG PLACEMENT

ISOMETRIC VIEW

PLUG GAPS BETWEEN LOGS WITH EXCAVATED MATERIAL

ALL Allowable alternative tie-down method

LAND / UPHILL WATER / DOWNHILL

COIR LOG (TYP.)

2" x 2" x 36" MIN. UNTREATED WOODEN STAKE (TYPICAL)

PLAN VIEW

SHORELINE = IF APPLICABLE (SEE CONTRACT PLANS)

VIEW A

COIR LOG PLACEMENT

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
SANDRA L. BAUSCH
LICENSE NO. 990
DATE: 07-22-2015

EROSION CONTROL DETAILS
COIR LOG PLACEMENT
STANDARD PLAN I-30.60-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Washington State Department of Transportation
STATE OF WASHINGTON
REGISTERED ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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).
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).

**General Notes**

1. Biodegradable Check Dams may need additional or modified staking to prevent undercutting or scouring.

**Non-Biodegradable Check Dam Notes**

1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer's recommendations and shall perform in accordance with Standard Specification 8-01.3(6).
2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.
3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.
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 one staple on each side of blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

NOTES
1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and slope steepness.
2. See Standard Specification 8-01.3(3) and 9-14.5(2).
3. Use manufacturer’s requirements. When manufacturer’s requirements are not provided, use installation requirements shown on Standard Plans.
4. Additional staples may be required on slopes greater than 3H : 1V.

2 ROWS OF STAPLES 4" APART, STAGGERED, 6" O.C. PLACED WITHIN 6" OF BLANKET EDGE.

EXTEND BLANKET FAR ENOUGH OVER CREST OF SLOPE TO EFFECTIVELY PREVENT UNDERCUTTING AND TO PROVIDE SECURE ANCHORING FASTENER (TYP.)
TAMPED NATIVE SOIL FROM PILE

ANTICIPATED WATER LINE

SHINGLE SPLICE BLANKET MUST EXTEND 36" ABOVE THE ANTICIPATED WATER ELEVATION

CHANNEL INSTALLATION - SECTION

EROSION CONTROL BLANKET

STAPLE - 18" O.C. MAX.

LONGITUDINAL ANCHOR DETAIL

CHANNEL TERMINATION - DOUBLE ROW OF STAPLES STAGGERED 6" APART

ISOMETRIC VIEW

INSTALLATION STEPS:
1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket parallel to the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

NOTES
1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.
2. Install Check Slots per manufacturer's recommendations.
3. See Standard Specification 8-01.2(3) and 9-14.6(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.

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.

CHANNEL TERMINATION - DOUBLE ROW OF STAPLES STAGGERED 6" APART

INSTALLATION STEPS:
1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket parallel to the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

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.
TEMPORARY SEDIMENT TRAP

SECTION A

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

1' - 0" DEPTH OF GRAVEL/TYPP
2' - 0" DEPTH OF 3/4" - 1-1/2" WASHED GRAVEL BACKFILL

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.

25' - 0" R. MIN. (TYP.)
4" - 8" QUARRY SPALLS

AS REQUIRED - 100' MIN. EXCEPT MAY BE REDUCED TO 50' MIN. FOR SITES WITH LESS THAN ONE ACRE OF EXPOSED SOIL.

EXISTING ROAD

ISOMETRIC VIEW

STABILIZED CONSTRUCTION ENTRANCE

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**CONSTRUCTION NOTES**

1. Drive ground rods before placing concrete. Move rod(s) and drain tiles with cover(s) as required to achieve full ground penetration. Maintain a 6' (ft) minimum clearance between ground rods and 6" (in) from foundation edge as detailed on Standard Plan J-60.08.

2. GRS conduits penetrating all cabinets shall be terminated with grounding end bushing and bonded to the cabinet grounding bus. All PVC conduits penetrating cabinet shall be terminated with end bushings.

3. Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If PVC conduits are specified, the conduit stub and end bushing shall not be glued to the coupling.

4. 4" (in) diam. x 1/2" (in) deep slump. Slope foundation within cabinet footprint toward sump. Drainpipe shall rise at least 3' below slab, polyethylene or copper tubing.

5. The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2" (in) or 9" (in) cabinet footing.

6. Cabinet power supply conduit.

7. Conduits for service grounding electrodes.

8. When detailed in Typical Foundation Plan is greater than 0' (ft), this conduit and conductor shall be deleted.

---

**TABLE**

<table>
<thead>
<tr>
<th>CONTROLLER OR TRANSFORMER BASE</th>
<th>SIZE W x D (IN)</th>
<th>CAPACITY (CONDUT DIAMIN.)</th>
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<tr>
<td>TYPE 333D</td>
<td>48.5&quot; x 30&quot;</td>
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<td>TYPE TRANSFORMER</td>
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<td>12.6 TO 35.0 KVA TRANSFORMER</td>
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<td>UNINTERRUPTABLE POWER SUPPLY</td>
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<td>332 CABINET</td>
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<td>12&quot; (IN) OF CONDUIT IN EACH LOCATION SHOWN</td>
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<tr>
<td>24&quot; (IN) OF CONDUIT IN EACH LOCATION SHOWN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12&quot; (IN) OF CONDUIT IN EACH LOCATION SHOWN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24&quot; (IN) OF CONDUIT IN EACH LOCATION SHOWN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**NOTES**

1. The cabinets shown in these details are shown for illustrative purposes only. The Contractor shall verify the plans and substitute those cabinets in place of the cabinets shown in these details. The Contractor shall install each cabinet type in the locations and orientation shown in these details.

2. The Contractor shall install the conduits in the locations shown. Conduits shall extend 2" (in) above the coupling. The grounded end bushing on GRS conduit and the end bushing on PVC conduit shall extend 3" (in) max. above the coupling. The conduit containing unused utility conductors shall extend into the utility chase.

3. The ground rods, drain tiles, and conduit bushings, and #4 rebar (90° with 30" (in) logo) may be omitted if no transformer or service cabinet is to be installed.

4. The cabinets shall be attached to the foundation with 4 each: 1/2" (in) x 10" (in) or 2" (in) x 4" (in) anchor bolts (see Details on Sheet 4 of 6). Washers, and nuts conforming to Standard Specification 9-06.01(1) and hot-dip galvanized after fabrication in accordance with AASHTO M 232. Locate anchor bolts per cabinet manufacturer. Stainless steel epoxy anchors may be used as an alternative, and shall be 1/2" (in) diameter x 9" (in), or 5/8" (in) diameter x 8" (in). All threaded rod (conforming to ASTM F593), washers (conforming to ASTM A240), and nuts (conforming to ASTM F594), shall be Type 304 stainless steel. Bolts shall extend 1 1/2" (in) min. to 2" (in) max. above the concrete pad prior to placing.

5. All reinforcing steel shall be embedded 2" (in) below surface of concrete.

6. Place a 1/2" (in) bead of silicone between cabinets and foundation.

7. Two ground rods are required for foundations with a service cabinet or transformer cabinet. See Standard Plan J-60.05 for details.

8. Concrete shall be class 3000. See Standard Specification 8-20.34.

9. Verify dead front locations from manufacturer prior to placing conduit in foundation.

10. Foundations installed in, or adjacent to, sidewalks shall be constructed with the top flush with the sidewalk surface and grade, not including concrete risers for cabinets. Omit chamfers where foundation abuts sidewalk.

11. If the slope is 3H : 1V or steeper, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

12. For Type 333SD Controller Cabinet, the cabinet vendor shall allow the Utility Transfer Switch to be installed on either side of the cabinet. The Utility Transfer Switch unit shall be shipped inside the cabinet for field installation by Maintenance personnel.

13. Height of cabinet riser shall be adjusted to serve environmental needs. Type D cabinet shall have no riser. NEMA P44, Type 333SD, and Type B Modified shall have a 9" (in) riser. All other cabinets shall have a 3 1/2" (in) riser. See Contract for alternative height. Adjust length of conduit and rebar accordingly.

14. Use (1) #4 hoop for a 3 1/2" (in) cabinet footing and (2) #4 hoops for a 9" (in) cabinet footing.

15. The Panel location is set by industry standards on all Controller Cabinets.


17. Verify pad size and location with Project Engineer.

18. Field bend #4 rebar around the Generator Anti-Theft Tie-Down Unit when required.

19. See Standard Plans J-10.21 and J-10.22 for additional details for Type D and Type E Service Cabinets.

20. As an alternate, #3 rebar spaced at 1" - 2" O.C. longitudinally and transversely may be used.

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**CABINET ORIENTATION CONDUIT LAYOUT AND FOUNDATION DETAIL**

**STANDARD PLAN J-10.10-03**

**SHEET 1 OF 6 SHEETS**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**May 28, 2015 9:33 AM**

**FRONT APPROVED FOR PUBLICATION**

**GRS**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

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**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**

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**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
**CONTROLLER CABINET FOUNDATION NOTES**

1. Slope conduit reserve area floor 1/4" (in) per 1' (ft) to the sump in the center.
2. All other dimensions shall be approved by the Engineer.
3. Provide 2" (in) clearance between conduit and edge of foundation well for cable slack.
4. For the rest of the foundation, see Standard Plan J-10.20 for details.
**NOTES**

1. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Obtain Engineer’s approval of maintenance pad orientation prior to proceeding with construction.

2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications, 6th Edition, 2012.

3. Concrete for walls and bases shall be class 4000.

4. Height of wall varies to match slope of existing grade. Contractor shall field-determine wall height and each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.

5. 3/4" (in) chamfer for all exposed corners.

6. For grounding details not shown, see Standard Plan J-60.05.

7. For cabinet and conduit details not shown, see Standard Plan J-10.10.

8. The cabinets shall be attached to the foundation with 4 each: 1/2" (in) x 7/8" (in) x 2" (in) x 4" (in) anchor bolts (see Detail on this Sheet), washers, and nuts conforming to Standard Specification 9-06.5(1) and galvanized after fabrication in accordance with AASHTO M 232. Locate anchor bolts per cabinet manufacturer. Stainless steel epoxy anchors may be used as an alternative, and shall be 1/2" (in) diameter x 9" (in), or 3/4" (in) diameter x 9" (in). All threaded rod (conforming to ASTM F593), washers (conforming to ASTM A309), and nuts (conforming to ASTM F594), shall be Type 304 stainless steel. Bolts shall extend 1 1/2" (in) min to 2" (in) max above the concrete pad.

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**STANDARD PLAN J-10.15-01**

**REINFORCING STEEL BENDING DIAGRAM**

All Dimensions are Out to Out

- **Sie Standard Spec. 9-07.10** for bending diam.

- **Anchor Bolt** See Note 8

- **Cabinet Shown for Display Purposes Only** (see contract for cabinet layout)

- **Drive ground rods before placing concrete. Move rod(s) and drain tilt(s) with cover(s) as required to achieve full ground penetration. Maintain a 6'-0" minimum clearance between ground rods as detailed on Standard Plan J-60.06.**

- **Limits of pigmented sealer. Typical for all retaining walls.**

- **Delete conduit and conductor when fence is not present.**

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NOTES (CONTINUED)

9. Hinges shall have stainless steel or brass pins.
10. Cabinet shall be rated NEMA 3R.
12. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:
   - Key Numbers 2, 3, 4, 6, 7, and 8.
   - Key Number 4 name plate shall read as follows: "PHOTOCYCLE BYPASS TEST ON" and "PHOTOCYCLE TEST OFF - AUTOMATIC."
   - See service cabinet detail.
13. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
14. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
15. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.
16. All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the Schedules. Approved PVC or polyethylene wire marking sleeves shall be used.
17. All nuts, bolts, screws, and washers used for mounting the photoelectric control enclosure, conduit body covers, and junction box cover shall be ASTM F939 or A193 Type 304 or Type 316 stainless steel.
18. A 1% tolerance is allowed for all dimensions.
19. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.
20. Install conduit couplings on all conduits.
21. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or solder in place. See Standard Plan J-10.20 for alternate door hinge details.
22. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded steel mesh with welded seams and mounting flanges and shall be hot-dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" (in) x 5/8" (in) expanded steel mesh may be used as an alternative material. See Standard Plan J-10.20 for enclosure mounting details.
23. See Contract for Breaker Schedule.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

REMOVABLE PANEL FOR EQUIPMENT

ELEVATION VIEW

SIDE VIEW

TYPE A SERVICE CABINET

(60 AMP TYPE 120 1w SERVICE CABINET)

TYPE A WIRING DIAGRAM ~ 120 VOLT

ALTERNATE STANDOFF BRACKET DETAIL (SEE NOTE 2)

SERVICES CABINET TYPE A

(0 - 60 AMP TYPE 120 VOLT SINGLE PHASE)

STANDARD PLAN J-10.16-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

June 3, 2015 4:17 PM

Washington State Department of Transportation

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

DRAWN BY: COLBY FLETCHER
NOTES (200 AMP TYPE 120/240 1e SERVICE CABINET)

2. Hinges shall have stainless steel or brass pins.
3. Cabinets shall be rated NEMA 3R and shall include two rain-tight vents.
4. Metering equipment shall be pad-lockable. Each door shall be gasketed. Install Best CX Construction Core on right side door. See Door Hinge Detail.
5. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:
   Key Numbers 2, 3, 4, 6, 7, 8, 9, & 10
   Key Number 4 name plate shall read: "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF-AUTOMATIC". See Service Cabinet Detail.
6. Metering arrangements vary with different serving Utilities. The Utility may require meter base mounting in the enclosure, on the side, or on the back of the enclosure. The Utility may require the dimension of the door and the front of the safety socket box to be less than the 11" (n) shown in the Left Side - Safety Socket Box Mounting Detail. The Contractor shall verify the service Utility's requirements prior to fabrication and installation of the service equipment.

Dimensions shown are minimum and shall be adjusted to accommodate the various junior sized equipment included.

8. All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpering of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.

9. The photoelectric unit shall be centered in the photoelectric enclosure to permit 360 degree rotation of the photoelectric without removal of the photoelectric unit or the photoelectric enclosure.

10. The internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or polyethylene wire markings sleeves shall be used.

11. All nuts, bolts, and washers used for mounting the photoelectric enclosure shall be stainless steel.

12. A ½% tolerance is allowed for all dimensions.

13. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dipped galvanized steel or stainless steel.

The meter base portion of this service was designed to meet metering portion of EUSERC Drawing 309 requirements.

15. When using alternate door hinge:
   Remove hinge pin to permit welding hinge to cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with brass balance and solder in place.

16. Verify the service utility stand-off dimension. Adjust the removable panel to the measurement provided by the Utility Company. After adjustment, remove all-thread bolts so that no less than two and no more than three full threads extend past the face of the nuts.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

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May 28, 2015 10:09 AM

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Burebich, Pass
Jul 3 2013 4:21 PM

Washington State Department of Transportation

SERVICE CABINET TYPE B MODIFIED (0 - 200 AMP TYPE 120/240 SINGLE PHASE)

STANDARD PLAN J-10.20-00

SHEET 1 OF 2 SHEETS
NOTES

1. Metering Arrangements vary with different serving utilities. The utility may require meter base mounting in the enclosure, on the side, or on the back of the enclosure. The utility may require the dimension between the door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting detail, see Standard Plan J-3b. The Contractor shall verify the serving utility's requirements prior to fabrication of and installing the service equipment.

2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor shall verify the serving utility's requirements prior to fabrication and installing the service equipment.


4. Hinges shall have stainless steel or brass pins.

5. Cabinets shall be rated NEMA 3R and shall include two rain tight vents.

6. Metering equipment doors shall be padlockable. Each door shall be gasketed. Install best construction core on bottom left and right doors. See door hinge detail, Standard Plan J-3b. Concealed heavy duty stainless steel lift off hinges are allowed as an alternative. Upper left door shall have 3 hinges, lower left door shall have 2 hinges, and right door shall have 3 hinges. All doors shall have a two position door stop assembly.

7. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key number 2, 3, 4, 5, 6, 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/or stainless steel.

10. The photocell unit shall be mounted 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 Polyethylene wire marking sleeves shall be used.

12. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.

13. A 1% tolerance is allowed for all dimensions.

14. See plans for breaker schedule.

15. Install conduit couplings on all conduits. Place couplings flush with top of concrete foundation.

16. Seal cabinet to foundation with a 1/2" bead of silicone. Apply silicone to dry surface only.

17. The meter base portion of this service was designed to meet metering portion of Euseco Drawing 309 requirements.
KEY
1. Meter base per serving utility requirements. As a minimum, the meter base shall be safety socket box with factory installed test bypass facility that meets the requirements of Eusins Drawing 305.
2. Main Breaker (See Breaker Schedule).
4. Transformer Breaker (See Breaker Schedule).
5. Photocell Test Panel.
6. Branch Breaker (See Breaker Schedule).
7. Transformer (See Breaker Schedule).
9. Contact breaker panel.
10. Molded Case Switch standoff bracket.
11. Photocell Enclosure - to be fabricated from 5/8" expanded steel mesh with welded seams and mounting flanges. Hot dip galvanized after fabrication. Type 5052 - 3003 aluminum with 5/8" x 5/8" openings equivalent to 5/8" expanded steel mesh may be used as alternative material. See Photocell Enclosure Mounting details, Standard Plan J-3b.
13. Transformer Breaker (See Breaker Schedule).
14. Photocell Enclosure - to be fabricated from 5/8" expanded steel mesh with welded seams and mounting flanges. Hot dip galvanized after fabrication. Type 5052 - 3003 aluminum with 5/8" x 5/8" openings equivalent to 5/8" expanded steel mesh may be used as alternative material. See Photocell Enclosure Mounting details, Standard Plan J-3b.
15. Hinged front facing door with 4" x 6" polished wire glass window.
16. Hinged dead front with 1/4 turn fasteners or slide latch.
19. Metal Wiring Diagram Holder.
21. Wireway - minimum size.
22. Screened Vents, 2 required, 1 each side, louvered plates.
24. Thermostat, 40°F closure 3 differential.
25. Strip Heater (100 watt nominal), with terminal strip cover.
27. Dry Transformer (480/120 volt) 3 KVA copper bussed and copper wound.
28. Reserved for meter, current transformer and/or disconnect switch as required by the utility.
29. 24 circuit panel board - minimum size with separate main breaker.
30. Label Cabinet with Buss work rating.
31. 6 Circuit Panel Board - minimum size.
32. Molded Case Switch, rating of switch shall equal or exceed main breaker rating. Provide landing lug rated to accept 350 Kcmil conductors. (Omit if utility requires the disconnect switch to be mounted externally, or if the utility does not require the disconnect switch.)
33. Molded case switch standoff bracket. (Omit if utility requires the disconnect switch to be mounted externally, or if the utility does not require the disconnect switch).
34. Molded case switch enclosure with cover. (Omit if utility requires the disconnect switch to be mounted externally, or if the utility does not require the disconnect switch).
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOTES
1. An eight-way expanding anchor may be used as an acceptable alternate to power-installed helical screw anchor.
2. If anchor hole diameter is greater than nominal diameter of folded anchors, a 5" (8) cover of 6" (9) to 12" (9) size rock shall be tapped in to replace disturbed soil immediately above the anchor.
3. See Standard Plans J-27.10 and J-27.15 for Type IV or Type V Strain Pole details not shown.
4. Self-Locking Cable Clamp Type Dead-Ending Device or Guy Wrap may be used. See Standard Spec. Sec. B-23.3(7) for additional requirements.
5. See Contract for Emergency Preampt
6. Timber strain pole burial depth is 10 percent (%) of the total pole length plus two (2) feet (Standard Spec. Sec. B-23.3(7) when foundation soil lateral bearing pressure is 2000 PSF and a friction angle 32 degree (4) or greater soil lateral pressure. Helical anchor soil lateral bearing pressure is 1000 PSF and a friction angle 26 degree (4) or greater. Soil lateral bearing pressure below 2000 PSF for timber strain pole soil lateral bearing pressure below 1000 PSF for helical anchor requires Special Design. Contact the WSDOT Bridge and Structures office through the Engineer for Special Design. timber strain pole burial depth.
NOTES

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 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.

6" (IN) DIAMETER STEEL HEAVY HEX NUT, 
WITH FLAT WASHER, TWO EACH REQUIRED PER ANCHOR BOLT - MIN OF TWO THREADS ABOVE TOP OF NUT OR 5/8" (IN) MAXIMUM (TYP.)

ANCHOR BOLT TEMPLATE ASSEMBLY - TWO REQUIRED
1/2" (IN) DIAMETER STEEL HEAVY HEX NUTS - FOUR REQUIRED PER ANCHOR BOLT
FLAT WASHERS - FOUR REQUIRED PER ANCHOR BOLT
COMMERCIAL CONCRETE

ANCHOR BOLT TEMPLATE - TWO REQUIRED
1/2" (IN) X 18" (IN) FULL THREAD ANCHOR BOLT - FOUR REQUIRED PER ASSEMBLY
1/2" (IN) DIAMETER STEEL HEAVY HEX NUTS - FOUR REQUIRED PER ANCHOR BOLT
FLAT WASHERS - FOUR REQUIRED PER ANCHOR BOLT
1/4” WEEP HOLE

FOR SIGNAL HEAD MOUNTING DETAILS; SEE STANDARD PLAN J-20.16

IMSA 20-1 SC #14 CABLE

BRONZE COLLAR AND TERMINAL COMPARTMENT

IMSA 20-1 7C #14 CABLE - FROM CONTROLLER (SEE NOTE 3)

IMSA 20-1 7C OR 5C #14 CABLE - TO SIGNAL DISPLAY (SEE CONTRACT PLANS FOR WIRE SIZE AND QUANTITIES)

IMSA 20-1 SC #14 CABLE

PEDESTRIAN SIGNAL WIRING DETAIL

(TYPE D MOUNTING SHOWN)

ACCESSIBLE PEDESTRIAN PUSHBUTTON WIRING DETAIL

IMSA 20-1 7C OR SC #14 CABLE - TO PUSHBUTTON (SEE CONTRACT PLANS FOR WIRE SIZE AND QUANTITIES)

2C (SH) CONDUCTOR - FROM CONTROLLER

2C (SH) CONDUCTOR - TO PUSHBUTTON (SEE CONTRACT PLANS FOR WIRE SIZE AND QUANTITIES)

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

EQUIPMENT GROUND CONDUCTOR - SEE STANDARD PLAN J-20.26

GROUNDING CONNECTION

GROUNDING STUD (TYP.)

STAINLESS STEEL WASHERS (TYP.)

STAINLESS STEEL NUT

FULL CIRCLE CRIMP-ON CONNECTOR (TYP.)

LEVELING NUT (TYP.)

STEEL REINFORCING BAR (TYP.)

3/8” DRAIN TUBE

FOUNDATION WIRING DETAIL

3C (SH) CONDUCTOR - TO PUSHBUTTON (SEE CONTRACT PLANS FOR WIRE SIZE AND QUANTITIES)

EQUIPMENT GROUNDING CONDUCTOR - SEE STANDARD PLAN J-20.26

WALK DISPLAY

WALK DISPLAY

NEUTRAL CONDUCTOR

SPARE CONDUCTOR

SPARE CONDUCTOR

DON'T WALK DISPLAY

DON'T WALK DISPLAY

DO NOT WALK DISPLAY

DO NOT WALK DISPLAY

ASSOCIATED PHASE NUMBER

ASSOCIATED PHASE NUMBER

PEDESTRIAN SIGNAL STANDARD (TYPE PS) ELECTRICAL DETAIL

STANDARD PLAN J-20.20-02

5C PEDESTRIAN HEAD TERMINATIONS

TERMINAL NUMBER | COLOR CODE | USE
--- | --- | ---
7*1 | R | DON'T WALK DISPLAY
7*2 | G | WALK DISPLAY
7*3 | W | NEUTRAL CONDUCTOR
7*4 | B | SPARE CONDUCTOR
7*5 | O | SPARE CONDUCTOR

7C PEDESTRIAN HEAD TERMINATIONS

TERMINAL NUMBER | COLOR CODE | USE
--- | --- | ---
7*1 | R | DON'T WALK DISPLAY
7*2 | G | WALK DISPLAY
7*3 | W | NEUTRAL CONDUCTOR
7*4 | B | SPARE CONDUCTOR
7*5 | O | DON'T WALK DISPLAY
7*6 | BL | WALK DISPLAY
7*7 | WB | NEUTRAL CONDUCTOR

ASSOCIATED PHASE NUMBER

ASSOCIATED PHASE NUMBER

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).
ACCESSIBLE PEDESTRIAN PUSHBUTTON (APS) ASSEMBLY

KEY

1. FACE PLATE
2. 1/4-20 x 3/8" LONG STAINLESS STEEL SCREW
3. 1/4-20 STAINLESS STEEL SCREWS
4. PUSHBUTTON FRAME ADAPTER
5. 1/4-20 STAINLESS STEEL BOLT W/ WASHER AND LOCK WASHER
6. PUSHBUTTON STATION
7. DRILL AND TAP SHAFT FOR 1/4" DIA. BOLT
8. DRILL AND TAP SHAFT FOR 5/8" WIRE GUIDE HOLE - ADD INSULINER

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY

PEDESTRIAN PUSHBUTTON FRAME ADAPTER

PEDESTRIAN PUSHBUTTON INSTRUCTIONAL SIGN

ATTACH SIGN TO ADAPTER - 1/4-20 x 3/8" STAINLESS STEEL SCREWS (TYP.)

ATTACH ADAPTER TO PUSHBUTTON STATION - 5/8" DIA. COUNTERSUNK HOLE, 3/8" LONG FLAT HEAD SCREWS (TYP.)

Effect: August 3, 2015 to July 31, 2016
WOOD POLE INSTALLATION ALTERNATIVE 1
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

WOOD POLE INSTALLATION ALTERNATIVE 3
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER POLE)

INSTALL FITTING WITH NYLON WASHER ON OUTSIDE OF HOUSING
- SEAL WITH SILICONE AFTER UNIT IS FULLY ASSEMBLED

KEY
1. FACE PLATE
2. 1/4-20 x 3/8" LONG STAINLESS STEEL SCREW
3. 1/4-20 STAINLESS STEEL SCREWS
4. PUSHBUTTON FRAME ADAPTER
5. LAG BOLT WITH WASHER
6. PUSHBUTTON STATION
7. CONDUIT DIAMETER + 1/8" HOLE THRU POLE
8. CONDUIT
9. 3/4" CONDUIT
10. LIQUID-TITE FLEX CONDUIT
11. ONE PIECE TWO HOLE CLAMP
12. LAG BOLT
13. INSULINER SLEEVE

PRE-DRILL (3) 1/4" WEEP HOLES IN BOTTOM RADIUS OF CONDUIT
DRIP LOOP - REAM HOLES WITH DRILL BIT TO ELIMINATE BURRS

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
WOOD POLE INSTALLATION ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

TEMPORARY TIMBER POLE

10/8/2012

ACCESSIBLE PEDESTRIAN PUSHBUTTON (PPB)
DETAILS
STANDARD PLAN J-20.26-01
SHEET 3 OF 2 SHEETS

APPROVED FOR PUBLICATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 0-47.1(2) FOR BENDING DAM.

DIMENSIONS ARE OUT OF OUT

SECTION A

SEE DETAILS ABOVE - MATCHLINE FOR SQUARE CONCRETE FOUNDATION

BASE PLATE DETAIL

SECTION B

SEE DETAILS ABOVE - MATCHLINE FOR ROUND CONCRETE FOUNDATION

FIXED BASE

ELEVATION

SQUARE CONCRETE FOUNDATION DETAIL

REINFORCING STEEL WITH STEEL REINFORCING WIRE

BENDING DIAGRAM

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOTES

1. Clamping bolts shall be tightened to 50 ft-lbs max. torque. After state inspection, burr threads to prevent nut rotation. DO NOT OVERTORQUE.

2. The final height of the Anchor Bolts shall be below the top of the slip plate assembly to ensure proper function of the slip base.

3. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: Provide 3' - 0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).

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.

BOLT ASSEMBLY - SEE STANDARD PLAN J-20.70 FOR DIAM. DETAIL

ANCHOR BOLT ASSEMBLY - SEE STANDARD PLAN J-20.70 FOR DIAM. DETAIL

- Per Anchor Bolt - Minimum of Two Threads Above Top of Nut or 5/8" (IN) Maximum (Typ.)

- Flat Washer - Two Req'd.

- Full Circle Washer - Two Req'd.

- Round Stout Stud with a Connector Suitable for Use Embedded in Concrete.


- Electrode Wires to pole to grounding stud with a connector suitable for use embedded in concrete.

- Clamp in g bolts shall be tightened to 50 ft-lbs max. torque. After inspection, burr threads to prevent nut rotation. DO NOT OVERTORQUE.

- 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.

- 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).

- Junction box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.

- Provide cable tie at wiring entering the junction box (for slip base installations only) - See Detail A, Standard Plan J-20.70.

- Keeper Plate shall not extend beyond the edges of the pole base plate.

- Full Circle Washer - Two Req'd.

- Flat Washer - Two Req'd.

- Round Stout Stud with a Connector Suitable for Use Embedded in Concrete.


- Electrode Wires to pole to grounding stud with a connector suitable for use embedded in concrete.

- Clamp in g bolts shall be tightened to 50 ft-lbs max. torque. After state inspection, burr threads to prevent nut rotation. DO NOT OVERTORQUE.

- 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.

- 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).

- Junction box serving the Standard shall preferably be located 5' - 0" (10'-0" Max.) from the Standard.

- Provide cable tie at wiring entering the junction box (for slip base installations only) - See Detail A, Standard Plan J-20.70.

- Keeper Plate shall not extend beyond the edges of the pole base plate.

- Full Circle Washer - Two Req'd.

- Flat Washer - Two Req'd.

- Round Stout Stud with a Connector Suitable for Use Embedded in Concrete.
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. Pedestrian signal displays mounted on the side of an octagonal (8 sided) traffic signal pole with a pole attachment angle other than 0°, 45°, 90°, 135°, 180°, 225°, 270°, or 315° shall utilize:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.
7. Junction Box serving the Standard shall preferably be located 5’-0" (10'-0" Max.) from the Standard.

CONCRETE FOUNDATION - SEE NOTE 1

TYPE 1 SIGNAL STANDARD
STANDARD PLAN J-21.15-01

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**FLASHING BEACON TYPE 1 SIGNAL STANDARD DETAILS**

**NOTES**


2. All poles shall be hot dip galvanized per AASHTO M111.

3. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.

4. Visor shall be 8" Polycarbonate, fully enclosed circle at bottom to reduce glare on sign. Display shall be of appropriate color needed.


6. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.

---

**EFFECTIVE**: AUGUST 3, 2015 TO July 31, 2016

*Washington State Department of Transportation*

[Diagram of Flashing Beacon Details]
FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.16

SEE STANDARD PLAN J-21.16 FOR MOUNTING HARDWARE DETAILS

2C (SH) B&W CABLE

8" FLASHING WARNING BEACON HOUSING (TYP.)

TERMINAL BLOCK (TYP.)

POLE

ORNAMENT CAP - WITH 2-WAY FLASHER

8" FLASHING BEACON

INSTALL SIZED REDUCING WASHER AND CONNECTOR TO Secure Conductors AT TOP OF POLE

1/4" WEEP HOLE

TERMINAL BLOCK

8" FLASHING BEACON

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

EQUIPMENT GROUNDING CONDUCTOR LEVELING NUT (TYP.)

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

CONDUIT COUPLING

2C (SH) B&W CABLE - TO FLASHING BEACON

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-20.20 FOR GROUND CONNECTION DETAILS

STEEL REINFORCING BAR (TYP.)

1" DIAMETER ELECTRICAL CONDUIT

POLE

1/4" WEEP HOLE

2C (SH) B&W CABLE - FROM FOUNDATION WIRING

FLASHER 1

FLASHING BEACON WIRING

ALTERNATING FLASH WIRING SHOWN

FLASHER 2

COLOR CODE

USE

B  POWER

W  NEUTRAL

R  FLASHER 1

Bu  FLASHER 2

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.
NOTES


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.
CUT SECTION BEHIND BARRIER (GROUND-MOUNTED)

BOTTOM OF LOWER TRAFFIC SIGNAL HEAD

TOP OF POLE

SIGN R15-601 – SEE SIGN PLACEMENT DETAIL

1'-6" MIN.

TOP OF BASE PLATE

CONCRETE FOUNDATION (SEE NOTE 1)

HAND HOLE (BEYOND) (SEE NOTE 13)

TOP OF ROADWAY

EMBANKMENT SECTION BEHIND BEAM GUARDRAIL (GROUND-MOUNTED)

TOP OF POLE

TOP OF BASE PLATE

CONCRETE FOUNDATION (SEE NOTE 1)

HAND HOLE (BEYOND) (SEE NOTE 13)

4'-0" MIN.

(SEE NOTE 11)

MAINTENANCE PAD – SEE STANDARD PLAN J-28.24 FOR DETAILS

BACKPLATES NOT SHOWN FOR CLARITY.
### ALTERNATE # 1 DRILLED SHAFT-TYPE CONSTRUCTION

**FOR LATERAL BEARING PRESSURE** = 2600 PSF & Ø = 28", 1000 PSF & Ø = 26" 

<table>
<thead>
<tr>
<th>GROUND SLOPE = 3H:1V OR FLATTER</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>FOUNDATION TYPE</th>
<th>X' (FT)</th>
<th>Y' (FT)</th>
<th>Z' (FT)</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>FOUNDATION TYPE</th>
<th>X' (FT)</th>
<th>Y' (FT)</th>
<th>Z' (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1000 PSF</td>
<td>3'-0&quot; ROUND</td>
<td>700</td>
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**FOR LATERAL BEARING PRESSURE** = 2600 PSF & Ø = 23", 1000 PSF & Ø = 18", 1000 PSF & Ø = 17" 

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<thead>
<tr>
<th>GROUND SLOPE = 3H:1V OR FLATTER</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>FOUNDATION TYPE</th>
<th>X' (FT)</th>
<th>Y' (FT)</th>
<th>Z' (FT)</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>FOUNDATION TYPE</th>
<th>X' (FT)</th>
<th>Y' (FT)</th>
<th>Z' (FT)</th>
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<td>3'-0&quot; ROUND</td>
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<tr>
<td></td>
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<td>3'-0&quot; ROUND</td>
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<td>700</td>
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<td>3'-0&quot; ROUND</td>
<td>1000 PSF</td>
<td>3000</td>
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</tbody>
</table>

**GROUND CONDUCTOR NON-INSULATED 4# AWG STRANDED COPPER - PROVIDE 3 MIN. BLACK ROUTE CONDUCTOR TO GROUNDING STUD**

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

**FOUNDATION REINFORCEMENT DETAIL**

**CONCRETE CAST DIRECTLY AGAINST UNDISTURBED EARTH, DRILLED SHAFT**

**ALTERNATE # 2 CORRUGATED METAL PIPE TYPE CONSTRUCTION**

**FOR LATERAL BEARING PRESSURE** = 2500 PSF & Ø = 28", 1000 PSF & Ø = 26" 

<table>
<thead>
<tr>
<th>GROUND SLOPE = 3H:1V OR FLATTER</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>FOUNDATION TYPE</th>
<th>X' (FT)</th>
<th>Y' (FT)</th>
<th>Z' (FT)</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
<th>FOUNDATION TYPE</th>
<th>X' (FT)</th>
<th>Y' (FT)</th>
<th>Z' (FT)</th>
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<tbody>
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<td></td>
<td>1000 PSF</td>
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<td>550</td>
<td>350</td>
<td>3'-0&quot; ROUND</td>
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<td>3'-0&quot; ROUND</td>
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<td>3'-0&quot; ROUND</td>
<td>1000 PSF</td>
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<td>3'-0&quot; ROUND</td>
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<td>700</td>
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<td>3'-0&quot; ROUND</td>
<td>1000 PSF</td>
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<td>700</td>
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<tr>
<td></td>
<td></td>
<td>3'-0&quot; ROUND</td>
<td>3000</td>
<td>700</td>
<td>350</td>
<td>3'-0&quot; ROUND</td>
<td>1000 PSF</td>
<td>3000</td>
<td>700</td>
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</tr>
</tbody>
</table>

**GROUND CONDUCTOR NON-INSULATED 4# AWG STRANDED COPPER - PROVIDE 3 MIN. BLACK ROUTE CONDUCTOR TO GROUNDING STUD**

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

**FOUNDATION REINFORCEMENT BAND DETAIL**

**CONCRETE CAST WITHIN A CORRUGATED METAL PIPE STAY-IN-PLACE FORM**
1. All material and workmanship shall be in accordance with the requirements of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.

2. The analysis and design for Adaptors 1 and 2 have been done in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals - Fifth Edition - Dated 2009, and Interims, using basic wind speed of 90 MPH and 50 years of design life.

3. Adaptors' parameters are based on field data and existing signal standard anchor bolts and bolt circles. Adaptor 1 shall be used for 15' (ft) thru 45' (ft) mast arm signal standards and Adaptor 2 for 46' (ft) thru 65' (ft).

4. Adaptors shall only be used for temporary installation of knocked down signal standards.

5. Materials specifications:
- All structural steel, except as otherwise noted
- Pipes: ASTM A572 GR. 50 OR ASTM A588
- Connecting/clamping bolts: AASHTO M 164 (ASTM A325)
- Nuts: AASHTO M 291 (ASTM A263) GRADE DH
- Washers: AASHTO M 293 (ASTM F436)

6. All bolts, rods, and related hardware shall be galvanized after fabrication per ASTM 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

SHEET 2 OF 5 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

DRAWN BY: GOLDFIEN, RICHARD

JUNE 12, 2014

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
### ALTERNATE #1 DRILLED SHAFT-TYPE CONSTRUCTION - DEPTH "D"

For Lateral Bearing Pressure = 2500 PSF & $\theta = 34^\circ$, 1500 PSF & $\theta = 28^\circ$, 1000 PSF & $\theta = 26^\circ$

<table>
<thead>
<tr>
<th>Ground Slope</th>
<th>Foundation Type</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (lbs)</th>
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</thead>
<tbody>
<tr>
<td>3:1 or flatter</td>
<td>1000 PSF</td>
<td>3'-0&quot; Round</td>
<td>1000 psi</td>
</tr>
<tr>
<td></td>
<td>1500 PSF</td>
<td>3'-0&quot; Round</td>
<td>1000 psi</td>
</tr>
<tr>
<td></td>
<td>2500 PSF or greater</td>
<td>3'-0&quot; Round</td>
<td>1000 psi</td>
</tr>
</tbody>
</table>

### ALTERNATE #2 CORRUGATED METAL PIPE TYPE CONSTRUCTION - DEPTH "D"

For Lateral Bearing Pressure = 2500 PSF & $\theta = 23^\circ$, 1500 PSF & $\theta = 18^\circ$, 1000 PSF & $\theta = 17^\circ$

<table>
<thead>
<tr>
<th>Ground Slope</th>
<th>Foundation Type</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:1 or flatter</td>
<td>1000 PSF</td>
<td>3'-0&quot; Round</td>
<td>1000 psi</td>
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<tr>
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<td>1500 PSF</td>
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<td>1000 psi</td>
</tr>
<tr>
<td></td>
<td>2500 PSF or greater</td>
<td>3'-0&quot; Round</td>
<td>1000 psi</td>
</tr>
</tbody>
</table>

### ALTERNATE #2 - CONSTRUCTION METHOD METAL (DINSURFACE) 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 (pips) 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).
1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 60' (H1).

3. Slip Bases shall not be installed on 60' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.


STEEL LIGHT STANDARD

STANDARD PLAN J-28.10-01

LIGHT STANDARD
WITH TYPE 1 (DAVIT) MAST ARM
(SLIP BASE SHOWN)

LIGHT STANDARD
WITH TYPE 2 (ELBOW) MAST ARM
(SLIP BASE SHOWN)
BASE LIGHT STANDARD BASE MOUNTED ON BRIDGE - SEE STD. PLAN J-28.45

MAST ARM LENGTH (12' MAX. FOR SINGLE ARM & 8' MAX. FOR DOUBLE ARM)

LUMINAIRE HEAD

BOLT CONNECTION

STEEL LIGHT STANDARD BARRIER MOUNTED BASE - SEE STD. PLAN J-28.45, C-8b, AND C-85.14

EDGE OF TRAVELEDeway VARIES WITH OFFSET DISTANCE SHOULDER

STEEL LIGHT STANDARD
STANDARD PLAN J-28.10-01 SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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

TOE OF EMBANKMENT WIDENING

SEE TAPER NOTE

FILL MATERIAL

TRAFFIC

PLAN VIEW

CASES A & B

EMBANKMENTS

END TAPER - FOR OPPOSING TRAFFIC

TOE OF EMBANKMENT WIDENING FOR END TAPER FOR OPPOSING TRAFFIC

SEE TAPER NOTE

FILL MATERIAL

TRAFFIC

PLAN VIEW

CASE C

DITCH SECTIONS

END TAPER - FOR OPPOSING TRAFFIC

TOE OF EMBANKMENT WIDENING FOR END TAPER FOR OPPOSING TRAFFIC

SEE TAPER NOTE

FILL MATERIAL

TRAFFIC

PLAN VIEW

CASE C

DITCH SECTIONS

END TAPER - FOR OPPOSING TRAFFIC

TOE OF EMBANKMENT WIDENING FOR END TAPER FOR OPPOSING TRAFFIC

SEE TAPER NOTE

FILL MATERIAL

TRAFFIC

PLAN VIEW

CASE C

DITCH SECTIONS

END TAPER - FOR OPPOSING TRAFFIC

TOE OF EMBANKMENT WIDENING FOR END TAPER FOR OPPOSING TRAFFIC

SEE TAPER NOTE

FILL MATERIAL

TRAFFIC

PLAN VIEW

CASE C

DITCH SECTIONS
**SECTION VIEW**

**CASE A**
SLOPES 3H:1V THRU 2H:1V (MAX.)

**CASE B**
SLOPES FLATTER THAN 3H:1V

**EMBANKMENTS**

**CASE C**
FORE SLOPES 4H:1V OR FLATTER

**CASE D**
FORE SLOPES STEEPER THAN 4H:1V (2H:1V MAX.)

**DITCH SECTIONS**
NOTES

STEEL LIGHT STANDARD PLACEMENT
MISCELLANEOUS
STANDARD PLAN J-28.26-01
SHEET 1 OF 1 SHEET

NOTES

STEEL LIGHT STANDARD PLACEMENT
MISCELLANEOUS
STANDARD PLAN J-28.26-01
SHEET 1 OF 1 SHEET

NOTES

STEEL LIGHT STANDARD PLACEMENT
MISCELLANEOUS
STANDARD PLAN J-28.26-01
SHEET 1 OF 1 SHEET

NOTES

STEEL LIGHT STANDARD PLACEMENT
MISCELLANEOUS
STANDARD PLAN J-28.26-01
SHEET 1 OF 1 SHEET

NOTES
METHOD 2
METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal (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).
NOTES

1. 50' (ft) (H) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.

2. Galvanizing shall be in accordance with AASHTO M 111.

3. See Standard Plans C-85, C-86.15, and J-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.

4. See Standard Specification Sections 6-03.3(33) and 8-20.3 (4) for the torque requirements for all of the anchor bolt installations. Install 1" (in) diameter clamping bolts in all slip bases to a torque of 95 Foot-Pounds. See Standard Specification Section 8-20.3 (13A). DO NOT OVERTIGHTEN. After state inspection, burt threads to prevent nut rotation.


---

EXPLoded View

ISOMETRIC VIEW

ELEVATION VIEW

ASSEMBLED

STANDARD PLAN J-28.40-02

SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

State of Washington

DATE: JUN 11 2014 1:31 PM

RICHARD ZERBEK, PE

PROFESSIONAL ENGINEER

STANDARD LIGHT STANDARDS

BASE MOUNTING

STANDARD PLAN J-28.40-02

SECN10: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**PLATE WASHER DETAIL**

1 1/4" (IN) DIAM. HOLE WITH SMOOTH CHAMFERED EDGES

**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’</th>
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</thead>
<tbody>
<tr>
<td>20’ TO 50’</td>
<td>SINGLE</td>
<td>6’ TO 16’</td>
<td>1’</td>
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<td>20’ TO 45’</td>
<td>DOUBLE</td>
<td>6’ TO 8’</td>
<td>1’</td>
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<tr>
<td>46’ TO 50’</td>
<td>DOUBLE</td>
<td>10’ TO 16’</td>
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<tr>
<td>46’ TO 45’</td>
<td>DOUBLE</td>
<td>10’ TO 16’</td>
<td>1’</td>
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</tbody>
</table>

**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 A36. All Slip Plate notched surfaces shall be finished smooth.

3. The clamping bolts shall be high-strength steel, manufactured from AASHTO M 164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M 232.


5. Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

6. Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or reusing a luminaire pole. For 1” (in) clamping bolts, tighten to 95 ft-lbs. For 1 1/4” (in) clamping bolts, tighten to 104 ft-lbs. DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.
### BASE TABLE

<table>
<thead>
<tr>
<th>ADAPTOR TYPE</th>
<th>ANCHOR BOLT DIAM (IN)</th>
<th>BOLT CIRCLE &quot;BC&quot; (IN)</th>
<th>EXISTING BASE TYPE</th>
<th>LUMINAIRE HEIGHT ((2' - 8))</th>
</tr>
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<tbody>
<tr>
<td>A-1</td>
<td>1&quot;</td>
<td>11&quot;</td>
<td>WELDED PLATE</td>
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<tr>
<td>A-2</td>
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<td>12 1/4&quot;</td>
<td>CAST ALUMINUM</td>
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<td>A-3</td>
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<td>12 3/4&quot;</td>
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<td>14 1/8&quot;</td>
<td>2-PC. ALUM. CLAMP</td>
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<td>14 1/8&quot;</td>
<td>2-PC. ALUM. CLAMP</td>
<td></td>
</tr>
</tbody>
</table>

### CONSTRUCTION NOTES

1. Wire brush existing threads.
2. Apply two coats of galvanizing paint (per Standard Specification 9-08.1(2B)).
3. Tighten bolt by "Turn of Nut" method (per Standard Specification S-03.3(32)).

### PLATE WASHER DETAIL

| (ASTM A36 OR A327 - GRADE 50) |
|-------------------------------|-------------------|
| ROUGHEN SURFACE AND APPLY EPOXY BONDING AGENT PRIOR TO PLACING GROUT PER STANDARD SPECIFICATION S-26.1(1) |

### DESCRIPTION

- **LUMINAIRE ARM**
  - Flange Facing Traffic
  - Tapped Holes Equally Spaced for Threaded Studs
  - Flat Edge Facing Traffic

- **TOP VIEW**
  - Keeper Plate
  - Bottom Slip Plate
  - Anchor Bolt
  - Top Slip Plate
  - Plate Washer

- **SECTION 1**
  - Bolt Circle "BC" - SEE BASE TABLE
  - Bolt Diameter (IN) W (IN) L (IN)
  - Plate Washer
  - Bolt Diameter (IN) Dia. Hole (TYP.)
  - Bolt Diameter (IN) Dia. Hole (TYP.)
  - Bolt Diameter (IN) Dia. Hole (TYP.)

- **TOP VIEW**
  - LUMINAIRE ARM
  - Bolt Circle "BC" - SEE BASE TABLE
  - Bolt Diameter (IN) Dia. Hole (TYP.)

- **DETAIL A**
  - Anchor Plate Slot Detail
  - Anchor Bolt Diameter (IN) Size
  - Bolt Diameter (IN) Dia. Hole (TYP.)

**NOTES**

1. The purpose of this plan is to provide the details for retrofitting a 4-bolt flange base with a slip base assembly.
2. Existing anchor bolts shall be inspected for corrosion, thread damage, and galvanizing. To minimize galvanic corrosion between dissimilar materials, ensure galvanizing remains intact while installing aluminum laminate.
3. After bolting the bottom slip plate assembly to the foundation, fill the slotted bolt holes with mastic per Standard Specification 9-08.7.
4. Grade around the foundation to ensure the stub height does not exceed 3 7/8" (IN). For grading requirements, see Standard Plan J-28.22.
5. Removal of the flange base from the existing base plate is required.
6. Misaligned anchor bolts shall be removed and replaced.
7. This adaptor shall be used only on luminaire poles that contain a handhole. Replace standards and foundation when the handhole is located in the flange base.
8. Galvanize the anchor plate, bottom slip plate, and top slip plate after fabrication according to ASTM A123.
9. Galvanize all hardware according to ASTM F2329.

**SPECIFICATIONS**

- **BC** - Foundation
  - Wt. 1000 LBS
  - 40' WEIGHT
  - 50' LENGTH

- **LUMINAIRE**
  - See Base Table
  - PLATE (PER ASTM A36)
  - HEX HEAD BOLT AND NUT (TYP.)
  - ONE PLATE WASHER, ONE HARDENED ROUND WASHER, 87-TUBES TAPPED BOLT ASSEMBLIES PER SLIP BASE (PER ASTM A327)

- **ANCHOR PLATE (PER ASTM A36)**
  - HARDENED WASHER (PER ASTM F2329)
  - EPOXY BONDING AGENT PRIOR TO PLACING GROUT PER STANDARD SPECIFICATION S-26.1(1)

- **KEEPPER PLATE**
  - 0.0149" (IN) Dia. Hole (TYP.)

- **POLE WALL**
  - 0.0149" (IN) Dia. Hole (TYP.)

- **TOP SLIP PLATE**
  - 0.0149" (IN) Dia. Hole (TYP.)

- **BOTTOM SLIP PLATE**
  - 0.0149" (IN) Dia. Hole (TYP.)

- **ANCHOR BOLT (PER ASTM A36)**
  - TRIM TO CLEAN SLIP PLATE BY 1/8" (IN) MIN.

- **TOP SLIP PLATE (PER ASTM A36)**
  - 3/8" (IN) Dia. Drain Tube (Per Standard Specification 9-26.3(3))

- **PLATE WASHER**
  - 0.0149" (IN) Dia. Hole (TYP.)

- **ANCHOR PLATE (PER ASTM A36)**
  - HARDENED WASHER (PER ASTM F2329)

**SHEETS**

- SHEET 1 OF 1 SHEET

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- Nahtak, Pacific
  - 2011 11 17 1:33 PM

**CONSTRUCTION NOTES**

- USE MATCHING DIAMETER FOR THREADED STUDS.
- CONTRACTOR SHALL VERIFY BOLT CIRCLE "BC" IN THE FIELD BEFORE ORDERING. IF "BC" OR ANCHOR BOLT SIZES DIFFER FROM THOSE LISTED, CONTACT HQ BRIDGE AND STRUCTURES OFFICE.
- FLAT EDGE FACING TRAFFIC.
- LUMINAIRE ARM.

**DIAMETER (IN) DIAM. HOLE (TYP.) - EVENLY SPACED**

- 1/2" (IN) DIAM. HOLE WITH SMOOTH CHAMFERED EDGES.

**SECTION 0**


**DRAWN BY**

- COLBY FLETCHER

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

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  - 2011 11 17 1:33 PM
3" (IN) DIAM.

Washer (TYP.)

Hex Nut (TYP.)

PLATE

See Standard Plan J-28.60 for pole base and hand hole requirements.

3/16" (IN) thick preformed "Fabrieka" fabric pad with 5" (IN)

Diam. Hole - cement to flange plate and trim outside edge flush.

See Contract Plan for slope of parapet face.

The face shall be plane after fabrication to provide a seal between the barrier and the elbow.

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.

NOTES

1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111.


STEEL LIGHT STANDARD ELBOW DETAIL

For Luminare Poles with Single Mast Arm 12' - 0" or less and Double Mast Arms 9' - 0" or less, mounted on Bridge or Retaining Walls.

EXPLODED ISOMETRIC VIEW

NOTE: Galvanized AASHTO GR. 105

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REDITED: AUGUST 3, 2015 TO July 31, 2016

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

WASHINGTON SIGNS

STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION

VENICE, WASH 08/01/2015 10:42 AM

STEEL LIGHT STANDARD ELBOW MOUNTING ON BRIDGE & RETAINING WALL

STANDARD PLAN J-28.45-02

SHEET 1 OF 1 SHEET
LUMINAIRE POLE

ROUND AND SMOOTH INSIDE EDGES

POLE BASE PLATE

REMOVABLE RAINTIGHT HAND HOLE COVER WITH GASKET

HAND HOLE COVER WITH GASKET - FASTEN WITH TWO STAINLESS STEEL (ASTM F 593) SCREWS

TYPICAL HAND HOLE ORIENTATION

NOTES

1. Pole Base Plate for a Slip Base design shall be 1 1/4" steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" steel manufactured from ASTM A572 GR 50, ASTM A588, or 1 1/2" manufactured from ASTM A36. All Pole Base Plate notched surfaces shall be finished smooth.


3. Galvanizing shall be in accordance with AASHTO M 111.

4. See Standard Plans C-8b, C-85.14, and J-28.60 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barrier.


CONFIGURATION AND LOCATION OF THE HAND HOLE VARIES AMONG MANUFACTURERS - MINIMUM SIZE OPENING SHOWN

FOR DETAILS NOT SHOWN, SEE VIEW A ABOVE:

ORIENTATION FOR INSTALLATION ON BRIDGE OR RETAINING WALL - SEE STANDARD PLAN J-28.45

VIEW A

FOR PLATE THICKNESS, REFER TO NOTE 1

TOP VIEW

POLE BASE PLATE DETAIL

STEEL LIGHT STANDARD POLE BASE AND HAND HOLE DETAILS

STANDARD PLAN J-28.50-02

ST. 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE HIGHWAY DEPARTMENT

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**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.

**CONDUCTOR ATTACHMENT DETAIL**

**CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS**

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**STEEL LIGHT STANDARD BARRIER MOUNTED BASE**

**STANDARD PLAN J-28.60-01**

Sheet 1 of 1 Sheet

Approved for Publication

Department of Transportation

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
CONDUCTOR WIRES
REMOVE ALL SLACK BEFORE INSTALLING CABLE TIE

DETAIL "A" GRS CONDUIT
SEE DETAIL "A" OR "B" PER CONDUIT TYPE

CABLE TIE – 150 POUND TENSILE STRENGTH BLACK
APPLICATION FOR FIXED BASE SIMILAR, EXCEPT NO CABLE TIE IS REQUIRED AT JUNCTION BOX
24" SLACK REQUIRED TO ALLOW QUICK DISCONNECTS TO BE PULLED OUTSIDE HAND HOLE 6" MIN.
BONDING JUMPER WIRE FOR GRS STEEL
EQUIPMENT GROUNDING CONDUCTOR
GROUNDING CONDUCTOR – FROM FOUNDATION
DOUBLE QUICK DISCONNECTS – PULL DOWN TIGHT TO CONDUIT (SHOWN LEFT UP FOR CLARITY)

DETAIL "B" PVC CONDUIT
LUMINAIRE POLE

POLE AND BRACKET CABLE – TO LUMINAIRE HEAD
POLE AND BRACKET CABLE = TO LUMINAIRE HEADS

GROUNDING NUT
GROUNDING NUT

TO GROUNDING NUT
CONDUCTOR WIRES

CONDUCTOR ATTACHMENT BRACKET
HAND HOLE

CONDUCTOR ATTACHMENT BRACKET
HAND HOLE

CONDUCTOR WIRES

TO GROUNDING NUT

DETAIL "C" GRS CONDUIT
SLIP BASE SHOWN

DETAIL "D" PVC CONDUIT
SLIP BASE SHOWN

STEEL LIGHT STANDARD WIRING DETAILS
STANDARD PLAN J-28.70-01

TYPICAL LOCATION OF JUNCTION BOX AND FOUNDATION

NOTE

STANDARD PLAN J-46.08

FOR GROUNDING REQUIREMENTS, SEE STANDARD PLAN J-46.08

SHEET 1 OF 1 SHEET

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**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.

**LOAD 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'-0" 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**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
NOTES

1. Verify Pole Top Plate, Camera Mount Plate, Bolt Circle, and Bolt Holes are adequate for the required Camera prior to releasing poles for manufacturing.

2. Steel shall be galvanized after fabrication per AASHTO M235. Fasteners less than 0.500" (in) diameter shall be stainless or brass.

3. Attach Camera to Camera Mount Plate using four (4) 3/8" UNC x 1.75" stainless steel bolts with eight (8) stainless steel washers and four (4) lock-nuts with nylon inserts, or as approved by the Camera Supplier.

4. For Ground Mount Details, see Standard Plan J-29.10. For Elbow Mount Details, see Standard Plan J-29.16.

DESIGN CRITERIA:

This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Basic wind velocity is 90 MPH. Design Life/Recurrence Interval 50 years.

WIND VELOCITY:

90 MPH
Maximum Pole Deflection shall not exceed 0.7" in 30 MPH and 1.4" in 70 MPH wind.

LOAD CASE #1:

Camera (1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:
Dish (1) - 1' - 0" diameter @ pole top level.

LOAD CASE #2:

Camera (1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:
Camera (2) - EPA = 0.54 sq. ft. @ 1' - 0" and 2' - 0" from pole top, and:
NEMA Cabinet (2) - EPA = 1.33 sq. ft. @ 3' - 8" from pole top. Install back-to-back NEMA Cabinets, and:
Radio Equipment (2) - EPA = 2.25 sq. ft. each @ 2' - 0" and 9' - 0" from pole top.

EPA = Effective Projected Area

CAMERA POLE DATA

CAMERA POLE STANDARD

STANDARD PLAN J-29.15-00

SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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 wires 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.
REINFORCING STEEL TYPICAL LAYOUT

SEE STD. SPEC. 9-07.1(2) FOR BENDING DIAM. ALL DIMENSIONS ARE OUT TO OUT

KEYNOTE
1. LIMITS OF PIGMENTED SEALER FOR ALL REINFORCEMENT WALLS.

NOTES
1. All material and workmanship shall be in accordance with the Standard Specifications.
2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
3. Concrete for 12" (in) thick maintenance pad shall be class 4000. Concrete for 4" (in) thick maintenance pad shall be class 3000.
4. Height of wall varies to match slope of finished grade. Contractor shall field-determine wall height at each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.
5. All exposed corners shall have 3/4" (in) chamfers.
6. For ground details not shown, see Standard Plan J-60.06.
7. Where concrete cover (clear) thickness is not shown, the clear distance from the face of the concrete to the face of any reinforcing steel shall be as follows: 3" (in) for bottom of maintenance pad, 2" (in) for top of maintenance pad, and 1 1/2" (in) at all other locations.
8. Falsework shall be carefully released to prevent impact or undue stress on the structure.
9. See Contract Plans for number, type, and location of conduits and conduits.
10. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Engineer's approval of maintenance pad slope and orientation required prior to proceeding with construction.

Use 4" (in) Maintenance Pad on slopes level to 10% : 1V
Use 12" (in) Maintenance Pad on slopes steeper than 10% : 1V

Slopes steeper than 2% : 1V shall require a special design.

LEGEND
- FRACTURED FINISH
β EXTEND BAR 6" (IN) INTO FOOTING
Ω ADJACENT TO SOIL

DRAWN BY: FERN DODGE

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

HIGH MAST LUMINARIAE MAINTENANCE PAD
STANDARD PLAN J-30.10-00

APPROVED FOR PUBLICATION
Jan 15 2015 10:54 AM
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

SECTION (B)

4" (IN) THICK MAINTENANCE PAD IS SHOWN IN THIS VIEW ~ 12" (IN) THICK MAINTENANCE PAD DETAIL IS SIMILAR
(REINFORCING, ANCHOR BOLTS, AND GUIDEPOSTS NOT SHOWN IN THIS VIEW FOR CLARITY)

SECTION (D)

STANDARD PLAN J-30.10-00

Sheet 2 of 2 sheets
JUNCTION BOX DIMENSION TABLE

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<th>MARK</th>
<th>ITEM</th>
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<th>TYPE 5</th>
<th>TYPE 6</th>
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<td>CAPACITY - CONDUIT DIAM.</td>
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<td>12&quot;</td>
<td>24&quot;</td>
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</table>

NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. All lid thicknesses are minimum. The diamond pattern shall be 3/32" minimum thickness.
3. Lid perimeter shall bear on frame. Mill to bearing seat and lid perimeter for full even contact after fabrication of frame and lid. Lid and frame units with uneven bearing will be rejected.
4. The installed lid and frame shall fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation on the contact surfaces.
5. A 1/4-20 NC x 1" S. S. ground stud shall be welded to the bottom of each lid: (2) each S. S. nuts and (3) each S. S. flat washers.
6. The hinges shall allow the lids to open 180°.
7. Bolts and nuts shall be liberally coated with anti-seize compound.
8. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-20 NC x 1" S. S. bolt, (2) each S. S. nuts, and (3) each S. S. flat washers. Equipment bonding jumper shall be #8 AWG min. x 4" of tinned bared copper.
11. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty. Heavy-Duty Junction Boxes shall not be installed in sidewalks, walkways, and shared use paths.
12. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" min. to 8" max. for initial construction stages during the contract, the limits shall be from 6" min. to 10" max. See Standard Specification 8-20.3(6).
13. Junction Box Types 4, 5, or 6 may be equipped with Ductile Iron (Alternative) Lid(s) and a Cast Iron (Alternative) Frame. Junction box shall meet the requirements of Std. Spec. 9-29.2 and shall be in accordance with approved shop drawings.
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

LOCKING LID STANDARD DUTY JUNCTION BOX

PLN VIEW

COVER MARKING DETAIL

NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. Minimum lid thicknesses are shown. The diamond pattern shall be a minimum of 29% of the overall thickness. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and top 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" thick 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 #8 AWG min. x 4" of tinned bare copper.
9. See the Standard Specifications for alternative reinforcement and class of concrete.
11. Capacity limit 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 be placed within the traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.
14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 8" min. to 8" max. for final grade of new construction only. See Standard Specification 9-23.3(9). Where adjustments are to be made to existing Junction Boxes, or for invent construction stages during the contract, the limits shall be from 8" min. to 10" max. See Standard Specification 9-23.3(6).

**SECTION A**

**SECTION B**

CONERTS NOT SHOWN
FLASHING BEACON ATTACHMENT
(Steel sign support shown)

ELEVATION

VIEW

RIGHT ISOMETRIC VIEW
TRAVELER INFORMATION SIGN SHOWN — SEE CONTRACT FOR SIGN MESSAGE AND SIZE

SIGN POST-MOUNTED JUNCTION BOX
STANDARD PLAN J-40.35-01

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR OBLIGATION

PLANNING AND DESIGN DIVISION

5-29-13

S-607A

DRAWN BY: L. R. LUNDQUIST

ENGINEER: M. T. MCGEE

DATE: 5/6/2015

SHEET 3 OF 3 SHEETS
NOTES

1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel welded seam construction. Finish shall be # 29 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 be field drilled or punched in the box ends. See Section B.

3. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box conduit connection. Use an insulated, grounded end bushing on the inside for GRS conduit. Use a sealing lock nut and a rigid PVC conduit bushing on the inside for PVC conduit.

4. The System Identification letters shall be 1/8" in thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 8-29.2(4) for details.

5. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.

6. Junction Box shall only be used in barriers with stationary-forms. If Slip-Form Traffic Barrier is required, use Conduct shown in the Alternative PVC Conduit detail.

7. Conduct Capacity = 8" (4" per end).

8. Conducts 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 Conduct Deflection Fitting "B" detail, convert RMC to PVC in Stationary-Form Barrier (per Standard Plan J-40.11: omit Conductor when this detail is not used.)
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 6-03.2(20).

2. Mount the stainless steel support using an approved resin-bonded anchor system, installed per manufacturer's recommendation. Resin-bonded anchors shall be stainless steel and shall be of 3/8" diameter (Expansion Anchors are not allowed). Anchor bolt embedment shall be 4 1/2" min.

3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in concrete. See Standard Plan J-60.13 for Stainless Steel Channel details.

4. The System Identification numbers on the box lid shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specifications 9-29.2(4).

5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimensions.

6. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit connection. An insulated grounded end bushing shall be used to terminate rigid Metal Conduit.

7. Equipment Bonding Jumper shall be # 8 AWG (min.) + 1 foot of tinned, braided copper.

8. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.
SEE ENTRANCE SAWCUT DETAIL THIS SHEET

DETAIL "A" SEE STANDARD PLAN J-50.10 SHEET 2

SEE CORNER SAWCUT DETAIL (TYP.)

LEAD-IN SAWCUTS (TYP.)

STOP LINE A

TYPE 1 STOP LINE LOOP (40' LONG OR AS SHOWN IN THE CONTRACT)

TYPE 1 STOP LINE LOOP WIRING DIAGRAM

PLAN

TYPE 1 STOP LINE LOOPS

CHISEL OUT 1/16" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT (TYP.)

CHISEL OUT 1/16" TO 1/2" CORNER REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT

LEAD-IN SAWCUT

CENTER OF LOOP AND VEHICLE LANE

LOOP SAWCUT

2' 0"

W

L X X

X

PHASE NUMBER

LANE NUMBER

LOOP NUMBER MARKING DETAIL

NOTES
1. For Installation Notes and Details see Standard Plan J-50.15.
2. For Sections A, B, and D see Standard Plan J-50.15.
NOTES
1. For Installation Notes and Details see Standard Plan J-50.15.
3. All of the loop lead-in wires shall return to the Junction Box.
4. For Splice Detail, see Standard Plan J-50.15.
5. For additional Induction Loop details, see Standard Plan J-50.15.
NOTES

1. For Installation Notes and Details see Standard Plan J-50.15.
3. All of the loop lead-in wires shall return to the Junction Box.
4. For Splice Detail, see Standard Plan J-50.15.
5. For Loop numbering Layout Details, see sheet 3.
6. For additional Induction Loop Details, see Standard Plan J-50.15.

CIRCULAR SAWCUT (TYP.)

PLAN

TYPE 3 STOP LINE LOOPS

EDGEOF SHOULDER

CONDUCT

LEAD-IN SAWCUTS (TYP.)

SEE ENTRANCE SAWCUT DETAIL THIS SHEET (TYP.)

SHOULDER

6' - 0" DIAM. (TYP.)

PLAN

TYPE 3 SAMPLING LOOPS

B

C

A

JUNCTION BOX

SEE STANDARD PLAN J-50.15 SHEET 2

SEE ENTRANCE SAWCUT DETAIL THIS SHEET (TYP.)

LEAD-IN SAWCUT (TYP.)

CIRCULAR SAWCUT (TYP.)

PLAN

TYPE 3 ADVANCE LOOPS

STATION #

SEE CONTRACT

EDGEOF SHOULDER

CONDUCT

LEAD-IN SAWCUT (TYP.)

SEE ENTRANCE SAWCUT DETAIL THIS SHEET (TYP.)

SHOULDER

6' - 0" DIAM. (TYP.)

PLAN

TYPE 3 INDUCTION LOOP

STANDARD PLAN J-50.12-00

SEE ENTRANCE SAWCUT DETAIL

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.)

LEAD-IN SAWCUT

SEE STANDARD PLAN J-50.15 SHEET 2

SEE STANDARD PLAN J-50.15 SHEET 2

SEE ENTRANCE SAWCUT DETAIL THIS SHEET (TYP.)
**LOOP INSTALLATION NOTES**

1. Install the Junction Box and the stub-out conduit with PVC sleeve. Conduit for the loop stub-out shall be as required in the conduit size table shown on sheet 1 of this set.

2. Lay out loops and loop lead-ins to miss cracks/joints in road, when possible. Maintain 18” minimum clearance from manholes and valve boxes.

3. The opening around the loop stub shall be patched with matching paving material if opened larger than PVC sleeve + 2”.

4. Sawcut the loop slots and the lead-in slots. Wash/dry cuts. File edges to remove burr of all saw-cuts into stub out sleeve.

5. Lay out the loop wire starting at the Junction Box, allowing 5’ minimum slack.

6. Install the wire in the loop slot as shown.

7. Finish laying out the wire at the Junction Box and identify the leads with the loop number, the "S" for start and the "F" for the finish, the loop series number, and the loop lead-in conductor number.

8. Twist each pair of the lead-in wires a minimum of two times per foot each foot, from the loop to the Junction Box. Reverse the direction of the twist for each successive pair installed. Seal loops/sawcuts.

9. Construct a supplemental splice containing any series loop connections in the adjacent junction box as required in the plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice.

10. Splice the loop lead-ins to the shielded cable as noted in the Contract.

11. All loop circuits shall be tested per Standard Specifications 8-20.3(14)D once installation is complete.

12. Existing stubouts shall be upgraded as necessary to conform to the conduit size table shown on sheet 1.

13. All loop lead-in sawcuts parallel to lane edge shall be at least 12" from edge of pavement and within six inches outside of lane or fog line when possible. Maintain 12" separation between parallel cuts or joints.

14. The loop stub-out sleeve shall have an inside diameter 1” larger than the outside diameter of the End Bell Bushing. Plug conduit and fill sleeve with sand until loops are installed to keep out Hot Asphalt during paving operations.

**INDUCTION LOOP DETAILS**

**STANDARD PLAN J-50.15-00**

**SHEET 2 OF 3 SHEETS**

APPROVED FOR PUBLICATION

Washington State Department of Transportation
SIDEWALK

CEMENT CONCRETE CURB OR GUTTER
SEE STANDARD PLAN F-10.12

LOOP STUB-OUT SLEEVE (1/4" TO 1/2"
BELOW TOP OF PAVEMENT)

LEAD-IN CONDUIT SHALL EXTEND A
MINIMUM OF 3/4" INTO PAVEMENT
(PAVEMENT DEPTH VARIES)

CONDUIT SECURED INTO
ROAD SURFACE (TYP.)

TO JUNCTION BOX

CEMENT CONCRETE BARRIER
SINGLE SLOPE BARRIER SHOWN
SEE CONTRACT PLANS FOR
SIZE AND TYPE

STUB-OUT DETAIL
WITH CEMENT CONCRETE CURB OR GUTTER

LEAD-IN CONDUIT SHALL EXTEND A
MINIMUM OF 3/4" INTO PAVEMENT
(PAVEMENT DEPTH VARIES)

CONDUIT SECURED INTO
ROAD SURFACE (TYP.)

TO JUNCTION BOX

INDUCTION LOOP DETAILS
STANDARD PLAN J-50.15-00
 SHEET 3 OF 3 SHEETS
 APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

1. Installation of signal detection loops in the bridge deck shall be cast-in-place and installation by saw cutting an existing bridge deck shall not be allowed. This plan is intended for new construction only (not allowed for existing structures).

2. For Supplemental Splice in adjacent junction box, see Splice Detail, per Standard Plan J-50.15.

3. Preformed loops shall conform to the layouts, numbering details, marking requirements, and wiring diagrams of Standard Plan J-50.12 for the number and types of loops shown in the Contract Plans.

4. Loops shall be tested immediately prior to pouring concrete, per Standard Specification 8-20.3(14).D.

5. Layout Preformed loops and loop lead-ins to maintain 1' (ft.) clearance from joints.

6. Construct a supplemental splice containing any series loop connections in adjacent Junction Box as required in the Plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice, as shown in Standard Plan J-50.12.

7. Barrier Junction Box - 8" x 8" x 18" NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slip-form barrier. (Junction Box can be recessed up to 1/8".) See Standard Plan J-40.36 or J-40.37.

8. For installation of Junction Box in the sidewalk, see Standard Plan J-40.40.

PREFORMED LOOP INSTALLATION DETAILS FOR NEW BRIDGE DECKS

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NEMA JUNCTION BOX IN SIDEWALK WITH SLIP RESISTANT LID - SEE STANDARD PLAN J-40.40. SEE CONTRACT DOCUMENTS FOR SIZE 2" CONDUIT IN SIDEWALK CURB.

2-2" CONDUITS IN BARRIER

PLAN VIEW

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER - SEE STANDARD PLAN J-40.36

2-2" CONDUITS IN BARRIER

NEMA JUNCTION BOX IN SIDEWALK WITH SLIP RESISTANT LID - SEE STANDARD PLAN J-40.40. SEE CONTRACT DOCUMENTS FOR SIZE 2" CONDUIT IN SIDEWALK CURB.

2-2" CONDUITS IN BARRIER

SECTION

PEDESTRIAN BARRIER

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

1" CONDUIT

DRAIN TUBE

2" CONDUIT IN BARRIER

DRAIN TUBE

2" CONDUIT IN SIDEWALK

2" CONDUIT IN SIDEWALK

RUN CONDUIT AND LOOP LEAD-IN BETWEEN TOP AND BOTTOM ROAR MATS

SECTION

PEDESTRIAN BARRIER

ELEVATION VIEW

8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER

2" CONDUIT IN BARRIER

DRAIN TUBE

1" CONDUIT

TOP OF BARRIER

TOP OF BARRIER

1" CONDUIT

1" CONDUIT

TOP OF BRIDGE DECK

TOP OF BRIDGE DECK

SINGLE SLOPE TRAFFIC BARRIER

PREFORMED LOOP INSTALLATION DETAILS FOR NEW BRIDGE DECKS

STANDARD PLAN J-50.16-01

SHEET 2 OF 2 SHEETS

APPROVED FOR FURTHER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

3/11/2013

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES
1. See Standard Plan J-40.10 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 0.2 micro henries of each other. All piezo ohms readings shall be OLS 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. 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.
Plan View

Typical 4 Lane PTR Layout with Median

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

Effective: August 3, 2015 to July 31, 2016
NOTES
1. See Standard Plan J-50.30 for Piezo Axle Sensor General Installation instructions, and Modified Type 2 Loop Wiring Details.

2. The Contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo ohms readings shall be OIL from shield to center conductor. Class WM piezo capacitance shall be 8 pf to 20 pf.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @ 10 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete pavement lanes, install the loops 4" to 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the shoulder size plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in Contract.

8. Use Schedule 40 PVC conduit from the Junction Box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 or more lanes in either direction, 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 both in unpaied shoulder use type 1 or 2. See Standard Plan J-40.10 for size and type. See Standard Specification 9-29.2(1) for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets. For Wire Color Code Identification Chart & Detail see Standard Plan J-50.30.

12. Cabinet can be placed on either side of the road depending on terrain/slope, etc. It does not have to be placed on increasing 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" pieces. For shoulders over 1", use 13" pieces.
**SAWCUT LAYOUT FOR PERMANENT TRAFFIC RECORDER SITE**

**MODIFIED TYPE 2 LOOP SHOWN**

1. Using paint and a straight edge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 6 ft. of cable inside the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" blade width, cut the piezo slot approximately 4 to 6 inches longer than the piezo length. The piezo slot depth must be a minimum of 1 1/2" to a maximum of 2".

3. Lead-in cuts for the piezo coax should be 1/4" minimum wide, at a depth of 1 1/2" to 2".

4. Using a pressure washer, remove all slurry and loose material from the piezo slot.

5. Completely dry piezo slot. No moisture or oily residue shall be allowed in piezo slot.

6. After piezo cut is dry, wire brush sides and bottom of entire piezo slot. Blow out loose debris.

7. Install the piezo according to manufacturer's recommendations. Class 2 piezo sensors shall be placed at bottom of piezo slot. Class 1 sensors must be installed at a specific depth particular to each site location. This depth will be measured and set by Statewide Travel and Collision Data Office (formerly TDO) inspector on site.

8. Place two pieces of 2" duct tape along the length of the sensor slot. Tape should be about 1/16" from slot edge.

9. Mix epoxy according to manufacturer's recommendations and pour in slot into the sensor. Be sure grout pours into slot slowly to avoid air pockets. Start at the piezo end and pour toward the coax to piezo attachment point. Repeat until the slot is completely full, at least two passes.

10. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor.

11. Remove tape.

12. Class 2 sensor installation is complete after epoxy has cured. Class 1 WIM sensors shall be sanded flush with the pavement surface the entire length of the piezo sensor. Use a belt sander with a coarse grit paper to get an even surface finish.

13. Lead-in placement and saw-cut methods vary depending on Regional preference and location. Coordination between WSDOT and Contractor is needed to determine method to be used prior to installation.

14. Place the Installation Brackets on the sensor every 12" for class 2 sensor, and every 5" for class 1 sensor, for the length of the sensor. Use the 3/4" brackets.

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**PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS**

**STANDARD PLAN J-50.30-00**

**SHEET 1 OF 3 SHEETS**

**APPROVED FOR PUBLICATION**

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**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
COLOR CODE IDENTIFICATION

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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-60.05. See Standard Specification 8-20.3(9) for other requirements.

COMBINED GALVANIZED STEEL RIGID METAL CONDUIT (RMC) AND RIGID PVC CONDUIT (PVC) APPLICATION

ITS - COMBINED GALVANIZED STEEL RIGID METAL CONDUIT (RMC) AND RIGID PVC CONDUIT (PVC) APPLICATION

ITS - COMBINED GALVANIZED STEEL RIGID METAL CONDUIT (RMC) AND RIGID PVC CONDUIT (PVC) APPLICATION

FIBER OPTIC CABLE ONLY, NO METALLIC CONDUCTORS

SECTIO N 0

TOP OF PAVEMENT OR EXISTING GROUND

TOP OF PAVEMENT OR EXISTING GROUND

RIGID PVC CONDUIT (PVC) APPLICATION

ITS - RIGID PVC CONDUIT (PVC) APPLICATION FIBER OPTIC CABLE ONLY, NO METALLIC CONDUCTORS

SECTIO N C

SECTIO N D

SECTIO N E

FROM DIFFERENT SERVICE

GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION

ITS - GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION FIBER OPTIC CABLE ONLY, NO METALLIC CONDUCTORS

ITS - GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION

TYPICAL GROUNDING DETAILS

STANDARD PLAN J-60.05-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

APPROVED FOR PUBLICATION
Required to supplement equipment grounding for luminaire standards with direct burial aerial feeds, or where required in the plans. Required at all service and separately derived systems.

Type D service cabinet 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.

Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing. See standard plan J-60.10 for parts.

**TYPICAL GROUNDING DETAILS**

**STANDARD PLAN J-60.05-00**

*RIGID PVC CONDUIT (PVC) APPLICATION*

*GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION*

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
Weld all around lid bonding stud ~ 1/4 NC × 1” stainless steel ~ liberally coat entire assembly w/ anti-seize compound.

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.
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 be also 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 adapter.

   RMC Conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.


3. Pipe wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

KEY NOTES

- See Standard Plan D-15.10

- Type DX Deflection (DX) fitting with Internal Bonding Jumper.

- Conduit Deflection Fitting Type "O" beyond (inside) barrier surface.

- 1'-0" long, 3/4" thick extended closed-cell 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.
NOTES

1. Install a Conduit Deflection (DX) Fitting “A” at the exit from the barrier. Install a Conduit Deflection (DX) Fitting “B” to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-60.11 for Conduit Deflection Fitting details.

2. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) “A.” RMC conduit shall also be used from the DX fitting(s) “A” to the PVC adapter in the barrier. PVC conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adapter. RMC conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.

3. 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


2. 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.

3. Where conduit exits a structure, wrap the conduit pipe for 1’ - 0” on each side of the joint.

4. 10’ - 0” long section of RMC conduit.

5. Conduit Deflection Fitting shall be in neutral state after installation.

6. Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1’ - 0” on each side of the joint.
**PLUMB LINE**

- SEE NOTE

**CONCRETE SLAB BRIDGE**

(AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONSTRAINED)

3/8" Diam. Resin Bonded Anchor with 4 1/2" Min. Embedment - SEE NOTE 1

**SECTION A**

**CONCRETE SLAB BRIDGE**

(AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONSTRAINED)

3/8" Diam. Resin Bonded Anchor with 4 1/2" Min. Embedment - SEE NOTE 1

**HORIZONTAL CHANNEL MOUNT**

(F-SHAPE BARRIER SHOWN - APPLY TO ALL BARRIER TYPES)

- DO NOT DRILL INTO ORDER

- CHANNEL SUPPORT ON SOFFIT

**STAINLESS STEEL CHANNEL SUPPORT DETAIL**

**STAINLESS STEEL CHANNEL SUPPORT DETAIL**

(FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONSTRAINED)

**ISOMETRIC VIEW**

**STAINLESS STEEL CHANNEL SUPPORT DETAIL**

**ISOMETRIC VIEW**

**STRAP THICKNESS CHART**

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE (IN.)</th>
<th>STRAP THICKNESS</th>
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<tbody>
<tr>
<td>1/2</td>
<td>0.840</td>
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<tr>
<td>3/4</td>
<td>1.050</td>
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<tr>
<td>1</td>
<td>1.315</td>
</tr>
<tr>
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<td>2 1/2</td>
<td>2.875</td>
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<td>3</td>
<td>3.050</td>
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<tr>
<td>3 1/2</td>
<td>4.000</td>
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<td>4</td>
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<tr>
<td>5</td>
<td>5.563</td>
</tr>
<tr>
<td>6</td>
<td>6.625</td>
</tr>
</tbody>
</table>

**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.

NOTE:
1. Typical view shown. Verify power source location, quantities, location of signs, and sign structure fixtures in Contract Plans.
2. Route IMSA 20-13C #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 IMSA 20-13C #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(E).
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 IMSA 20-13C #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 × 13 Luminaire Brackets are to be reused for a new Sign-Lighting Luminaire.
   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.
**Signal Bridge Standard Electrical Details**

**Standard Plan J-75.41-00**

**Sheet 3 of 4 Sheets**

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**Effective: August 3, 2015 to July 31, 2016**

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**Electrical Details**

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**Signal Bridge Standard Electrical Details**

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**Effective: August 3, 2015 to July 31, 2016**

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**Effective: August 3, 2015 to July 31, 2016**

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**Effective: August 3, 2015 to July 31, 2016**

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**SIGN MOUNTING NOTES**

1. An acceptable alternative to a Locknut w/nylon insert shall be as follows:
   - Nylock Blue Nylon Torque-Patch
   - Nylock Precote 30
   - ND Patch 350 Ring Patch
   All products shall be applied the full length of the bolt threads with 360° coverage.

2. Hot dip galvanize all non-stainless parts.

3. For sign lighting details, See Standard Plans J-75.40 (for Monotube) and J-75.45 (for Round or Multi-sided) structures.

---

**PLAN VIEW**

- **2" (IN) STEEL PIPE BRACE**
- **Z-BAR**
- **WINDBEAM**

**ELEVATION VIEW**

- **MONOTUBE BEAM**
- **SIGN FACE PERPENDICULAR TO TRAVELED LANE**

**ISOMETRIC VIEW**

- **MONOTUBE SIGNAL BRIDGE SIGN MOUNTING DETAILS (SKewed Sign DETAIL)**

**END PLATE DETAIL**

- **1/2" (IN) STEEL SQUARE BAR**
- **3/4" (IN) STEEL SQUARE BAR**

**STIFFENER DETAIL**

- **3/4" (IN) SQUARE BAR CONTINUOUS BETWEEN FIELD SPlice (CMIT) HARD HOLES, TENONS, & VIBRATION DAMPER SEE DETAIL**

**BOLT DETAIL**

- **1/2" (IN) DIAM. ROD CUT TO FIT**
- **1/4" (IN) PLATE CUT TO FIT**

**WASHER**

- **LONG BOLT**
- **MULTI-SIDED**

---

**STANDARD PLAN J-75.41-00**

**SIGNAL BRIDGE STANDARD ELECTRICAL DETAILS**

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**APPROVED FOR PUBLICATION**

Washington State Department of Transportation

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**STANDARD PLAN J-75.41-00**

**SIGNAL BRIDGE STANDARD ELECTRICAL DETAILS**

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Washington State Department of Transportation
EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

NOTES

1. Typical view shown. Verify power source location, quantities, and location of signs and sign structure fixtures in Contract Plans.
2. Route separate IMSA 20-1-3C #14 cables from load side of terminal strip to each additional Sign-Lighting Luminaire (where applicable) and provide sufficient slack wire per Standard Specification 8-20.3(b).
3. Label all conductors with sign light and circuit number at isolation switch, hanger, and ballast enclosure. Label shall be a PVC or Polyolefin wire marking sleeve per Standard Specification 9-29.
4. Install quick-disconnect fuse kits between the power supply wires and pole and bracket cable per Standard Specification 9-29.7. Fuse size shall be 200% larger than load size.
5. The conductors in the IMSA 20-1-3C #14 cable shall be black, red, and white. The white conductor shall be permanently identified as an equipment grounding conductor per the NEC.
6. All GRUs conduits embedded in foundation shall be terminated with grounding and bushing and bonded to the ground terminal in the base of pole. All PVC conduits embedded in foundations shall be terminated with end bell bushing.
7. 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 structure.
8. For details not shown, see Standard Plan G-90.40.
9. All holes shall be drilled and tapped.
10. Use the Retrofit details only when the following conditions apply:
   A. Existing W4 × 13 Steel Beam sign brackets are to be reused for a new Sign-Lighting Luminaire.
   B. The span between the existing Luminaire Brackets is too wide to attach the new Sign-Lighting Luminaire and Luminaire Mounting Plate.
11. If the sign structure includes a maintenance walkway, the Luminaire Mounting Plate shall be bolted to the walkway grating.

DRAWN BY: COLEY FLETCHER
APPROVED FOR PUBLICATION

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

SHEET 1 OF 2 SHEETS

OVERHEAD SIGN ELECTRICAL DETAILS (TRUSS STRUCTURE)

STANDARD PLAN J-75.45-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

COOKEVILLE, TENNESSEE

APPROVED FOR PUBLICATION
**Effective:** August 3, 2015 to July 31, 2016

**SIGN-LIGHTING FIXTURE WITH RETROFIT**

- **Luminaire Bracket** (Typ.) - W4 x 13 Steel
- **Conduit Body**
- **1 5/8" (IN) Liquidtight Flexible Metallic Conduit - 24" (IN) Long, Max.**

**Section E**

- **Sign-lighting luminaires**
- **1 5/8" (IN) x 1 5/8" (IN) S.S. Mounting Channel**
- **1 1/2" (IN) Bolt**

**Section F**

- **Sign-lighting Luminaires**
- **3/8" (IN) Dia. Washer**
- **1 1/2" (IN) Bolt**

**Detail J**

- **Use details above the matchline on sign light mounting detail**
- **Vertical Braces - W4 x 13 Steel**

**Detail G**

- **Use details below the matchline on retrofit mounting detail**
- **Vertical Braces - W4 x 13 Steel**

**Detail H**

- **3/4" (IN) LB Conduit Body**
- **3/4" (IN) Straight Liquidtight Conduit Connector**
- **3/4" (IN) Liquidtight Flexible Metallic Conduit - 24" (IN) Long, Max.**

**Section I**

- **Sign-lighting Luminaires**
- **3/8" (IN) Dia. Washer**
- **1 1/2" (IN) Bolt**

**Matchline**

- **ELECTRICAL CONDUIT**
- **3/4" (IN) Liquidtight Flexible Metallic Conduit - 24" (IN) Long, Max.**

**Detail CD**

- **Plate of Metallic Conduit - 3/4" (IN) Liquidtight Flexible Metallic Conduit - 24" (IN) Long, Max.**

**U-Bolt Connection**

- **Galvanized Steel Conduit - 24" (IN) Long, Max.**
- **3/4" (IN) Liquidtight Flexible Metallic Conduit - 24" (IN) Long, Max.**

**Detail I**

- **Sign-lighting Luminaires**
- **3/8" (IN) Dia. Washer**
- **1 1/2" (IN) Bolt**

**Matchline**

- **1' - 8" Max.**
- **2' - 0" Max.**
- **1' - 0" Max.**

**Sign Light Mounting Detail**

- **Matchline on**
- **W4" Vertical Brace - Matchline on**

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- **Washington State Department of Transportation**
- **State Design Engineer**

**J-75.45-01**

**Sheet 2 of 2 Sheets**

**Effective:** August 3, 2015 to July 31, 2016
NOTE 1. The Heavy Duty Lid shall be used when a Cable Vault is placed in the paved shoulder or the traveled way. Use a 9" thick lid for new Cable Vault installations. Use a 6" thick Heavy Duty Lid when converting a Standard Duty Cable Vault into a Heavy Duty Cable Vault in the paved shoulder or the traveled way and no overlay is called for in the Contract. Otherwise, see Contract Plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Cable Vault and Lid when placed in unapaved areas. Use Standard Duty Pull Box in sidewalks, walkways, and shared-use paths. Use Standard Duty Cable Vaults installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surfacing treatment (see Contract Documents for details) and the year of manufacture.

The permanent marking shall be 1/8" inch line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

3. 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.

4. Connect a Bonding Jumper to the steel conduit bushing for GRB conduit and connect the steel conduit bushing to the ground vault at the threaded brass ground insert. Connect the equipment grounding conductors in the PVC and GRB conduit to the bonding ground insert. The Bonding Jumper shall be #8 min. x 4" (ft.) of tin finned braided copper between the lid and the frame of the Heavy Duty tops and from the Heavy Duty top to the threaded brass ground insert. The Bonding Jumper shall be #8 min. x 4" (ft.) of tin finned braided copper between the lid on a Standard Duty vault and the threaded brass ground insert. See Contract Plan Sheets and Standard Plan J-46-03 for Bonding Jumper requirements.

5. The system identification letters shall be 1/8" line thickness formed with engraving, casting, stamping, or with a S. S. weld bead. See COVER MARKING DETAIL, Standard Specification 9-23.34. Ductile iron lid lettering shall be recessed.

6. Cement concrete shall be Class 4000.

7. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

8. Capacity - conduit diameter = 60" (in.).

11. Excavate material, place 6" crushed surfacing pad per Standard Specification 8-20.3(6). Field bend #8 reinforcing bar to allow conduit into the Cable Vault. Field bend reinforcing bar back into place, wire in (2) places and cast in commercial concrete (commercial concrete only allowed for bottom/wall completion).

12. This drawing depicts a typical Cable Vault assembly. Reinforcing not shown. Each manufacturer's Cable Vault assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.
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 braided copper between the lid and the frame and shall be #8 min. x 4 (ft) of tinned braided 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 4000.

8. Capacity - conduit diameter = 40" (in).

9. Vault shall be installed on 6" (in) crushed surfacing pad in accordance with Standard Specification 8-19.3(b).

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.

13. Location wire splice shall be molded splice enclosure or splice connector with terminal connection.

**BOLTS, NUTS AND WASHERS - ASTM F939 OR A193, TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)**

- Equipment Grounding Conductor
- Copper Solderless Crimp Connector
- Equipment Bonding Jumper – See Note 5
- See Contract for Conduit Size and Number
- Identified to contain future Fiber Optic Cable
- RMC Shown – See Contract for Conduit Type
- PVC Shown – See Contract for Conduit Type
- Location Wire

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**SMALL CABLE VAULT**

**STANDARD PLAN J-90.21-00**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**DESIGNER:**

**DREW BY:**

**DATE:**

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
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 roadside delineation with Channelization Devices is optional. The appropriate taper length shall be L/2. See Standard Plan K-24.20 for minimum taper length (L).

4. For long term projects a channelization/pavement marking plan should be implemented.

5. Temporary Raised Pavement Marker (TRPM) may be used on a pattern spacing 5' O.C. to simulate a solid line.
NOTES
1. For sign installation details, see Std. Plan G - series.
2. In rural areas, the "V" Height can be a minimum of 7 feet for primary signs and 6 feet for the supplemental plaques for greater visibility, as directed by the engineer.
3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

HEIGHT V
<table>
<thead>
<tr>
<th>TO BOTTOM OF SIGN</th>
<th>TO BOTTOM OF SUPPLEMENTAL PLAQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(NO SUPPLEMENTAL PLAQUE)</td>
<td>(WHEN REQUIRED)</td>
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<tr>
<td>RURAL</td>
<td>5' MINIMUM</td>
</tr>
<tr>
<td>URBAN</td>
<td>7' MINIMUM</td>
</tr>
</tbody>
</table>

SIGN INSTALLATION (FILL SECTION)
SIGN INSTALLATION (CURB SECTION)
SIGN INSTALLATION (SIDEWALK AND CURB SECTION)
SIGN INSTALLATION (BEHIND TRAFFIC BARRIER)
SIGN WITH SUPPLEMENTAL PLAQUE INSTALLATION (FILL SECTION)
SIGN INSTALLATION (DITCH SECTION)
USE ATTACHMENT DETAIL A

OR

ATTACHMENT DETAIL B

WARNING LIGHT ATTACHMENT DETAIL

ATTACHMENT DETAIL A

ATTACHMENT DETAIL B

WARNING LIGHT ATTACHMENT

DRILL THREE 1/2" DIAM. HOLES THROUGH BARRICADE SUPPORT ANGLE

(1) 3/8"-16 X 1 1/2" STEEL HEX BOLT
(2) 1" FLAT WASHERS
(3) 3/8"-16 STEEL HEX NUT

6" X 1 1/2" X 1 1/2" X 1/8" STEEL ANGLE

4' - 0" MIN. - 8' - 0" MAX.

SIDE

TOP OF BARRICADE SUPPORT ANGLE

ELEVATION

TYPE 3 BARRICADE

NOTE 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.

NOTE 2. WARNING LIGHT ATTACHMENT DETAIL

NOTE 3. ORANGE AND WHITE RETROREFLECTIVE SHEETING ASTM D4956 - TYPE III OR II (SEE NOTE 3)

NOTES

1/8" LONG (TYP.)

6" X 2" X 2" X 1 1/8" TUBULAR STEEL

1 1/2" X 1 1/2" X 1/8" STEEL ANGLE

SANDBAGS AS REQUIRED TO STABILIZE BASE - ALL LEGS

ATTACHMENT DETAIL A

ATTACHMENT DETAIL B

WARNING LIGHT ATTACHMENT

TOP OF BARRICADE SUPPORT ANGLE

DRILL TWO 1/2" DIAM. HOLES THROUGH BARRICADE SUPPORT ANGLE

(1) 3/8"-16 X 1 1/2" STEEL HEX BOLT
(2) 1" FLAT WASHERS
(1) 3/8"-16 STEEL HEX NUT

3/4" PLYWOOD PANEL

6" X 2" X 2" X 1/8" TUBULAR STEEL WITH PRE-DRILLED HOLES

NOTE:

(1) 3/8"-16 X 3" STEEL HEX BOLT
(2) 1" FLAT WASHERS
(1) 3/8"-16 STEEL HEX NUT

TYPE 3 BARRICADE

STANDARD PLAN K-80.20-00

EXPRESS AUGUST 5, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: LISA CYFOR

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
USEABLE TRAFFIC LANE

AREA CLOSED TO TRAFFIC

Z MIN

TYPE 3L BARRICADE

STRIPE ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

AREA CLOSED TO TRAFFIC

Z MIN

USEABLE TRAFFIC LANE

TYPE 3R BARRICADE

ROAD CLOSURE AT INTERSECTION

ROAD CLOSURE AT OTHER LOCATIONS

WORK AREA

TYPE 3L BARRICADE

TYPE 3R BARRICADE

BARRICADE PLACEMENT

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

STANDARD PLAN K-80.20-00

SHEET 1 OF 2 SHEETS

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Washington State Department of Transportation

EXPIRES AUGUST 9, 2009
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).

**EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016**
TABLE 8-10-02 POST SPECIFICATIONS

<table>
<thead>
<tr>
<th>POST</th>
<th>PIPE</th>
<th>ROLL FORMED</th>
<th>T-POST</th>
<th>NOM. SIZE (IN. x .060)</th>
<th>WEIGHT (LBS)</th>
<th>WEIGHT (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>END, CORNER, OR PULL POST</td>
<td>2&quot; DIAM.</td>
<td>Y</td>
<td>5.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIAM.</td>
<td>2</td>
<td>1.85</td>
<td>FABRIC LOOP - 2 SIDES</td>
<td>3.12</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 8-10-02 STEEL POSTS AND BRACES

NOTES
1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.
2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts that mark the angle point of any sudden change in topography.
3. See Standard Specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2 x 4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

WIRE FENCE TYPES 1 & 2
AND WIRE GATES

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR ADOPTION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

DATE

6-19-2012
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 16d galvanized nails to prevent block rotation. See Standard Specification 9-16.3(2).
3. Attach blocks to steel posts using bolt holes on approaching traffic side of post web.

---

STEEL POST - SEE NOTE 1

END OR CORNER (BRACE) POST WITH STEEL POST

DETAIL A

---

VIEW B

---

STEEL BODY PLATE - SEE DETAIL

---

ELEVATION VIEW

---

PULLED POST WITHIN RUN

DETAIL C

---

GLARE SCREEN FABRIC - 1" DIAMOND WIRE MESH

---

STEEL POST - SEE NOTE 1

---

END OR CORNER (BRACE) POST WITH EXISTING WOOD POST

DETAIL A

---

ISOMETRIC VIEW

---

NOTE

1. All glare screen posts shall be 2 1/2" I.D. galvanized steel.
2. Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toe-nailed to post with 16d galvanized nails to prevent block rotation. See Standard Specification 9-16.3(2).
3. Attach blocks to steel posts using bolt holes on approaching traffic side of post web.
GLARE SCREEN TYPE 1
DESIGN B
STANDARD PLAN L-40.15-01

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP - 48" x 12" (TYP.)

SEE MOUNTING DETAIL

TOP OF ROADWAY

= 12': 0"

PLASTIC PIPE - 12" (NOM.) x 2' - 7" LONG
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

ELEVATION

WOOD SPACER
- 3" x 2 1/2" x 13"

TIMBER POST
- 4 x 6 (NOM.)

END POST

TOP VIEW
(CAP NOT SHOWN)

EYE SCREW - 5/8" DAM. + 6" WITH 2" FLAT WASHER

PLASTIC PIPE CAP - 12" (NOM.) x 2' - 7" LONG COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

ACCESS CONTROL GATE

STANDARD PLAN L-70.10-01

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

WASHINGTON State Department of Transportation

EXPIRES JUNE 30, 2008
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP
- 48" x 12" (TYP.)

5/8" DIAM. WIRE ROPE

SEE MOUNTING DETAIL

MIDDLE POST - REMOVABLE

TOP OF ROADWAY

YELLOW REFLECTIVE TAPE - 3" (TYP.)

PAIDLOCK (TYP.) - AGENCY PROVIDED

ELEVATION

WOOD SPACER
- 3" x 2 1/2" x 13"

TIMBER POST
- 4" x 6 (NOM.)

PLASTIC PIPE - 12" (NOM.) x 2' - 7" LONG
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

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

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

SECTION A

SECTION B

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES
1. Where shown on the Plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
NOTES
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

RAMP CHANNELIZATION
TWO LANE

STANDARD PLAN M-1.40-02

TWO-LANE ON-CONNECTION

TWO-LANE OFF-CONNECTION
COLLECTOR-DISTRIBUTOR ROAD ON-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.

RAMP CHANNELIZATION
COLLECTOR-DISTRIBUTOR ROAD
STANDARD PLAN M-1.60-02

COLLECTOR-DISTRIBUTOR ROAD OFF-CONNECTION
Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. When weaving section is more than 3/4 of a mile in length, use lane line.

3. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

- **L** = LANE WIDTH
- **R** = RAMP LANE WIDTH

**SINGLE-LANE, PARALLEL TYPE – ON-CONNECTION**

**DOUBLE-LANE, PARALLEL TYPE – ON-CONNECTION**

**RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION STANDARD PLAN M-1.50-03**

**WEAVING SECTION**
NOTE

1. Install a minimum of 3 sets of diagonal chevrons in the gore area. A 50’ (ft) spacing is standard; however, for gore areas shorter than 150’ (ft), use a 25’ (ft) spacing, and for gore areas greater than 400’ (ft), a spacing of 100’ (ft) may be used.

GORE AREA MARKINGS
WITH CHEVRONS

YELLOW EDGE LINE

CHEVRON MARKING (TYP.) ~ WHITE CROSSHATCH MARKING ~ SEE STANDARD PLAN M-24.60 FOR SIZE

WHITE EDGE LINE

CONTINUE GORE MARKINGS AT SAME SPACING TO END OF GORE AREA (SEE NOTE 1)

(SEE NOTE 1) (SEE NOTE 1) (SEE NOTE 1)

GORE AREA SUPPLEMENT WITH TYPE 2 RAISED PAVEMENT MARKERS

YELLOW EDGE LINE

TYPE 2Y RPMs @ 8’ SPACING

VARIES (8’ MAX)

20’ (TYP)

WHITE EDGE LINE

CONTINUE GORE MARKINGS AT SAME SPACING TO END OF GORE AREA (SEE NOTE 1)

(SEE NOTE 1) (SEE NOTE 1) (SEE NOTE 1)
NOTE

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' (ft) spacing is standard, however, for gore areas shorter than 150' (ft), use a 25' (ft) spacing, and for gore areas greater than 400' (ft), a spacing of 100' (ft) may be used.
STOPPING POINT FOR LEFT TURN LANE

LEFT-TURN CHANNELIZATION
SYMMETRICAL WIDENING ABOUT CENTERLINE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

LEFT-TURN CHANNELIZATION
ASYMMETRICAL WIDENING LEFT OF CENTERLINE

LEFT-TURN CHANNELIZATION
ASYMMETRICAL WIDENING RIGHT OF CENTERLINE

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimension may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways, with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.
**NOTES**

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four lane undivided highways shall be a double centerline.

6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

---

**LEGEND**

- **L =** 12' Typical Lane Width. See Contract for specified lane widths.
- **Type 2L (SL) Traffic Arrow**

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER G</th>
<th>APPROACH TAPER H</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 MPH</td>
<td>10'</td>
<td>27'</td>
</tr>
<tr>
<td>35 MPH</td>
<td>12'</td>
<td>27'</td>
</tr>
<tr>
<td>30 MPH</td>
<td>10'</td>
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<tr>
<td>25 MPH</td>
<td>10'</td>
<td>27'</td>
</tr>
<tr>
<td>20 MPH</td>
<td>10'</td>
<td>27'</td>
</tr>
</tbody>
</table>

**OPTIONAL MARKED DECELERATION TAPER**

(for limited use in urban areas)

**LEFT-TURN CHANNELIZATION**

REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING

( FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)
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.

7. 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.

8. 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.

9. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

10. Centerline striping on four-lane undivided highways shall be a double centerline.

11. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.
LEFT-TURN CHANNELIZATION
IN TWO-WAY LEFT-TURN LANE

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. 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

\[ L = 12 \text{ Typical Lane Width. See Contract for specified lane widths.} \]

\[ \text{Type 2L (SL) Traffic Arrow} \]

Can be reduced to a minimum of 50' to increase storage capacity.
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
L = 12' Typical Lane Width, See Contract for specified lane widths.
Type 2L (SL) Traffic Arrow
Type 2R (SR) Traffic Arrow

DOUBLE LEFT-TURN CHANNELIZATION
STANDARD PLAN M-3.50-02
SHEET 1 OF 1 SHEET

POSTED SPEED APPROACH TAPER D
60 MPH 720' 480'
55 MPH 600' 480'
50 MPH 600' 400'
45 MPH 540' 360'
40 MPH 480' 240'
35 MPH 420' 180'
30 MPH 360' 150'
25 MPH 300' 120'
20 MPH 240' 120'

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NO:

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.

* = Denotes required traffic arrow. Accompanying ONLY word message optional. See Standard Plan M-80.10 for spacing.

Type 2R (SR) Traffic Arrow

Type 3L (SL) Traffic Arrow

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.
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.

GRID IS 1" (IN) SQUARE BIKE RIDER SYMBOL DETAIL
MARKING AREA 6.02 SQ.FT.

MARKING AREA 4.25 SQ.FT.

GENERAL NOTE
See Contract for location and material requirements.
4" wide broken yellow painted line

Plan Centerline Marking

4" wide solid yellow painted line

Plan Bollard Marking

4" wide solid yellow painted line

Plan Marking Around Multiple Bollards

Marking Shown at Reduced Drawing Scale

NOTE:
1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle. (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.

Effective: August 3, 2015 to July 31, 2016
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.

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.

DIMENSIONS SHOWN ARE APPROXIMATE. SEE CONTRACT.
NOTES
1. See the Contract Plans for locations of crosswalk centerlines.
2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.
3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
NOTES:
1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.
2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.
3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.

LEGEND
- [Symbol] Reserved Parking Sign and post with 87-801A Plaque, if indicated (See Sign Fabrication Manual)
- [Symbol] Access Parking Space Symbol
- [Symbol] Manufactured wheel stop
- [Symbol] Detectable Warning Pattern

PARKING SPACE LAYOUTS
STANDARD PLAN M-17.10-02

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTES

1. Dotted Extension Line shall be the same color as the line it is extending.

2. Edge Line shall be white on the right edge of traveled way, and yellow on the left edge of traveled way (on one-way roadways). Solid Lane Line shall be white.

3. The distance between the lines of the Double Centerline shall be 12" everywhere, except 4" for left-turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-state routes) may specify a 4" distance for all locations.

The distance between the lines of the Double Lane Line shall be 4".
NOTES
1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80’ (ft) intervals on tangents and on horizontal curves with a radius of 1500’ (ft) or more, and at 40’ (ft) intervals on horizontal curves having radii of less than 1500’ (ft). Center the RPMs in the gaps between the pavement marking lines.

2. Type 2Y RPMs, when specified, shall be placed outside the left edge line at 80’ (ft) intervals. See "Left Edge of Lane Placement Detail."

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPMs on multilane one-way roadways, and Type 2YY RPMs on two-lane two-way roadways.

4. The Type 2W RPMs placed on multilane one-way roadways and all RPMs set in recesses shall have an abrasion-resistant coating.

5. Do not recess side-to-side RPMs on Wide Dotted Lane Lines.

TYPE 2 RPM RAISED FACE COLORS
- Type 2YY: Yellow and yellow
- Type 2W: White - one side only
- Type 2Y: Yellow - one side only

LONGITUDINAL MARKING SUPPLEMENT WITH RAISED PAVEMENT MARKERS
STANDARD PLAN M-20.30-03

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
**SECTION A**

**TWO-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS**
FOR USE WHERE SPECIFIED IN CONTRACT

**RECESS LENGTH**

- TAPER LENGTH
- FLAT
- TAPER LENGTH

**TOP OF PAVEMENT MARKER**

- ADHESIVE

**TOP OF PAVEMENT**

- TYPE 2Y RPM (SEE NOTE 4)

**SECTION B**

**ONE-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS**
FOR USE WHERE SPECIFIED IN CONTRACT

**RECESS LENGTH**

- TAPER LENGTH
- 8" FLAT

**ONE-WAY TRAFFIC**

- MARKER

**TOP OF PAVEMENT MARKER**

- ADHESIVE

**TOP OF PAVEMENT**

- TYPE 2W RPM OR TYPE 2Y RPM (SEE NOTE 4)

**RADIUS VARIES DEPENDING ON SAW BLADE DIAMETER**

- 1/16" MIN.
- 1/4" MAX.
LEFT-TURN LANE
(SEE NOTE 3)

DOUBLE CENTERLINE (YELLOW) -
SEE DETAIL ③

SEE DETAIL ③

DOUBLE CENTERLINE (YELLOW) -
SEE DETAIL ③

WIDE LANE LINE -
SEE DETAIL A

OPTIONAL (SEE NOTE 3)

TWO-WAY LEFT-TURN CENTERLINE -
SEE DETAIL ③

SEE DETAIL ③

TWO-WAY LEFT-TURN CENTERLINE -
SEE DETAIL ③

WIDE LANE LINE -
SEE DETAIL A

END TWO-WAY LEFT-TURN LANE

INSIDE RADIUS OF LEFT-TURNING VEHICLE

SEE DETAIL ③

TWO-WAY LEFT-TURN LANE

TWO-WAY LEFT-TURN LANE

NOTES
1. Raised pavement markers shall be installed only when specified in the Contract Plans.
2. See the Standard Plans for marker designation.
3. The portion labeled “OPTIONAL” is used only when the Optional Marked Deceleration Tape (see Standard Plans M-3.10 and M-3.20) is specified in the Contract Plans.

Type 2L (SL) Traffic Arrow

LONGITUDINAL MARKING SUPPLEMENT WITH RPMs ~ TURN LANES
STANDARD PLAN M-20.40-03

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

STANDARD ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTE

1. The NO PASS LINE (when required) is applied parallel to the CENTERLINE, 4' away, with the Type 2YY RPM's aligned (similar to TWO-WAY LEFT-TURN LINES).
NOTE
Use the dimensions shown in this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher and on all on-ramps and off-ramps.

TYPE 2L (LEFT) TRAFFIC ARROW
MARKING AREA 23.14 SQ.FT.

TYPE 2R (RIGHT) TRAFFIC ARROW
MARKING AREA 17.93 SQ.FT.

GRID 4" (IN) SQUARE
1" = 4' ELLIPSE "A" AXIS
1" = 4' ELLIPSE "B" AXIS
CENTER POINT OF ELLIPSES

MARKING AREA
17.93 SQ.FT.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTE

Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
SYMBOL MARKINGS - TRAFFIC ARROWS FOR LOW-SPEED ROADWAYS

STANDARD PLAN M-24.40-02

MARKING AREA
15.94 SQ.FT.

TYPE SSR (RIGHT)
TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

MARKING AREA
15.94 SQ.FT.

TYPE 6SL (LEFT)
TRAFFIC ARROW

MARKING AREA
15.94 SQ.FT.

SYMMETRICAL ABOUT CENTER
GRID IS 4" (IN) SQUARE

MARKING AREA
19.58 SQ.FT.

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

DRAWN BY: COBLY FLETCHER

APPROVED FOR PUBLICATION
By: 
Apr 16 2015 10:11 AM

STATE DESIGN ENGINEER
Washington State Department of Transportation
### Symbol Markings

#### Yield Ahead Symbol

<table>
<thead>
<tr>
<th>Symbol Type</th>
<th>Use</th>
<th>Marking Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Less than 45 MPH</td>
<td>25.96 sq.ft.</td>
</tr>
<tr>
<td>Type 2</td>
<td>45 MPH or greater</td>
<td>36.64 sq.ft.</td>
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#### Yield Line Symbol

- **Multiple Symbols Required for Transverse Yield Line**
- See Contract

#### Access Parking Space Symbol

- **Standard**
- **Minimum**

#### Speed Bump Symbol

- **Marking Area**: 12.08 sq.ft.

### Miscellaneous

- **Symbol Markings**
- **Effective**: August 3, 2015 to July 31, 2016

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**Additional Information**

- **Grid**: 4" (in) square marking area
- **Symbol Markings**: Standard Plan M-24.60-04
- **Sheet**: 2 of 2 sheets
- **Approval**: Washington State Department of Transportation
**BARRIER DELINEATOR REQUIREMENTS**

- Spacing of Barrier Delineators shall be as shown in the Plans.
- The housing or bracket can be flexible or rigid, molded from a durable plastic or other durable material approved by the Engineer, and shall be attached to the barrier with an adhesive recommended by the manufacturer. The attachment point on the barrier surface shall be free of dirt, curing compound, moisture, paint, or any other matter that would adversely affect the adhesive bond.
- Barrier Delineators shall be one-sided for single direction traffic, or two-sided for bi-directional traffic.
- Color shall be white on the right of traffic, and yellow on the left of traffic.
- The reflective surface shall be rectangular or trapezoidal.
- Reflective Sheeting: 12 square inches minimum surface area; Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.
- Plastic Reflector: 9 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:

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<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Specific Intensity (cd/ft-c)</th>
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</thead>
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<tr>
<td>0.1°</td>
<td>0°</td>
<td>126</td>
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<tr>
<td>0.1°</td>
<td>20°</td>
<td>56</td>
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</table>

**NOTES**

1. When the Contract Plans requires a guide post with concurrent guardrail runs, the Contractor shall either:
   A. Drive the flexible guide post in line with the guardrail posts, or
   B. Mount the shorter flexible guide post onto the guardrail post.
2. Guide posts shall be fastened to the wooden guardrail post using two 2" (r in) x 3/8" (in) lag screws with washers, along centerline of post. Also acceptable is any approved attachment method submitted by the guardrail post manufacturer.
3. Guide posts shall be fastened to the steel guardrail posts using two galvanized 2" (r 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(1B). Also acceptable is any approved attachment method submitted by the guardrail post manufacturer.
4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delineators where guide posts are required.

**GUIDE POST TYPE DEFINITIONS – REFLECTIVE SHEETING APPLICATIONS**

<table>
<thead>
<tr>
<th>Type W</th>
<th>Type WW</th>
<th>Type Y</th>
<th>Type YY</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="REFLECTIVE SHEETING" /></td>
<td><img src="image2" alt="REFLECTIVE SHEETING" /></td>
<td><img src="image3" alt="REFLECTIVE SHEETING" /></td>
<td><img src="image4" alt="REFLECTIVE SHEETING" /></td>
</tr>
</tbody>
</table>

- **TOP MOUNT** PER CONTRACT
- **SIDE MOUNT** PER CONTRACT

**GUIDE POSTS AND BARRIER DELINEATORS**

**STANDARD PLAN M-40.10-03**

**Barri er Delineators**

(Concrete barrier types and locations vary, single slope in median shown)

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

3. "S" dimension shown on Standard Plan M-40.40 or 100', whichever is smaller.

4. One half of "S" dimension shown on Standard Plan M-40.40 or 50', whichever is smaller.

5. Two spaces at 100'.

6. Three equal spaces when R < 75', four equal spaces when R ≥ 75'.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50' feet maximum.

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10
THREE EQUAL SPACES WHEN R < 75'

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>TYPE G1</th>
<th>TYPE G2</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>G1</td>
</tr>
<tr>
<td>FACING TRAFFIC</td>
<td>BACK SIDE</td>
</tr>
<tr>
<td>WHITE</td>
<td>WHITE</td>
</tr>
<tr>
<td>6'</td>
<td>3'</td>
</tr>
<tr>
<td>8'</td>
<td>4'</td>
</tr>
<tr>
<td>GREEN</td>
<td>GREEN</td>
</tr>
</tbody>
</table>

FOUR EQUAL SPACES WHEN R ≥ 75'

GUIDE POST PLACEMENT
GRADE INTERSECTIONS
STANDARD PLAN M-40.30-00

NOTE
GUIDE POST SPACING (FEET)

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
<td>30</td>
</tr>
<tr>
<td>200</td>
<td>35</td>
</tr>
<tr>
<td>250</td>
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<tr>
<td>300</td>
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<td>800</td>
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</tr>
<tr>
<td>900</td>
<td>85</td>
</tr>
<tr>
<td>1,000</td>
<td>90</td>
</tr>
<tr>
<td>1,200</td>
<td>100</td>
</tr>
<tr>
<td>1,700</td>
<td>120</td>
</tr>
<tr>
<td>2,300</td>
<td>140</td>
</tr>
<tr>
<td>2,500</td>
<td>150</td>
</tr>
<tr>
<td>3,000</td>
<td>160</td>
</tr>
<tr>
<td>4,500</td>
<td>200</td>
</tr>
<tr>
<td>5,500</td>
<td>220</td>
</tr>
<tr>
<td>6,500</td>
<td>240</td>
</tr>
<tr>
<td>7,600</td>
<td>260</td>
</tr>
<tr>
<td>8,800</td>
<td>280</td>
</tr>
<tr>
<td>10,000</td>
<td>300</td>
</tr>
</tbody>
</table>

R > 10,000: 300

INTERPOLATE FROM THE TABLE FOR RADIUS 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
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

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

MEDIAN Crossovers

LANE REDUCTIONS

G U I D E P O S T P L A C E M E N T  
M I S C E L L A N E O U S

S T A N D A R D P L A N  M - 4 0 . 6 0 - 0 0

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
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.)

RUMBLE STRIP PLACEMENT AT INTERSECTIONS
ISOMETRIC VIEW
TYPICAL SHOULDER INSTALLATION

UNIT SECTION A

UNIT SECTION B

12" - TYPES 2 AND 4
16" - TYPE 3
3/8"

PERSPECTIVE VIEW

UNDIVIDED HIGHWAY
(TYPE 4 PATTERN SHOWN)

SHOULDER RUMBLE STRIP
TYPES 2, 3, AND 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN M-60.20-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
SHOULDER RUMBLE STRIP
TYPES 2, 3, AND 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN M-60.20-02

1. RUMBLE STRIP PLACEMENT AT INTERSECTIONS
2. TYPE 2 - 12' GAP AND 12" WIDE STRIP
3. TYPE 3 - 16' GAP AND 16" WIDE STRIP
4. TYPE 4 - 12" WIDE STRIP

- EDGE OF PAVED SHOULDER - EPS
- EDGE LINE
- SHOULDER RUMBLE STRIPS

- MAJOR ROAD
- TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER

- RADIUS POINT OF RIGHT TURN RADIUS (TYP.)
- TERMINATE SHOULDER RUMBLE STRIPS 40' MINIMUM FROM THE BEGINNING OR END OF EACH RIGHT TURN RADIUS.

- SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4
- FOR UNDIVIDED HIGHWAYS
- STANDARD PLAN M-60.20-02

- SHEET 2 OF 2 SHEETS
- APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

SHOULDER TAPER DETAIL

1. NOT LESS THAN 4' - PROVIDE 9" WHEN BARIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

- MAJOR ROAD
- TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER

- RADIUS POINT OF RIGHT TURN RADIUS (TYP.)
- TERMINATE SHOULDER RUMBLE STRIPS 40' MINIMUM FROM THE BEGINNING OR END OF EACH RIGHT TURN RADIUS.

- SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4
- FOR UNDIVIDED HIGHWAYS
- STANDARD PLAN M-60.20-02

- SHEET 2 OF 2 SHEETS
- APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
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

TERMINATE AT END OF LEFT TURN CHANNELIZATION STRIPING

APPROX. MIDWAY BETWEEN MILLED GROOVES

MARKER

RAISED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

REFER TO STANDARD PLAN M-20.30 FOR
RECESSED PAVEMENT MARKER DETAIL

RECESSED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

OMIT CENTERLINE RUMBLE STRIPS IN THIS AREA

± 1'-0"

RUMBLE STRIP USAGE AS DIRECTED BY ENGINEER

LONGITUDINAL MARKING (TYP.)

RUMBLE STRIP (TYP.)

RADIUS POINT (TYP.)

LONGITUDINAL MARKING (TYP.)

TERMINATE RUMBLE STRIP AT
BEGINNING AND END OF
APPROACH OR INTERSECTION

CENTERLINE RUMBLE STRIP
STANDARD PLAN M-65.10-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
NOTE

1. Typically, four times the letter or numeral height - minimum, up to ten times - maximum, or according to Plans.
EIGHT FOOT HIGH LETTERS AND NUMERALS ARE SHOWN ON A FOUR-INCH SQUARE GRID FOR USE ON ROADWAYS WITH A POSTED SPEED OF 45 MPH OR MORE
SIX FOOT HIGH LETTERS AND NUMERALS SHOWN ON A THREE-INCH SQUARE GRID

STUVWXYZ1234567890

TEN FOOT HIGH LETTERS SHOWN ON A FIVE-INCH SQUARE GRID

FOR USE ON ROADWAYS WITH A POSTED SPEED OF 40 MPH OR LESS