Standard Plans

M 21-01
August 6, 2012
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Washington State Department of Transportation
Engineering and Regional Operations
Development Division, Design Office
PO Box 47329
Olympia, WA 98504-7329

Email: designstandards@wsdot.wa.gov
www.wsdot.wa.gov/design/standards/plans.htm
Foreword

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

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

Contact the Design Standards Team at:

(360) 705-7256 (phone)
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Olympia, WA 98504-7329.

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

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Contact the Engineering Publications Office at (360) 705-7430 if you require additional copies of this manual.

Pasco Bakotich III
State Design Engineer
# Comments

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<td>M-40.20-00</td>
<td>Guide Post Placement: Interchanges</td>
<td>10/12/07</td>
</tr>
<tr>
<td>M-40.30-00</td>
<td>Guide Post Placement: Grade Intersections</td>
<td>9/20/07</td>
</tr>
<tr>
<td>M-40.40-00</td>
<td>Guide Post Placement: Horizontal Curves</td>
<td>9/20/07</td>
</tr>
<tr>
<td>M-40.50-00</td>
<td>Guide Post Placement: Bridges</td>
<td>9/20/07</td>
</tr>
<tr>
<td>M-40.60-00</td>
<td>Guide Post Placement: Miscellaneous</td>
<td>9/20/07</td>
</tr>
<tr>
<td>M-60.10-01</td>
<td>Shoulder Rumble Strip Type 1, for Divided Highways</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-60.20-02</td>
<td>Shoulder Rumble Strip, Types 2, 3, and 4, for Undivided Highways</td>
<td>6/27/11</td>
</tr>
<tr>
<td>M-65.10-02</td>
<td>Center Line Rumble Strip</td>
<td>5/11/11</td>
</tr>
<tr>
<td>M-80.10-01</td>
<td>Traffic Letter and Numeral Applications</td>
<td>6/3/11</td>
</tr>
<tr>
<td>M-80.20-00</td>
<td>Traffic Letters and Numerals (High Speed Roadways)</td>
<td>6/10/08</td>
</tr>
<tr>
<td>M-80.30-00</td>
<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
</tr>
</tbody>
</table>
**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).
**NOTES**

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

**APPROXIMATE WEIGHTS**

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

**ISOMETRIC**

**PLAN VIEW**

**SECTION**

**RISER RING DIMENSIONS**

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

**SECTION**

**COVER**

**SECTION**

**LETTER MONUMENT CASE AND COVER STANDARD PLAN A-10.30-00**

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Pasco Bakotich III 10-05-07

MONUMENT CASE AND COVER

**EFFECTIVE:** AUGUST 6, 2012 TO August 4, 2013

**DATE:** 10-05-07

**CONCRETE BASE**

**CONCRETE BASE**

**SOIL**

**GROUT**

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

**SECTION**

**INSTALLATION**

**SECTION**

**CASE**

**SECTION OF LETTER**

**APPROXIMATE WEIGHTS**

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

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

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

---

### Table: Slope Treatment

<table>
<thead>
<tr>
<th>Cut Slope (H: V)</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Line (H: V)</td>
<td>L = 10'</td>
<td>L = 5'</td>
</tr>
<tr>
<td>1:5</td>
<td>0.5'</td>
<td>1.0'</td>
</tr>
<tr>
<td>1:4</td>
<td>1.0'</td>
<td>1.0'</td>
</tr>
<tr>
<td>1:3</td>
<td>1.2'</td>
<td>1.0'</td>
</tr>
<tr>
<td>1:2</td>
<td>2.0'</td>
<td>1.5'</td>
</tr>
<tr>
<td>2:1</td>
<td>1.5'</td>
<td>1.5'</td>
</tr>
<tr>
<td>3:1</td>
<td>1.2'</td>
<td>1.0'</td>
</tr>
<tr>
<td>4:1</td>
<td>1.5'</td>
<td>1.0'</td>
</tr>
<tr>
<td>5:1</td>
<td>2.0'</td>
<td>1.0'</td>
</tr>
</tbody>
</table>

SLOPE TREATMENT

STANDARD PLAN A-20.10-00

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

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Washington State Department of Transportation

APPROVED FOR PUBLICATION

Pasco Bakotich III 08-31-07
STATE DESIGN ENGINEER

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

NOTE: THE PLAN EFFECTIVE DATES ARE REISSUED DUE TO TECHNICAL CORRECTIONS. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
GAGE 6' K 6' WIRE MESH REINFORCEMENT CENTERED IN CONCRETE. (SEE STD. SPEC. 9-07.7)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

10 GAGE 6" x 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE.

(Bottom edge of slope protection follows bottom of ditch)

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

PLAN

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

OUTER EXTREMITY
OF BRIDGE

EXTEND SLOPE PROTECTION
6" BEYOND OUTER EXTREMITY
OF BRIDGE

FOOTING

FOOTING

SECTION A

SECTION B

DUMMY JOINT (TYP.)
NOTES

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

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

MASONRY UNIT (TYP.)

FOOTING

EMBANKMENT SLOPE

EXISTING SOIL

MASONRY UNIT

SECTION A

VOID (TYP.)

MASONRY UNIT DETAIL

(SEE NOTE 1)

MASONRY UNIT PLACEMENT ON SKewed BRIDGE

LATERAL EXTREMITY OF BRIDGE

FOOTING

PLAN

TOP OF SLOPE UNDER BRIDGE

TOP OF SLOPE UNDER BRIDGE

CURB FOOTING

CURB SECTION

(SEE NOTE 2)

TOP OF ROADWAY

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

SECTION WITH SIDEWALK

TYPICAL SECTION

TOP OF ROADWAY

SIDESCHOOL CROSS SLOPE

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

2' - 6" OR DEPTH OF FOOTING PLUS LENGTH OF ONE MASONRY UNIT

MATCH SHOULDER CROSS SLOPE

5' - 0" MIN.

EDGE OF SHOULDER

TOP OF ROADWAY

MATCH SIDEWALK CROSS SLOPE

SIDEWALK 6' 0" MIN.

(SEEN CONTRACT)

TOP OF ROADWAY

FOOTING

WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

SANDRA L. SALISBURY

CERTIFICATE NO. 005860

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SEMI-OPEN CONCRETE MASONRY SLOPE PROTECTION STANDARD PLAN A-30.15-00

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

Pasco Bakotic II

11-8-07

APPROVED FOR PUBLICATION

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

Hexagonal mesh must meet minimum requirements of ASTM A975 for gabions.

U-Section of wire rope clip must be applied to the dead end, and saddle of wire rope clip must be applied to the live end of the rope as shown.

All wire rope loops shall include a standard weight thimble.

Maximum length of top horizontal support rope = B

Maximum anchor spacing = A

WIRE MESH SLOPE PROTECTION

STANDARD PLAN A-30.30-01

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

WIRE ROPE DETAIL

4" GALVANIZED, WELDLESS STEEL RING WITH A MINIMUM SINGLE PULL WORKING LIMIT OF 10,000 LBS. (TYP.) – AT ALL ENDS OF HORIZONTAL SUPPORT ROPES

LIVE END (SEE NOTE 3)

DEAD END (SEE NOTE 3)

THIMBLE (SEE NOTE 4)

WIRE ROPE CLIP (TYP.)

MAXIMUM ANCHOR SPACING (A)

MAXIMUM LENGTH – TOP HORIZONTAL SUPPORT ROPE (B)

<table>
<thead>
<tr>
<th>H</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0’ – 100’</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>100’ – 200’</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>200’ – 300’</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

0’ – 100’

100’ – 200’

200’ – 300’

<table>
<thead>
<tr>
<th>H</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>50’</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>100’</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>200’</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>300’</td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>

SEAM ALTERNATIVES

3" FABRIC OVERLAP

OVERLAPPED SEAM WITH FASTENERS

OVERLAPPED SEAM WITH LACING

11 GAGE HIGH TENSILE STEEL FASTENERS

9 GAGE (MIN.) GALVANIZED LACING WIRE OR 11 GAGE HIGH TENSILE STEEL FASTENERS EVERY CELL (≥ 3" SPACING)

8 x 12 TYPE DOUBLE TWISTED HEXAGONAL WIRE MESH FABRIC. (SEE NOTE 2)

9 GAGE (MIN.) GALVANIZED LACING WIRE, WOVEN THROUGH EACH CELL

3" SPACING

12" FOLD

3" FABRIC OVERLAP

SEAM

SEAM

SEAM

SEAM

WIRE ROPE CLIPS

3/4" DIAM. 6x19 IWRC GALVANIZED WIRE ROPE

MAXIMUM LENGTH OF TOP HORIZONTAL SUPPORT ROPE = B

LENGTH VARIES

ANCHOR
Dowel Bar Basket

Plan View
"U" shape assembly shown

Notes:
1. The "U" shape or "V" shape are both acceptable.
2. Wire sizes shown are minimum required.
3. All wire intersections are to be welded.
4. 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.

Base:
- 1/2" R. PLUS 1/8"

Section A
Elevation View
"U" shape assembly shown

Section B

Effective: August 6, 2012 to August 4, 2013

Approved for Publication

Pasco Bakotic III
08-11-09
State Design Engineer

Washington State Department of Transportation
**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION A**

**ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**

**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION B**

**ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**

**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION C**

**EDGE OF SHOULDER**

**CONDITION D**

**ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**

**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION E**

**ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**

**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION F**

**CIRCULAR FRAME**

**ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**

**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION G**

**NOTE**

**ALL CONDITIONS ARE SHOWN IN PLAN VIEW**

**CONDITION H**

**ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**

**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION I**

**ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**

**FACE OF CURB**

**PAVEMENT JOINT**

**CONDITION J**

**NOTE**

**ALL CONDITIONS ARE SHOWN IN PLAN VIEW**
DRILL A 2" DIAM. FULL-DEPTH HOLE, FILL WITH JOINT SEALER.

T - JOINT DETAIL

PAVEMENT JOINT (TYP.)

TYPICAL ISOLATION JOINT GUIDELINES

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>FEATURE</th>
<th>EDGES, FLANGES OR LIPS IN THE PAVEMENT SECTION</th>
<th>CONTINUOUS VERTICAL FACE THROUGH THE PAVEMENT SECTION</th>
<th>DISTANCE FROM NEAREST TRANSVERSE JOINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CATCH BASIN OR COMBINATION GRADE</td>
<td>USE</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B</td>
<td>CATCH BASIN OR COMBINATION GRADE</td>
<td>USE</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>C</td>
<td>CATCH BASIN OR COMBINATION GRADE</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>USE</td>
<td>&lt; 4 FT FROM JOINT</td>
<td>---</td>
</tr>
<tr>
<td>E</td>
<td>GRATE INLET, CATCH BASIN OR CONCRETE INLET</td>
<td>USE</td>
<td>&lt; 4 FT FROM JOINT</td>
<td>---</td>
</tr>
<tr>
<td>F</td>
<td>GRATE INLET, CATCH BASIN OR CONCRETE INLET</td>
<td>USE</td>
<td>&gt; 4 FT FROM JOINT</td>
<td>---</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>&lt; 4 FT FROM JOINT</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 GRADE CAST INTO ADJUSTMENT SECTION.

TYPICAL APPLICATIONS

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

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

3. The contractor shall avoid sawing existing concrete. The construction tolerance to locate the saw cut is ±1/4" (0 min. to 1/2" max.) from the existing concrete (DETAILs 1 and 5).
NOTES

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

2. Longitudinal joints shall be placed on lane lines and shall be constructed and sealed in accordance with Standard Specification Section 5-06.3(a). Joints may be either a sawcut crack control joint or a construction joint. Sawcut joints shall terminate 1'-0" before reaching edge of slab and must be saw cut as soon as possible after placement of concrete.
   
   (A) Approach slabs less than 40' wide — no joint is required.
   
   (B) Approach slabs wider than 40' — one or more joints are required to divide the slab into approximately 24' wide sections.

3. The minimum lap splice of #5 is 2'-0" #5 is 2'-0", #6 is 3'-0", and #8 is 3'-3". All lap splices shall be staggered so that no more than 50% of rebar is spliced at the same location. Lap splices shall be located within the middle half of the bridge approach slab. Optional splices are allowed for #4. #6.

~ Longitudinal Section ~

~ PLAN ~

~ BENDING DIAGRAM ~

~ STANDARD PLAN A-40.50-01 ~
**Plan of Bridge Approach Slab**

- **Wire Rope Loops**: See Standard Plan C-8
- **Concrete Barrier Transition Type 2**: See Std. Plan C-8

**Edge of Shoulder**

- **Concrete Barrier Transition Type 2**: See Std. Plan C-8

**Concrete Barrier Connection to Bridge Traffic Barrier**

**Plan with Unrestrained Barrier**

- **Expansion Joint**
- **Bridge Approach Slab**
- **Wire Rope Loops**: See Standard Plan C-8
- **Concrete Barrier Transition Type 2**: See Std. Plan C-8

**Plan with Anchored Barrier**

- **Expansion Joint**
- **Bridge Approach Slab**
- **Wire Rope Loops**: See Standard Plan C-8
- **Concrete Barrier Transition Type 2**: See Std. Plan C-8

**Concrete Barrier Widening at Bridge End with Curtain Wall**

**Standard Plan A-50.20-01**

**Effective**: August 6, 2012 to August 4, 2013
Plan View
Dowel Bar Retrofit
For two lane divided highway (one way traffic)
For each lane in undivided highway (two way traffic)

Section B

Dowel Bar Retrofit
For one lane divided highway (one way traffic)

Section C

Skewed Transverse Contraction Joint
See Std. Plan A-40.10
CONCRETE PAVEMENT

TOP OF EXISTING CEMENT CONCRETE PAVEMENT

3/8" FOAM CORE BOARD MATERIAL TO MAINTAIN JOINT

1 1/2" (TYP)

1/4" (TYP)

DOWEL BAR EXPANSION CAP - BOTH ENDS

CENTER OF SAW

TOP OF PAVEMENT AFTER GRINDING (NOT INCLUDED IN BID ITEM)

RADIUS VARIES DEPENDING ON SAW BLADE DIAM

3/8" FOAM CORE BOARD - DRILL 1 1/2" DIAM HOLE FOR DOWEL BAR

1 1/2" SAW CUT DEPTH

1/4" MIN

3/4" MIN

1/2" MIN

DOWEL BAR

CAULKING FILLER

CONCRETE PATCH MATERIAL

EXISTING CONCRETE PAVEMENT

3/16" MIN. TO 5/16" MAX

SAW CUT AFTER CONCRETE PATCH MATERIAL HAS SET

1/8" MIN TO 1/4" MAX DEPTH OF CONCRETE PATCH MATERIAL ABOVE EXISTING CONCRETE SURFACE

1 1/2"

TRANSVERSE CONTRACTION JOINT

LENGTH NEEDED FOR DOWEL BAR PLACEMENT

TOP OF PAVEMENT AFTER GRINDING

NOTE TO CONTRACTOR:

STANDARD PLAN

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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 replace 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' - 0" 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' - 0" beyond each end of section having 20% section loss.
PIPE ALLOWANCES

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

★ CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

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

2. The knockout diameter shall not be greater than 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.

RECTANGULAR ADJUSTMENT SECTION

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

PRECAST BASE SECTION

#3 BAR EACH CORNER

#3 BAR HOOP EACH SIDE

#3 BAR EACH WAY

ALTERNATIVE PRECAST BASE SECTION

#3 BAR EACH CORNER 18" MIN.

#3 BAR HOOP

(SEE NOTE 1)
NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>CATCH BASKIN DIAMETER</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>48&quot;</td>
<td>4&quot;</td>
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</table>

PIE ALLOWSANCES

<table>
<thead>
<tr>
<th>CATCH BASKIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER</th>
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<tr>
<td>48&quot;</td>
<td>CONCRETE 24&quot; ALL METAL 30&quot; CPSSP 30&quot;</td>
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<tr>
<td>144&quot;</td>
<td>SOLID WALL PVC 72&quot;</td>
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</tbody>
</table>

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

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

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

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

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

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

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

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

9. Alternative shear gate designs are acceptable if material specifications are met and flange bolt pattern matches.
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.
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
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<td>48&quot;</td>
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</tbody>
</table>
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

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<th>DIAM.</th>
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</table>

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>
<tr>
<th>DIAM. (IN.)</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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</tbody>
</table>
CUTAWAY ELEVATION VIEW

INTEGRAL BASE DETAIL

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, drywall base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.

TOE OF SWALE SLOPE / BOTTOM OF SWALE

DISTANCE VARIES SEE CONTRACT

TOE OF SWALE SLOPE / BOTTOM OF SWALE

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

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

CIRCULAR GRATE - SEE STANDARD PLAN B-30.80

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

ADJUSTMENT SECTION (TYP.)

GROUND LINE

UNDISTURBED SOIL

NATIVE BACKFILL

UNDERGROUND DRAINAGE GEOTEXTILE, MODERATE SURVIVABILITY, CLASS A

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

6H : 1V

TOE OF DRYWELL SLOPE / BOTTOM OF SWALE

SEEPAGE PORT (TYP.) SEE NOTE 2

GRAVEL BACKFILL FOR DRYWELL

VARES

VARES

48" I.D.
NOTES

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

ALTERNATIVE PRECAST FOOTING DETAIL

FOUR 8" DIAM. DRAIN HOLES (TYP.) POSITIONED NOT TO INTERFERE WITH REINFORCING BARS
CIRCULAR FRAME (RING) – SEE STANDARD PLAN B-30.70
CIRCULAR GRATE – SEE STANDARD PLAN B-30.80
FINISHED SURFACE

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

ALTERNATIVE PRECAST FOOTING DETAIL

ALTERNATIVE FOOTING
INTEGRAL BASE
PRECAST
PRECAST WITH RISER

CUTAWAY ELEVATION VIEW

INTEGRAL BASE DETAIL

GRAVEL BACKFILL FOR DRYWELL
SEEPAGE PORT – SEE NOTE 2

UNDERGROUND DRAINAGE
GEOTEXTILE, MODERATE SURVIVABILITY, CLASS A

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

CRUSHED SURFACING BASE COURSE:

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

DRYWELL TYPE 3
(WITH AT-GRADE INLET)
STANDARD PLAN B-20.60-03

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
APPROVED FOR PUBLICATION
Pasco Bakotich III 03-15-12
STATE DESIGN ENGINEER

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTES

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

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

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

4. Bolt-down capability is required on all frames, grates and covers, unless specified in the Contract. Provide two holes in the Frame that are vertically aligned with the grate slots. The frame shall accept the 5/8" x 11 NC x 2" allen head cap screw by being tapped, or other approved mechanism. The location of bolt-down holes varies among manufacturers. See BOLT-DOWN DETAIL, Standard Plan B-30.10.

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

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

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>Maximum Inside Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforced or Plain Concrete</td>
<td>12&quot;</td>
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<tr>
<td>All Metal Pipe</td>
<td>15&quot;</td>
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<td>CPSSP (Std. Spec. 9-05.20)</td>
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<td>Solid Wall PVC (Std. Spec. 9-05.12)</td>
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<tr>
<td>Profile Wall PVC (Std. Spec. 9-05.12)</td>
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*CORRUGATED POLYETHYLENE STORM SEWER PIPE

### NOTES

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

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

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

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

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

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

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

FRAME CAST INTO PRECAST ADJUSTMENT SECTION — SEE STANDARD PLAN B-30.90 FOR ADJUSTMENT SECTION DETAILS

RECTANGULAR FRAME (REVERSIBLE)
STANDARD PLAN B-30.10-01

Pasco Bakotich III 04/26/12
STATE DESIGN ENGINEER
Washington State Department of Transportation

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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. Alternative reinforcing designs are acceptable in lieu of the rib design.

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

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

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

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

3. Refer to Standard Specification 9-05.15(2) for additional requirements.
1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 5/8" - 11 NC x 2" Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

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

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

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

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

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

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

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

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

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

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

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

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

1/2" (TYP.)

1/2" (TYP.)
NOTES

1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.

2. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-20.20 and B-20.80.
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.

PIECE ALLOWSANCES

<table>
<thead>
<tr>
<th>PIPE ALLOWANCES</th>
<th>MAXIMUM INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
<td>18&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>21&quot;</td>
</tr>
<tr>
<td>CPSSP (*) (STD. SPEC. 9-05.20)</td>
<td>18&quot;</td>
</tr>
<tr>
<td>SOLID WALL PVC (STD. SPEC. 9-05.12(1))</td>
<td>21&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC (STD. SPEC. 9-05.12(2))</td>
<td>21&quot;</td>
</tr>
</tbody>
</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

SECTION A ONE PIECE BASE

SECTION B TWO PIECE BASE

TOP VIEW

SECTION A TWO PIECE BASE

SECTION B TWO PIECE BASE

UNIT "H"

4 MIN.

UNIT "I" & "K" AS REQUIRED

APPROX. 12 1/2"

10'-8" MAX. (MIN. 10'-0"

5 1/2 MIN.

3 SPACES @ APPROX. 11"

2" 3 MIN.

37"

10'-8" MAX. (MIN. 10'-0"

5 1/2 MIN.

3 SPACES @ APPROX. 11"

2" 3 MIN.

37"

10'-8" MAX. (MIN. 10'-0"

3 SPACES @ APPROX. 11"

2" 3 MIN.

37"

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3 SPACES @ APPROX. 11"

2" 3 MIN.

37"

10'-8" MAX. (MIN. 10'-0"

3 SPACES @ APPROX. 11"

2" 3 MIN.

37"
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 grate 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.


GRATE INLET TYPE 2

STANDARD PLAN B-35.40-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso

06-08-06

STATE DESIGN ENGINEER

Washington State Department of Transportation

EXPRESSES JULY 4, 2007

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
ELEVEN EQUAL SPACES

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

GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)

TOP

SIDE

END

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

WELDED GRATES
FOR GRATE INLET

STANDARD PLAN B-40.20-00

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. The Contract may specify a rotated inlet installation. Orient the Grate 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.

NORMAL INSTALLATION

ROTATED INSTALLATION

BOLT-DOWN DETAILS
SEE NOTE 2

RECESSED ALLEN HEAD CAP SCREW
5/8" - 11 NC x 2"

FRAME AND DUAL VANED GRATES
FOR GRATE INLET
STANDARD PLAN B-40.40-01

ISOMETRIC VIEWS
SEE NOTE 1

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-16-10

STATE DESIGN ENGINEER

DRAWN BY: LISA CYTORD

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

1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.
2. Bevel or round exposed concrete edges 1/2".
3. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.
4. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.
5. All pickup holes shall be grouted full after the inlet has been placed.
6. The steel angles shall be set so that each bearing bar of the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface. For grates, see Standard Plan B-50.20.
7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.
8. The inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.
9. Precast inlets shall be marked with the manufacturer's identification on the inside of the structure in some readily accessible location.

**PLAN**

- STEEL ANGLE
- TOP
- PLAN
- SECTION A
- SECTION B
- ISOMETRIC

**SECTION A**

- 4" x 3" x 3/8" STEEL PLATE - TACK WELD TO ANGLE
- 1/4" ANCHOR STUD OPTION

**SECTION B**

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

**GRATE SUPPORT DETAIL**

- (Six Supports Required)

**DROP INLET TYPE 2**

**STANDARD PLAN B-45.40-00**

**EXPRESSED JULY 5, 2007**

**APPROVED FOR PUBLICATION**

Harold J. Peterfeso 06-01-06

Washington State Department of Transportation
3 1/2" x 1/2" x 34 1/2" STEEL PLATE (TYP.)

OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING

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

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

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

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

SECTION A

SECTION B

SECTION C

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

GRIND TOP AND BOTTOM FLUSH AFTER WELDING

TYPE 1

TYPE 2

TYPE 3

GRATES FOR DROP INLET

STANDARD PLAN B-50.20-00

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Harold J. Peterfeso 06-01-06

STATE DESIGN ENGINEER

DATE

EXPIRES JULY 4, 2007

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
**CONCRETE AND DUCTILE IRON PIPE**

- Pipeline Zone Backfill (See Note 1)
- Gravel Backfill for Pipeline Zone Bedding (See Note 2)
- Foundation Level

**TRENCH WIDTH**

- See Note 3

---

**THERMOPLASTIC PIPE**

- Pipeline Zone Backfill (See Note 1)
- Gravel Backfill for Pipeline Zone Bedding (See Note 2)
- Foundation Level

**TRENCH WIDTH**

- See Note 3

---

**METAL PIPE**

- Pipeline Zone Backfill (See Note 1)
- Gravel Backfill for Pipeline Zone Bedding (See Note 2)
- Foundation Level

**TRENCH WIDTH**

- See Note 3

---

**NOTES**

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

---

**CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS**

<table>
<thead>
<tr>
<th>PIPE</th>
<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCULAR PIPE (DIAMETER)</td>
<td>12&quot; to 24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td></td>
<td>30&quot; to 54&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**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

Harold J. Peterfeso 06-01-06

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

**EXPIRES JULY 4, 2007**

---

**EFFECTIVE:** AUGUST 6, 2012 TO August 4, 2013
NOTES

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

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

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

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

5. Use 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

(All dimensions are in inches)

<table>
<thead>
<tr>
<th>Band Type</th>
<th>Corrugation Pitch x Depth</th>
<th>Pipe Diameter</th>
<th>Min. W</th>
<th>Gasket Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPE D</strong></td>
<td>2 ( \frac{2}{3} \times \frac{1}{2} ) OR ( \frac{3}{1} ) REFORMED TO ( 2 \times \frac{3}{2} \times \frac{3}{2} )</td>
<td>12 ~ 64</td>
<td>12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td><strong>TYPE F</strong></td>
<td>2 ( \frac{2}{3} \times \frac{1}{2} ) OR ( \frac{3}{1} ) REFORMED TO ( 2 \times \frac{3}{2} \times \frac{3}{2} )</td>
<td>90 ~ 144</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td><strong>TYPE J</strong></td>
<td>2 ( \frac{2}{3} \times \frac{1}{2} )</td>
<td>12 ~ 48</td>
<td>2 3/4</td>
<td>BUTYL</td>
</tr>
<tr>
<td><strong>TYPE K</strong></td>
<td>2 ( \frac{2}{3} \times \frac{1}{2} )</td>
<td>54 ~ 84</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td><strong>TYPE D</strong></td>
<td>3 ( \times \frac{1} {1} ) REFORMED TO ( 2 \times \frac{3}{2} \times \frac{3}{2} )</td>
<td>36 ~ 60</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td><strong>TYPE F</strong></td>
<td>3 ( \times \frac{1} {1} ) REFORMED TO ( 2 \times \frac{3}{2} \times \frac{3}{2} )</td>
<td>66 ~ 108</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td><strong>TYPE J</strong></td>
<td>( \frac{3}{1} )</td>
<td>12 ~ 48</td>
<td>10 1/2</td>
<td>O-RING</td>
</tr>
<tr>
<td><strong>TYPE K</strong></td>
<td>( \frac{3}{1} )</td>
<td>12 ~ 48</td>
<td>12</td>
<td>O-RING</td>
</tr>
<tr>
<td><strong>TYPE D</strong></td>
<td>( \frac{3}{1} )</td>
<td>54 ~ 84</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td><strong>TYPE F</strong></td>
<td>( \frac{3}{1} )</td>
<td>54 ~ 144</td>
<td>24</td>
<td>SLEEVE</td>
</tr>
</tbody>
</table>

* Pipe arch only

---

**COUPLING BANDS FOR CORRUGATED METAL PIPE**

**STANDARD PLAN B-60.40-00**

**SHEET 1 OF 1 SHEET**

APPROVED FOR PUBLICATION

Harold J. Peterfeso  06-01-06

Washington State Department of Transportation

EXPRES JUL 4, 2007
NO:
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

LENGTH IN A MULTIPLE OF 2'

SIDE VIEW - PLACEMENT

ALLOWABLE HEIGHTS OF COVER

<table>
<thead>
<tr>
<th>SPAN</th>
<th>RISE</th>
<th>12 GAGE THICK CORRUGATED METAL COVER</th>
<th>MIN.</th>
<th>MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-8&quot;</td>
<td>7'-1&quot;</td>
<td>4&quot;</td>
<td>26&quot;</td>
<td></td>
</tr>
<tr>
<td>6'-10&quot;</td>
<td>8'-2&quot;</td>
<td>5&quot;</td>
<td>25&quot;</td>
<td></td>
</tr>
</tbody>
</table>

ANIMAL UNDERPASS

STANDARD PLAN B-65.20-01

Approved for Publication 04/26/12

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

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
NOTES

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

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

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

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

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

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

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

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

8. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 16 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.
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".
NOTES

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

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

3. Bevel culvert pipe to match side slope.

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

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

---

SLOPE TO MATCH SIDE SLOPE

HEADWALL - COMMERCIAL CONCRETE

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

Top View

CULVERT IS PERPENDICULAR TO ROADWAY

STEEL PLATE DETAIL

CULVERT PIPE OR PIPE ARCH - SEE NOTE 3

SAFETY BAR - SEE NOTE 2

CUT AND WELD

SOCKET - SEE NOTE 1

STEEL PLATE - SEE DETAIL

Top View

CULVERT IS SKEWED TO ROADWAY

4.5" DEEP BLOCKOUT

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

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

3" X 18" STEEL PLATE

2" (TYP.)

4" (TYP.)

2" (TYP.)

6" X 24" X 5/8" STEEL PLATE

3/4" DIAM. X 18" THREADED ROD CENTERED THROUGH PIPE, SECURED WITH NUTS, OR 3/4" X 6" ANCHOR STUDS WELDED TO PIPE. SPACING SHALL BE 8" FROM TOP AND 8" FROM BOTTOM OF CONCRETE (TYP.).

1/4"

8"

8"

4 MIN

Socket shall extend into safety bar 4"

3/4" DIAM. X 18" THREADED ROD CENTERED THROUGH PIPE, SECURED WITH NUTS, OR 3/4" X 6" ANCHOR STUDS WELDED TO PIPE. SPACING SHALL BE 8" FROM TOP AND 8" FROM BOTTOM OF CONCRETE (TYP.).

3/4"

24"

18"

6"

3/4"

8" X 2 1/4" X 7/8" STEEL PLATE

3/4" DIAM. X 18" THREADED ROD CENTERED THROUGH PIPE, SECURED WITH NUTS, OR 3/4" X 6" ANCHOR STUDS WELDED TO PIPE. SPACING SHALL BE 8" FROM TOP AND 8" FROM BOTTOM OF CONCRETE (TYP.).

6"

STEEL PLATE - SEE DETAIL
NOTES

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

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

3. Slope shall match Side Slope; 6H:1V preferred, not steeper than 4H:1V.
1. All pipes or pipe arches shall be attached as shown in CONNECTOR DETAIL.
2. When a Toe Plate Extension is required, it shall be the same gage as the End Section. The dimensions shall be 8" high, and 6" less than the overall width. Install centered, and lapped 2", fasten with 3/8" x 3/4" galvanized bolts on 12" maximum centers.
3. Cross Drainage Bar and Safety Bars shall be 3" Schedule 40 galvanized steel pipe. Cross Drainage Bars shall be placed a maximum 30" apart.
4. Slotted holes for safety bar attachment shall be provided on end sections.
5. Number of Safety Bars required will vary depending upon the length of the end section.

### METAL END SECTIONS FOR CIRCULAR PIPES

<table>
<thead>
<tr>
<th>PIPE DIAM. (INCHES)</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
<th>GAGE</th>
<th>A</th>
<th>H</th>
<th>W</th>
<th>OVERALL L</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SLOPE 4:1</td>
<td>SLOPE 6:1</td>
</tr>
<tr>
<td>36</td>
<td>0.109</td>
<td>12</td>
<td>9</td>
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### METAL END SECTIONS FOR ARCHED PIPES

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<tr>
<th>PIPE ARCH DIMENSIONS</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
<th>GAGE</th>
<th>A</th>
<th>H</th>
<th>W</th>
<th>OVERALL L</th>
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<tr>
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<td>SLOPE 6:1</td>
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<td>16</td>
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<td>538</td>
</tr>
</tbody>
</table>

*SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"
**SAFETY BAR (TYP.)**

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**

**MINIMUM DIMENSIONS**

<table>
<thead>
<tr>
<th>PIPE DIAM. (INCHES)</th>
<th>MINIMUM THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **PIPE ARCH DIMENSIONS**
  - **MINIMUM THICKNESS**
    - **INCHES GAGE A H W**
    - **OVERALL WIDTH**
    - **L L**
    - **SLOPE 4:1**
    - **SLOPE 6:1**

**METAL END SECTIONS FOR ARCHED PIPES**

**DIMENSIONS (INCHES)**

<table>
<thead>
<tr>
<th>PIPE ARCH DIMENSIONS</th>
<th>EQUIL. SPAN (IN.)</th>
<th>MINIMUM THICKNESS</th>
<th>OVERALL WIDTH</th>
<th>L L</th>
<th>SLOPE 4:1</th>
<th>SLOPE 6:1</th>
</tr>
</thead>
</table>

- **TAPERED END SECTION WITH TYPE 4 SAFETY BARS**
  - **ON CROSS ROAD**

**STANDARD PLAN B-80.40-00**

**APPROVED FOR PUBLICATION**

**DATE**

- **WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**
6" WYE

6" WYE

6" SEWER PIPE

6" (SEWER SIZE) TEE

6" SINGLE BRANCH WYE
FOR TWO CONNECTIONS

45° BEND

45° BEND

6" WYE

6" SEWER PIPE

COMMERCIAL CONCRETE

ELEVATION

SECTION A

SECTION B

30" x 30" MIN.

30" x 30" MIN.

6" x (SEWER SIZE) TEE

FOR SANITARY SEWER USE

VERTICAL CONNECTION

STANDARD PLAN B-85.10-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakitch III  06-10-08
STATE DESIGN ENGINEER
Washington State Department of Transportation

EXPRESS JULY 1, 2009

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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.
STANDING SIDE SEWER CONNECTION

STANDARD PLAN B-85.30-00

FOR SANITARY SEWER USE

45° BEND

4" OR 6" SEWER PIPE
(SEE CONTRACT)

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

45° BEND

TEE

SEWER MAIN

STANDING SIDE SEWER CONNECTION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

APPROVED FOR PUBLICATION
Harold J. Peterfeso 06-01-06
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
ONE LENGTH OF DUCTILE IRON PIPE (CLASS 50) TO SOLID BEARING WHEN SPAN IS MORE THAN 48"

FLEXIBLE JOINT
BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER
COMMERCIAL CONCRETE BLOCK - Poured in place
D.I.P. 90° BEND CLEARANCE 2"
6" MIN.
30° - 0° MAX.

DUCTILE IRON DROP CONNECTION

TYPICAL MANHOLE
1/2 BLIND FLANGE AS DAM

ELEVATION

MORTAR DAM OR PLUG AS REQUIRED BY ENGINEER

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

FLEXIBLE JOINT
BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER
COMMERCIAL CONCRETE BLOCK - Poured in place
D.I.P. 90° BEND CLEARANCE 2"
6" MIN.
30° - 0° MAX.

CONCRETE ENCASED DROP CONNECTION

ELEVATION

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

FOR SANITARY SEWER USE

TYPICAL MANHOLE FOUNDATION CONSTRUCTION

TYPICAL MANHOLE FOUNDATION CONSTRUCTION

FOR SANITARY SEWER USE

DIP TEE CLEARANCE 2"

COMMERCIAL CONCRETE BLOCK - Poured in place

TYPICAL MANHOLE

COMMERCIAL CONCRETE - Poured in place

TYPICAL MANHOLE

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

ELEVATION

Type A

36" MIN. (UNLESS DIRECTED OTHERWISE)

PROPERTY LINE

FACE OF CURB

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

M E C H A N I C A L J O I N T WITH TIE ROD LUGS

6" PIPE

6" GATE VALVE (FLANGE BY MECHANICAL JOINT)

WATER MAIN

4. ELEVATION

Type B

36" MIN. (UNLESS DIRECTED OTHERWISE)

PROPERTY LINE

FACE OF CURB

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

HUB AND FLANGE CASTING

AUXILIARY GATE VALVE

WATER MAIN

4.
**NOTES**

1. Coat the pipe threads with asphalt after assembly.
2. All piping shall be galvanized steel.
3. Valve and piping to valve shall be 2" unless otherwise noted in the Contract.
4. Locate blowoff outlet near property corner if possible.
NOTES
1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.

2. Locate at the high point of the main, tap top of main.
**NOTES**

1. Contractor to provide blocking adequate to withstand full test pressure.
2. Divide thrust by safe bearing load to determine 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></td>
<td>A</td>
</tr>
<tr>
<td>4&quot;</td>
<td>250</td>
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<td>6&quot;</td>
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<td>7,070</td>
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<tr>
<td>8&quot;</td>
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**SOIL TYPE**

<table>
<thead>
<tr>
<th>SAFE BEARING LOAD (PSF)</th>
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<tbody>
<tr>
<td>MUCK, PEAT, ETC.</td>
</tr>
<tr>
<td>SOFT CLAY</td>
</tr>
<tr>
<td>SAND</td>
</tr>
<tr>
<td>SAND AND GRAVEL</td>
</tr>
<tr>
<td>SAND AND GRAVEL CEMENTED WITH CLAY</td>
</tr>
<tr>
<td>HARD SHALE</td>
</tr>
</tbody>
</table>
TWO TIE RODS WITH TURNBUCKLES

THING 6"

BLOCKING FOR 11.25° OR 22.5° VERTICAL BENDS

FOUR TIE RODS WITH TURNBUCKLES

THREAD 6"

BLOCKING FOR 45° VERTICAL BENDS

### Dimension Table

<table>
<thead>
<tr>
<th>Pipe Diam.</th>
<th>Test Pressure (PSI)</th>
<th>Bend Angle</th>
<th>Concrete Volume (Ft³)</th>
<th>Cube Size (Ft)</th>
<th>Tie Rod Diam.</th>
<th>Tie Rod Embedment</th>
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<td>12</td>
<td>2.3</td>
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<tr>
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<td>2.8</td>
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<tr>
<td>6'</td>
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<td>2.4</td>
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<td></td>
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<td>27</td>
<td>3.0</td>
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<td>3.6</td>
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<td>14'</td>
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<td>1 1/8&quot;</td>
<td>30&quot;</td>
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</tbody>
</table>
The document contains a diagram of a median barrier drainage installation. It includes sections labeled A and B, showing details of the barrier, finished grade, pipe (typical), and grate inlet type 2 (typical). The sections are intended to be used with concrete barrier type 2. The diagram also includes notes on precast cement concrete adjustment sections and standard plan B-36.40. The drawing is approved for publication with the date March 1, 2009.
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, 4, 4a, 5, or 5a.

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

5. See Contract Plans for length of Curb.

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.

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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.
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

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 16d galvanized nail to prevent block rotation.

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

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

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

NOTE

TIMBER BLOCK FOR STEEL POST

STANDARD PLAN C-1

BEAM GUARDRAIL

TYPES 1 - 4

(W-BEAM)

ASSEMBLY DETAIL

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

NOTE 1

Types 1 & 2

5/8" + 1/8" BUTTON HEAD BOLT W/ 7/32" OVAL GRIP & RECESSED HEX NUT

NOTE 4

Types 1 & 2

SPLICE BOLT W/ 7/32" OVAL GRIP & HEX NUT W/ CUT WASHER

NOTE 5

W8 x 9 OR W8 x 15

NOTE 6

Types 1 & 2

5/8" + 1/4" BUTTON HEAD SPICE BOLT W/ 7/32" OVAL GRIP & RECESSED HEX NUT (EIGHT REQUIRED PER SPLICE)
NOTES

1. Type 10 post shall be 8x8 timber or W6x8. Type 11 post shall be 10x10 timber or W8x10. 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.

13' - 6 1/2" SEE NOTE 3

3' - 1 1/2" SEE NOTE 3

3' - 1 1/2" SEE NOTE 3

3' - 1 1/2" SEE NOTE 3
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. W6x9 steel posts and timber blocks are alternates for 6 x 8 timber posts and blocks. W6x15 steel posts and timber blocks are alternates for 10 x 10 timber posts and blocks.

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

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

6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.
NOTES

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

DETAIL A

TYPE 20

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

DETAIL B

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

BEAM GUARDRAIL

STANDARD PLAN C-1c
See Note 1

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

10 Gage

Splice bolt slots
7/16" x 1/8" (TYP)

Post bolt slots
3/16" x 2 1/2" (TYP)

Splice bolt slots
7/16" x 1/8" (TYP)

Post bolt slots
3/16" x 2 1/2" (TYP)
NOTES

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

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

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

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

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

6. When Beam Guardrail Flared Terminals are used on both ends a minimum of 25'-0" of Beam Guardrail shall be installed.
NOTES
1. For terminal type and details, see Contract and applicable Standard Plan(s).
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10H:1V when the guardrail is within 12' - 0" from the edge of the shoulder.
3. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier.

FLARE RATE TABLE

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

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

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

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

3. Type 4 anchor required. See applicable Standard Plan(s).

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

TERMINAL PAY LIMIT - SEE NOTE 1

ANCHOR PAY LIMIT - SEE NOTE 3

BEAM GUARDRAIL PAY LIMIT

- SEE CONTRACT

EDGE OF SHOULDER

TWO-WAY TRAFFIC

VARIES - SEE CONTRACT

CASE 10A

ONE-WAY TRAFFIC

CASE 10B

ONE-WAY TRAFFIC

OR

TWO-WAY TRAFFIC

CASE 10A, B, or C

ONE-WAY TRAFFIC

CASE 10C

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

GUARDRAIL PLACEMENT

STANDARD PLAN C-2d

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-21-06

05/2006 CLARIFIED DIMENSION OF CLEARANCE FOR HAZARD

REVISED

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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 1½" 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 "H", 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 Rail Element using the lowest splice bolt of 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 "BeamGuardrail Posts and Blocks".

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

GUARDRAIL PLACEMENT

CASE 14

STANDARD PLAN C-2h

APPROVED FOR PUBLICATION

Donald K. Nelson
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTES

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

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


**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.

<table>
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<td>40 or less</td>
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</table>

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

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield 6/12/98
DEPUTY STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EXPIRES MAY 3, 2000

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
GUARDRAIL PLACEMENT
12'-6" SPAN
STANDARD PLAN C-2k

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SECTION A

SECTION B

BEAM GUARDRAIL PAY LIMIT

25' NESTED W-BEAM

6'-3" TYP.

12'-6"

6'-3" TYP.

GROUND LINE

ELEVATION

CASE 19 A

SPICE IN CENTER

BEAM GUARDRAIL PAY LIMIT

37'-6" NESTED W-BEAM

6'-3" TYP.

12'-6"

6'-3" TYP.

GROUND LINE

ELEVATION

CASE 19 B

SPICE AT POSTS

SINGLE W-BEAM RAIL ELEMENT

NESTED W-BEAM RAIL ELEMENTS

APPROVED FOR PUBLICATION
Clifford E. Mansfield 07-27-01
STATE DESIGN ENGINEER
Washington State Department of Transportation

EXPRES MAY 3, 2002

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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.
1. See Contract for transition and connection type.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Guardrail installation shall be Beam Guardrail Type 1 with standard post and block.
4. First letter of case designation indicates end treatment on side road. Second letter indicates end treatment on main road. For instance a terminal on the side road and a bridge connection on the main road would be Case 22 BC.
5. For terminal type and details, see Contract and applicable Standard Plan(s).
6. Radius dimensions shall be etched into plate replacing the letters "HH" shown on the Identification Plate Detail. Digits shall be 1 1/2" MIN height and 3/4" MAX width. Plate shall be galvanized after etching.
7. The guardrail Identification Plate shall be mounted at the lower splice bolt on the back side of the rail element at the PC of the guardrail radius.
NOTE

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

TYPE 2

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

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

6' - 6" LONG, 10x10 POSTS WITH 6x8 BLOCKS (TYP.)

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

TYPE 4

FOR 45 MPH AND BELOW

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

3' - 1 1/2" SPACING

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

TYPE 5

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

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

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

TYPE 6

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

TOTAL LENGTH = 25' - 0"

SEE STD. PLAN C-1b
NOTES

1. If the distance from the end of the bridge to the end of the thrie beam bridge rail section exceeds 5' - 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.
BEAM GUARDRAIL TRANSITION SECTIONS
STANDARD PLAN C-3b

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

THREE BEAM GUARDRAIL TRANSITION SECTION TYPE 13 - PAY LIMIT

SEE TRAILING END TRANSITION DETAILS

12'-6" THREE BEAM

PAY LIMIT

SEE CONTRACT PLANS FOR QUANTITY

12'-6" NESTED THREE BEAM

(12 GAGE)

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

THREE BEAM GUARDRAIL REDUCER SECTION TYPE A

(10 GAGE)

VARIES 3" TO 2'-5"

TWO SPACES

@ 3'-1 1/2"

6'-3"  

THREE BEAM INSTALLED AT FACE OF BRIDGE RAIL

6'-6" POST WITH STANDARD BLOCK

(10 GAGE)

6'-6" LONG, 10 x 10 POST WITH

STANDARD BLOCK

(12 GAGE)

SEE NOTE 3

6'-6" LONG

HMA RAMP

SEE NOTE 3

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

THREE BEAM GUARDRAIL TRANSITION SECTION TYPE 14 - PAY LIMIT

HMA RAMP

SEE NOTE 3

6'-6" POST WITH STANDARD BLOCK

(10 GAGE)

6'-6" LONG, 10 x 10 POST WITH

STANDARD BLOCK

(12 GAGE)

SEE NOTE 3

6'-6" LONG

HMA RAMP

SEE NOTE 3

6'-6" POST WITH STANDARD BLOCK

(10 GAGE)

6'-6" LONG

HMA RAMP

SEE NOTE 3

6'-6" POST WITH STANDARD BLOCK

(12 GAGE)

6'-6" LONG, 10 x 10 POST WITH

STANDARD BLOCK

(12 GAGE)

SEE NOTE 3

6'-6" LONG

HMA RAMP

SEE NOTE 3
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 F-10.40) at face of Guardrail.

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

1. Unless otherwise indicated in the contract, the SRT - 350 (12.5, 8 Post) as manufactured by Trinity Industries, Inc., 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 manufacturers 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

ELEVATION VIEW
SRT OPTION

PLAN VIEW
FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)

PLAN VIEW
FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)

FLARED TERMINAL PAY LIMIT (SEE NOTES 1 AND 2)
NOTES

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

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

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

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

5. Length for ET-PLUS (TL3) and SKT-350 is 50'. Length for ET-PLUS (TL2) and SKT-TL2 is 25'.
PLAN

BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 1

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.
**GUARDRAIL POST LAYOUT - DESIGN 1**

1. **GUARDRAIL POST**
   - 5/8" DIAM. x 10" LONG

2. **W-BEAM WOOD BLOCK**
   - FOR WOOD POSTS
   - SEE STANDARD PLAN C-1b

3. **THREE BEAM WOOD 6" x 8"**
   - BREAKAWAY POST - SEE STANDARD PLAN C-1b

4. **6" STEEL FOUNDATION TUBE**
   - TS 8" x 0.1875"

5. **3 1/2" DIAM. HOLES**

**NOTE:** CABLE BEARING PLATE NOT SHOWN

**GUARDRAIL POST LAYOUT - DESIGN 2**

1. **GUARDRAIL BOLT**
   - 5/8" DIAM. x 17" LONG

2. **W-BEAM WOOD BLOCK**
   - FOR WOOD POSTS
   - SEE STANDARD PLAN C-1b

3. **THREE BEAM WOOD 6" x 8"**
   - BREAKAWAY POST - SEE STANDARD PLAN C-1b

4. **6" STEEL FOUNDATION TUBE**
   - TS 8" x 0.1875"

**NOTE:** CABLE BEARING PLATE NOT SHOWN
NOSE CABLE ANCHOR PLATE

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

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

NOSE CABLE ANCHOR PLATE

1L
2L
3L

U-BOLT CABLE CLIP AT MIDDLE AND QUARTER POINTS OF RAIL - (8) REQUIRED SEE RAIL ELEMENT DETAIL

BEAM GUARDRAIL
BULL NOSE TERMINAL

STANDARD PLAN C-4f

SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 07/2012

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STATE OF WASHINGTON
1. Anchor plate may be constructed from 1/4" plates welded to equal strength and dimensions as shown.
2. For end section details see Standard Plan "Beam Guardrail End Sections".
3. For post details, see Standard Plan "Beam Guardrail Posts and Blocks".
4. Eight 5/8" x 1 1/2" machine bolts with hex nut and washer. Place washer on face side of rail.
5. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
6. Toe nail bearing plate with 10d nail at corners to prevent turning.
7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.
NOTES

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

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

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

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

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

5. Outside nut shall be torqued against inside nut to a minimum of 100 ft/lbs.
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.
1. End Section Design G shall be used except where noted on the plans or contract.

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

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

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

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

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

---

DESIGN C (THRIE BEAM)

DESIGN D (THRIE BEAM)

DESIGN D (THRIE BEAM) END SECTION

DESIGN F (THRIE BEAM)

DESIGN G (THRIE BEAM) END SECTIONS

STANDARD PLAN C-7a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-16-11

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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).
WIRE SEIZING - SHALL BE EIGHT WRAPS OF 16 GAUGE WIRE WITH THE ENDS TWISTED TOGETHER, OR EQUIVALENT FASTENING.

WIRE ROPE LOOP DETAIL

1/8" THICK PLATE WASHER

PLATE WASHER 1/8" THICK

2 MIN., 2 1/2 MAX. 3/4" I.D. LOOP

WIRE ROPE LOOPS - SEE NOTE 1

HOLE FOR DRIFT PIN

1" DIAM. PIN WITH ROUNDED BOTTOM EDGES

See Note 3

CONNECTING PINS AND DRIFT PINS

BARRIER TERMINAL

REINFORCING STEEL BENDING DIAGRAM

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

2 1/8" FOR CONNECTING PIN

2 1/2" FOR DRIFT PIN

5/8" WIRE ROPE

1/2" 5/8" WIRE ROPE

BARRIER SECTION

REINFORCING STEEL BENDING DIAGRAM

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

See Note 4

BARRIER CONNECTION DETAIL

SIDE VIEW

TOP VIEW

WIRE ROPE LOOPS

3/4" MAX. (TYP.)

2" R. - BEVEL OR ROUND EDGES

2" MIN.

2 1/2 MAX.

SIDE VIEW

HOLE FOR DRIFT PIN

REINFORCING STEEL

BENDING DIAGRAM

SIDE VIEW
CONCRETE BARRIER TYPE 4 AND TRANSITION SECTION

STANDARD PLAN C-8a

APPROVED FOR PUBLICATION

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

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

INTERMEDIATE PLAN

TRANSITION PLAN

INTERMEDIATE ELEVATION

TRANSITION ELEVATION

SECTION A-A

TRANSITION END VIEW

SECTION B-B

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

1. The intended use of this plan is for the permanent anchoring of Precast Concrete Barrier Type 2 (see Standard Plan C-8) on hot mix asphalt pavement.

2. Remove the Type 3 Anchors by first driving the steel pins down through the barrier further into the pavement to allow lifting the barrier without interference, then remove the pins from the pavement.

3. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
CONCRETE BARRIER TYPE 2 (NJ-SHAPE) END VIEW

CONCRETE BARRIER TYPE 2 (NJ-SHAPE) END VIEW

WIRE ROPE LOOP (TYP.)
SEE STD. PLAN C-8

WIRE ROPE LOOP (TYP.)
SEE STD. PLAN C-8

CONNECTING PIN - SEE STD. PLAN C-8

CONNECTING PIN - SEE STD. PLAN C-8

BARRIER FACE
OF CONCRETE

1 1/2"

WIRE ROPE LOOP - SEE STD. PLAN C-8

WIRE ROPE LOOP - SEE STD. PLAN C-8

1 1/4" I.D. LOOP

1 1/4" I.D. LOOP

REINFORCING STEEL BENDING DIAGRAM

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

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

CONCRETE BARRIER TYPE 2 (NJ-SHAPE)

CONCRETE BARRIER TYPE 2 (NJ-SHAPE)

(Shown at Limit of Transition)

(Shown at Limit of Transition)

SECTION A

SECTION B

BRIDGE F-SHAPE TRAFFIC BARRIER

ISOMETRIC VIEW

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

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

BRIDGE F-SHAPE TRAFFIC BARRIER

ON BRIDGE

TRANSITION SECTION - AS SHOWN IN PLAN

TRANSITION SECTION - MIRROR IMAGE OF PLAN

TRANSITION SECTION

- MIRROR IMAGE OF PLAN

E F F E C T I V E :  AUGU S T  6 ,  2 0 1 2  T O  A ugu st 4 ,  2 0 1 3

E F F E C T I V E :  AUGU S T  6 ,  2 0 1 2  T O  A ugu st 4 ,  2 0 1 3
NOTES

1. Length of W8 x 35 and W6 x 9 shall be determined by measurement from top of ground to top of grout pad. This distance shall be verified by the Contractor.

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

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

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

---

**POST BEARING PLATE DETAIL**

**TRAFFIC SIDE**

**W8 x 9 STEEL POST**

**SLOTTED HOLE (TYP.)**

**5/8" STEEL PLATE**

**WOOD BLOCK FOR STEEL POSTS**

\~ SEE STANDARD PLAN C-1b

**GROUND LINE**

**EXISTING BOX CULVERT**

**BOX CULVERT GUARDRAIL STEEL POST TYPE 2**

(0" TO 6" GROUND COVER)

**POST BASE PLATE DETAIL**

**1" DIAMETER HOLE**

\(\text{Typ.}\)

**5/8" STEEL PLATE**

**POST BEARING PLATE DETAIL**

**1" X 1 1/2" SLOTTED HOLE**

\(\text{Typ.}\)

**5/8" STEEL PLATE**

**POST BASE PLATE**

**3/4" GROUT PAD**

**HIGH STRENGTH BOLTS**

\~ FOUR REQUIRED

\(\text{SEE NOTE 1}\)

**TRAFFIC SIDE**

**POST BASE PLATE**

**3" D.C.R.**

**POST BEARING PLATE**

**DETAIL A**

**POST BASE ATTACHMENT**

**POST ANCHOR ATTACHMENT DETAIL**

\(\text{SEE NOTE 2}\)

**POST ANCHOR ATTACHMENT DETAIL**

\(\text{SEE NOTE 4}\)

**BOX CULVERT GUARDRAIL STEEL POST**

**STANDARD PLAN C-10**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

Pasco Bakich III 06-03-10

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
**Traffic Side**

1. **Cover Plate Detail**
   - 1/4" Diameter hole (typ.) in cover plate for 3/4" x 2" long bolt with hex nut and washer.
   - 5/8" steel plate.

2. **Base Plate Detail**
   - 1" diameter hole (typ.)
   - W8 x 35.
   - 1" steel plate.

3. **Base Attachment**
   - See anchor attachment detail for center of double box culvert.
   - W8 x 35 steel post.

4. **Anchor Attachment Detail**
   - See note 2.
   - Base plate.
   - Double box culvert.

5. **Box Culvert Guardrail Steel Post Type 1**
   - (9' to 36' ground cover).
   - W8 x 35 steel post.

6. **Detail C**
   - Post base plate = see detail sheet 1.
   - 3/4" x 2" long bolt with hex nut and washer (typ.).

7. **Detail B**
   - Base attachment.
   - W8 x 35 steel post = see note 1.

8. **Detail**
   - Post attachment.
   - 3/4" Grout pad.

**Wood Block for Steel Posts**
- See standard plan C-15.

**State Design Engineer**
- Pasco Bakotich III
- 06-03-10

**Effective:** August 6, 2012 to August 4, 2013
NOTE

1. For W-Beam Type 31 shoulder application, see Standard Plan C-28.40.

TRAFFIC BARRIER SHOULDER WIDENING — FOR SHOULDERS 8.0’ AND WIDER
STANDARD PLAN C-16a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-03-10
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTES

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

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

3. For W-Beam Type 31 shoulder application, see Standard Plan C-28.40.
NOTES
1. For component details, see Standard Plan C-23.60.
2. For terminal type and details, see Contract Plans and applicable drawings.
3. The slope from the edge of the shoulder into the face of the guardrail cannot exceed 10H:1V when the face of the guardrail is less than 12'-0" from the edge of the shoulder.
4. For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.
5. Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.
### Beam Guardrail Transition Section

#### Beam Guardrail Type 31

- **Pay Limit (See Note 3)**

#### Beam Guardrail Type 31 Non-Flared Terminal

- **Pay Limit (See Note 1)**

---

**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>15 : 1</td>
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<tr>
<td>60</td>
<td>14 : 1</td>
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<td>45</td>
<td>10 : 1</td>
</tr>
<tr>
<td>40 or less</td>
<td>9 : 1</td>
</tr>
</tbody>
</table>

---

**NOTES**

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

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

3. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier. See Standard Plan C-24.10 for connection details.

---

**EFFECTIVE:** AUGUST 6, 2012 TO August 4, 2013
1. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10° : 1V when the guardrail is within 12° : 0° from the edge of the shoulder.

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

NOTES

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

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

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

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

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

1. For additional details not shown on this plan, refer to Standard Plan C-20.10.
2. CRT post to be wood only.

---

**BEAM GUARDRAIL TYPE 31**

**PLACEMENT 12'-6". 18'-9" OR 25'-0" SPAN**

**STANDARD PLAN C-20.40-03**

**SECTION A**

**CONTROLLED RELEASING TERMINAL (CRT) POST DETAIL**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 07/212

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

---

**PLAN VIEW**

**ELEVATION VIEW**

---

**BEAM GUARDRAIL TYPE 31 - PAY LIMIT**

---

**OBSTRUCTION**

---

**W6x9 STEEL POST (TYP.)**
NOTES

1. See Contract for transition and connection type.

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

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

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

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

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

GUARDRAIL PLACEMENT

STRONG POST ~ TYPE 31

INTERSECTION DESIGN

STANDARD PLAN C-20.42-03

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
1. Beam Guardrail post spacing shall be 6’ - 3” on centers.
2. Use a single or combination of blocks to achieve the actual 12” offset. See Standard Specification 9-16.3(2). Wood blocks shall be toe-nailed to post (and blocks, if block combinations are used) with 16d galvanized nails to prevent block rotation.
3. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.
4. For details not shown, see Standard Plan C-20.10.
5. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3(2).
NOT STEEPER THAN 10H : 1V

NO BOLT REQUIRED

SECTION A

SECTION B

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

LOCATION OF POSTS & BLOCKS (TYP)

EDGE OF WIDENED EMBANKMENT

W-BEAM RUB RAIL

W-BEAM RUB RAIL

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

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>RATE</th>
<th>POSTED SPEED (mph)</th>
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<tr>
<td>10 : 1</td>
<td>45</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 OR LESS</td>
</tr>
</tbody>
</table>

FLARE RATE - SEE TABLE

FLARE RATE - SEE TABLE

NOT STEEPER THAN 4H : 1V

BEAM GUARDRAIL TYPE 1

BEAM GUARDRAIL TYPE 2 - PAY LIMIT

BEAM GUARDRAIL TYPE 1

BURIED TERMINAL TYPE 2 - PAY LIMIT (TERMINAL LENGTH VARIES)

ELEVATION (PROFILE ALONG RAIL)

ELEVATION (PROFILE ALONG RAIL)

NO BOLT REQUIRED

SECTION B

SECTION C

SEE NOTE 3

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

TOP OF CUT

FLARE RATE - SEE TABLE

FLARE RATE - SEE TABLE

NOT STEEPER THAN 4H : 1V

NOT STEEPER THAN 10H : 1V

1' - 6" MAX.

1' - 6" MAX.

NO BOLT REQUIRED

SECTION A

SECTION B

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

LOCATION OF POSTS & BLOCKS (TYP)

EDGE OF WIDENED EMBANKMENT

W-BEAM RUB RAIL

W-BEAM RUB RAIL

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

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</tbody>
</table>

FLARE RATE - SEE TABLE

FLARE RATE - SEE TABLE

NOT STEEPER THAN 4H : 1V

BEAM GUARDRAIL TYPE 1

BEAM GUARDRAIL TYPE 2 - PAY LIMIT

BEAM GUARDRAIL TYPE 1

BURIED TERMINAL TYPE 2 - PAY LIMIT (TERMINAL LENGTH VARIES)

ELEVATION (PROFILE ALONG RAIL)

ELEVATION (PROFILE ALONG RAIL)

NO BOLT REQUIRED

SECTION A

SECTION B

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

LOCATION OF POSTS & BLOCKS (TYP)

EDGE OF WIDENED EMBANKMENT

W-BEAM RUB RAIL

W-BEAM RUB RAIL

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

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FLARE RATE - SEE TABLE

FLARE RATE - SEE TABLE

NOT STEEPER THAN 4H : 1V

BEAM GUARDRAIL TYPE 1

BEAM GUARDRAIL TYPE 2 - PAY LIMIT

BEAM GUARDRAIL TYPE 1

BURIED TERMINAL TYPE 2 - PAY LIMIT (TERMINAL LENGTH VARIES)

ELEVATION (PROFILE ALONG RAIL)

ELEVATION (PROFILE ALONG RAIL)

NO BOLT REQUIRED

SECTION A

SECTION B

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

LOCATION OF POSTS & BLOCKS (TYP)

EDGE OF WIDENED EMBANKMENT

W-BEAM RUB RAIL

W-BEAM RUB RAIL

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

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FLARE RATE - SEE TABLE

FLARE RATE - SEE TABLE

NOT STEEPER THAN 4H : 1V

BEAM GUARDRAIL TYPE 1

BEAM GUARDRAIL TYPE 2 - PAY LIMIT

BEAM GUARDRAIL TYPE 1

BURIED TERMINAL TYPE 2 - PAY LIMIT (TERMINAL LENGTH VARIES)

ELEVATION (PROFILE ALONG RAIL)

ELEVATION (PROFILE ALONG RAIL)

NO BOLT REQUIRED

SECTION A

SECTION B

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

LOCATION OF POSTS & BLOCKS (TYP)

EDGE OF WIDENED EMBANKMENT

W-BEAM RUB RAIL

W-BEAM RUB RAIL

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

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</table>

FLARE RATE - SEE TABLE

FLARE RATE - SEE TABLE

NOT STEEPER THAN 4H : 1V

BEAM GUARDRAIL TYPE 1

BEAM GUARDRAIL TYPE 2 - PAY LIMIT

BEAM GUARDRAIL TYPE 1

BURIED TERMINAL TYPE 2 - PAY LIMIT (TERMINAL LENGTH VARIES)

ELEVATION (PROFILE ALONG RAIL)

ELEVATION (PROFILE ALONG RAIL)
NOT STEEPER THAN 10H: 1V

NOT STEEPER THAN 4H: 1V

1' - 6" MAX.

5/8" x 2" LONG BUTTON HEAD BOLT WITH 7/32" OVAL GRIP, CUT WASHER, AND HEX NUT

NOT STEEPER THAN 4H: 1V

NOT FLATTER THAN 3H: 1V

1' - 0" MIN. COVER

SECTION A

SECTION B

SECTION C

SEE NOTE 3

NOTES

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

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

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

Refer to SECTION "C":

\[ \text{Elevation } G = (\text{Elevation } S - D \times 0.1) + 31 \]

FLARE RATE TABLE

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

BEAM GUARDRAIL TYPE 31

BURIED TERMINAL TYPE 2 - PAY LIMIT

TERMINAL LENGTH VARIES
NOTES

1. These terminals are FHWA accepted at Test Level Three (TL-3) and may be used for all posted speeds.

2. An ET-31 (Steel) as manufactured by Trinity Industries, Inc. or an SKT-SP-MGS as manufactured by Road Systems Inc. shall be installed according to manufacturer's recommendations.

3. A reflectorized object marker shall be installed according to manufacturer's recommendations.

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

5. Terminal shall be installed at a widening, ensuring that the end piece is entirely off the shoulder. While these terminals do not require an offset at the end, a flare is recommended. A maximum flare of 25 : 1, or flatter over the length of the terminal is allowed for either the ET-31 (Steel) or the SKT-SP-MGS, with a maximum offset of 24" (in.) over 50' (ft.).

6. For Terminal details, see WSDOT approved manufacturer's drawings.
NOTES

1. These Terminals are FHWA accepted at Test Level Two (TL-2) and may be used in applications with speeds of 40 MPH or less.

2. An ET-31 (TL-2) as manufactured by Trinity Industries, Inc. or an SKT-SP-MGS (TL-2) as manufactured by Road Systems Inc. shall be installed according to manufacturers' recommendations.

3. A reflectorized object marker shall be installed according to manufacturers' recommendations.

4. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the Terminal limits.

5. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While these Terminals do not require an offset at the end, a flare is recommended. A maximum flare of 25:1 or flatter over the length of the Terminal is allowed for either the ET-31 (TL-2) or the SKT-SP-MGS (TL-2), with a maximum offset of 24" (in.) over 50' (ft.).

6. For Terminal details, see WSDOT-approved manufacturers' drawings.
NOTES

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

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

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

4. Use details for Wood Breakaway post shown on this plan and components shown on Standard Plan C-1b.

5. Fasten the Anchor Cable using two 1" nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft.-lbs.

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

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

PLAN A CONNECTION

FACE OF GUARDRAIL, EDGE OF SHOULDER

NEW BRIDGE TRAFFIC BARRIER
(SINGLE SLOPE BARRIER SHOWN)

TRANSITION SECTION PAY LIMIT

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

PLAN B CONNECTION

FACE OF GUARDRAIL, EDGE OF SHOULDER

BEAM GUARDRAIL PAY LIMIT

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

PLAN C CONNECTION

FACE OF GUARDRAIL, EDGE OF SHOULDER

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

NOTE 2. If the last guardrail post is 3" or less from the end of the bridge barrier, this attachment and blackout is not necessary.

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

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

NOTE 5. See Bridge Plans for additional connection details.

NOTE 6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3 (2).
**BEAM GUARDRAIL (TYPE 31) TRANSITION SECTION TYPE 20**

**STANDARD PLAN C-25.18-03**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**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 and 6 require an additional hole to attach tapered blocks and/or rubrail.
6. Posts 1 and 2 are W6 x 15 steel posts – 7' - 6" long. Posts 3 through 9 are 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 shaped barrier shall be tapered or the barrier blocked out so that the toe of the barrier does not project past the face of the approach guardrail.

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

3. For details of typical components, see Standard Plans C-1b and C-20.10.
1. See Standard Plans C-1b, C-1d, C-20.10 and C-25.20 for rail elements and thrie beam block details.

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

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

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

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

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

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

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

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

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

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

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

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

---

**SINGLE-SLOPE CONCRETE BARRIER (PRECAST)**

**STANDARD PLAN C-70.10-00**

**DIMENSION TABLE**

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>HORIZONTAL BARS (QTY.)</th>
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</thead>
<tbody>
<tr>
<td>3'-6&quot;</td>
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<td>9&quot;</td>
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<td>4 1/2&quot;</td>
<td>5</td>
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<td>2'-10&quot;</td>
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</table>

**REINFORCING STEEL BENDING DIAGRAM**

SEE STD. SPEC. B-07.110 FOR BENDING DIAMETERS

**PREPARED GRADED BASE**

**HYPOTHETICAL GRADE DIFFERENTIAL**

**ISOMETRIC VIEW**

**NOTE:** WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE

<table>
<thead>
<tr>
<th>MARK</th>
<th>REINFORCING SIZE</th>
<th>WELDED WIRE REINFORCING</th>
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<td>#4 D -20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>#5 D -31</td>
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</tbody>
</table>
1. PERMANENT INSTALLATION requirements: Embed barrier 3" minimum, install 1/4" Pre-molded Joint Filler between segments, fill the Connection Blackout with grout, centering the Rebar Grid in the Blackout before adding grout.

2. TEMPORARY INSTALLATION requirement: Place a Rebar Grid in the Connection Blackout 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 imbedment of 3'.

---

**NOTES**

- **DIMENSION TABLE**
  - **EFFECTIVE:** AUGUST 6, 2012 TO August 4, 2013
  - **PLAN**
  - **ELEVATION**
  - **SECTION A**
  - **SECTION B**
  - **SECTION C**
  - **ISOMETRIC VIEW**

**WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE**

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

**REINFORCING STEEL BENDING DIAGRAM**

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

---

**SINGLE-SLOPE CONCRETE BARRIER (PRECAST) TRANSITION SECTION**

**STANDARD PLAN C-75.10-00**

---

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 04/18/12
State Designs Branch
State Department of Transportation
NOTES

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

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

3. See Standard Plan C-70.10 for Rebar Grid DETAIL and Barrier CONNECTION DETAIL.

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

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

* WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE

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

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

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 9-97/12 FOR BENDING DIAMETERS

DIMENSION TABLE

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

SEE NOTE 5

SINGLE-SLOPE CONCRETE BARRIER (PRECAST) VERTICAL BACK STANDARD PLAN C-75.20-00 SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION 04/18/12

Washington State Department of Transportation

Pasco Bakotich III 04/18/12 STATE DESIGN ENGINEER

STATE ENGINEER'S OFFICE
NOTES
1. PERMANENT INSTALLATION requirements: Embed barrier 3\" minimum, install 1/4\" Premolded Joint Filler between segments, fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.
2. TEMPORARY INSTALLATION requirement: Place a Rebar Grid in the Connection Blockout between barrier segments.
3. See Standard Plan C-70.10 for REBAR GRID DETAIL and BARRIER CONNECTION DETAIL.
4. The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3\' - 6\'', and a minimum embedment of 3\".
1. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slipform construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" and adjust the rebar dimensions as required.

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

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

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

---

The diagram includes details on reinforcing steel bending, weld substituting option tables, and expansion joint details. It also references specific sections of the standard plan C-80.10-00, indicating how the dimensions and details should be applied to the construction of the single-slope concrete barrier.
**SINGLE-SLOPE CONCRETE BARRIER (CAST-IN-PLACE)**

**DUAL-FACED STANDARD PLAN C-80.10-00**

---

**SECTION A**

3'-6" BARRIER FOR USE WITH A 6" TO 9" MAX. GRADE SEPARATION
(SEE NOTE 3)

---

**SECTION A**

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

---

**TOP OF ROADWAY**

3'-6" BARRIER SHOWN LEVEL

---

**TOP OF ROADWAY**

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

---

**TOP OF ROADWAY**

STANDARD MOUNTING HEIGHT
36'-0" MINIMUM TO 120'-0" MAXIMUM BETWEEN EXPANSION JOINTS. DIRECTION OF TRAVEL. DIRECTION OF TRAVEL. PLAN. DUMMY JOINT - SEE NOTE 2. SINGLE SLOPE CONCRETE BARRIER (BID ITEM). TOP OF ROADWAY. FIELD BEND #5 BARS. 3/4" CHAMFER (TYP.). 1'-8" 10'-0" MIN. TO 12'-0" MAX. 4-5 SPACES @ 1'-6" = 7'-6". * WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE.

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

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

REINFORCING STEEL BENDING DIAGRAM

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

DIMENSION TABLE

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>SEE NOTE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>STD. 3'-6&quot;</td>
<td>8&quot; 2'-0&quot;</td>
</tr>
<tr>
<td>WHP 4'-0&quot;</td>
<td>9 1/8&quot; 2'-2 1/4&quot;</td>
</tr>
</tbody>
</table>

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'.
**NOTES**

1. The Transition Section is used in the configurations shown in Standard Plans C-85.10 and C-85.11.

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

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

4. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 6" and a minimum embedment of 3'.
1. The Vertical Back barrier is used only in the configurations shown in Standard Plans C-85.10 and C-85.11, and when placed against a retaining wall.

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

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

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

---

**NOTES**

- **WELDED WIRE REINFORCING SUBSTITUTION OPTION TABLE**

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

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

---

**REINFORCING STEEL BENDING DIAGRAM**

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

**DIMENSION TABLE**

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD. 3'-0&quot;</td>
<td>8&quot;</td>
<td>1'-4&quot;</td>
<td>3</td>
<td>2'-6&quot;</td>
<td>1'-0 1/4&quot;</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>HP 4'-0&quot;</td>
<td>9 1/8&quot;</td>
<td>1'-5 1/8&quot;</td>
<td>4</td>
<td>3'-0&quot;</td>
<td>1'-1 1/2&quot;</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

---

**EXPANSION JOINT MODIFICATION**

**SEE NOTE 2**

---

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

**VERTICAL BACK STANDARD PLAN C-80.40-00**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

---

**Pasco Bakotich III**

**STATE DESIGN ENGINEER**

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

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

---

**ISOMETRIC VIEW**
NOTE
This plan is for transitions to Precast Concrete Barrier Type 2 only.
See contract for transitions to other barrier shapes and bridge rails.

CONCRETE BARRIER TYPE 2
MULTIPLE SURFACES TO SINGLE SLOPE

ELEVATION

REINFORCING STEEL BENDING DIAGRAM

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

CONCRETE BARRIER TRANSITION
TYPE 2 TO SINGLE-SLOPE
STANDARD PLAN C-80.50-00

STATE DESIGN ENGINEER
Washington State Department of Transportation

APPROVED FOR PUBLICATION
Pasco Bakitch III 04/18/12
STATE DESIGN ENGINEER
Washington State Department of Transportation

NOTE
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 x 6 W2.1 x W2.1 (8 GAGE)
6 x 6 W2.9 x W2.9 (6 GAGE)
6 x 6 W4.0 x W4.0 (4 GAGE)
4 x 4 W1.4 x W1.4 (10 GAGE)
4 x 4 W2.1 x W2.1 (8 GAGE)
4 x 4 W2.9 x W2.9 (6 GAGE)

1 1/2" CLEARANCE ON ALL SURFACES

SLOPE TO DRAIN 0 to 5'-0"
COMMERCIAL CONCRETE 3/8" PREMOLDED JOINT FILLER (TYP.)

TOP OF ROADWAY

SELECT BORROW INCL. HAUL

SECTION B

CONCRETE CAP

SELECT BORROW INCL. HAUL

SECTION A

SINGLE-SLOPE CONCRETE BARRIER: VERTICAL BACK (TYP.)

STANDARD PLAN C-85.10-00

APPROVED FOR PUBLICATION 04/18/12

 Pasco Bakotich III 04/18/12
 STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

NOTES

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

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

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

2. For Single-Slope Concrete Barrier details, see Standard Plan series C-70’s (precast) or C-80’s (cast-in-place).
NOTE 2
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 (turnover and sliding) in the Service Limit State.

2. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and a Rebar Grid as shown on Standard Plan C-13.

3. Grounding conductor shall be non-insulated #4 AWG stranded copper, provide a 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' and 50' Light Standards with 16" max. length double mast arms.

7. Concrete shall be Class 4000.
NOTES
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-13.
2. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide a 3'-0" slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
3. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.
4. Concrete shall be Class 4000, unless otherwise noted.
NOTES
1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-13.
2. All concrete shall be class 4000.

BARS

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

SEE DIMENSION TABLE - NOT COUNTING SPLICES

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

VARIATES 3 1/4"
TO 3 3/4"

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

SINGLE-SLOPE CONCRETE BARRIER TRANSITION FOR MONOTUBE SIGN SUPPORT
STANDARD PLAN C-85.18-00

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

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

SECTION A

SECTION B

TABLE

<table>
<thead>
<tr>
<th>GRADE SEPARATION</th>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 5&quot;</td>
<td>3'-0&quot;</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3'</td>
<td>MIN.</td>
<td>4</td>
</tr>
<tr>
<td>UP TO 7&quot;</td>
<td>4'-0&quot;</td>
<td>9</td>
<td>1/4&quot;</td>
<td>2</td>
<td>3'/2&quot;</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>UP TO 10&quot;</td>
<td>4'-6&quot;</td>
<td>10</td>
<td>1/4&quot;</td>
<td>2</td>
<td>3'/2&quot;</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>
NOTES
1. See Standard Specification B-21.3(9) for construction requirements.
2. Use a template to locate and secure the bolts during foundation installation.
4. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide a 3'-0" slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
5. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>SHAFT CONCRETE</th>
<th>CLASS 4000P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL OTHER CONCRETE</td>
<td>CLASS 4000</td>
</tr>
<tr>
<td>STEEL REINF BAR</td>
<td>AASHTO M 31 GRADE 60</td>
</tr>
<tr>
<td>ANCHOR RODS</td>
<td>ASTM F 1554 GRADE 105</td>
</tr>
<tr>
<td>ANCHOR NUTS</td>
<td>AASHTO M 291</td>
</tr>
<tr>
<td>ANCHOR WASHERS</td>
<td>AASHTO M 293</td>
</tr>
<tr>
<td>ANCHORAGE GALVANIZED</td>
<td>AASHTO M 232</td>
</tr>
<tr>
<td>STEEL PLATE</td>
<td>ASTM A 36</td>
</tr>
</tbody>
</table>

SHAFT DEPTH

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

ELEVATION

NOTE 1: See STANDARD PLAN G-60.10 for grounding conductor details (see note 4).
NOTES

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

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

INSTALLATION DETAILS

ROADSIDE INSTALLATION DETAIL

MEDIAN INSTALLATION DETAIL

GORE INSTALLATION DETAIL

ATTENUATOR CONFIGURATIONS

(NUMBERS INSIDE BARRELS INDICATE LBS.)

TYPE 1
POSTED SPEED
40 MPH OR LESS

TYPE 2
POSTED SPEED
45 MPH

TYPE 3
POSTED SPEED
50 MPH

TYPE 4
POSTED SPEED
55 MPH

TYPE 5
POSTED SPEED
60 MPH

TYPE 6
POSTED SPEED
70 MPH

EXAMPLE CONFIGURATION

IMPACT ATTENUATOR
INERTIAL BARRIER
CONFIGURATIONS
STANDARD PLAN C-90.10-00

APPROVED FOR PUBLICATION
Pasco Bakotich III 07-03-08
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EXPIRES JUL 24, 2008

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

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

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

APPROVED FOR PUBLICATION

Harold J. Peterfeso 11-10-05
WASHING TON STATE DEPARTMENT OF TRANSPORTATION
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

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

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

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
**NOTES**

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

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

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

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

**CAST-IN-PLACE CONCRETE WALL WITH TRAFFIC BARRIER ON SPREAD FOOTING**

1. **CONSTRUCTION JOINT WITH ROUGHENED SURFACE**

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

3. **RIGHT-OF-WAY WALL**

4. **REINFORCING STEEL**

   - BAR "D" - CENTERED ON WALL
   - SURFACE TREATMENT AS REQUIRED

5. **ALTERNATE SIDES**

6. **OPTIONAL**

   - 3 FEET FOR #4 @ 12" OR #3 @ 18"

7. **BAR "B" @ 4" (TYP.) PLACE AS SHOWN**

8. **TOP OF ROADWAY**

9. **FOOTING WIDTH TRANSITION DETAIL**

10. **ELEVATION**

11. **BENDING DIAGRAM**

12. **JOINT AND CORNER DETAIL**

13. **NOTES**

    - **WALL HT H**
    - **TYPE 6A**
    - **TYPE 6B**
    - **TYPE 6C**
    - **TYPE 6D**

14. **EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**
### 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.

### Typical Section

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

#### Notes:

- **Noise Barrier Wall Type 6SS**
- **Standard Plan D-2.16-00**
- **Sheet 1 of 1 Sheet**
- **Approved for Publication**

**Harold J. Peterfeso**

**11-10-05**

**Washington State Department of Transportation**
NOTES

1. Wall to be designated Noise Barrier Wall Type 7SA, 7SB, 7SC or 7SD. The Contract specifies actual wall designations.

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

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

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

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

NOISE BARRIER WALL
TYPE 7SS

STANDARD PLAN D-2.20-00

APPROVED FOR PUBLICATION

Harold J. Petersen
11-10-05

Washington State Department of Transportation
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

APPROVED FOR PUBLICATION

Harold J. Petersen
11-05
Washington State Department of Transportation

EXPRES AUGUST 21, 2012

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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

JOINT AND CORNER DETAIL
NOTE

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

### DIMENSION TABLE

<table>
<thead>
<tr>
<th>S</th>
<th>A</th>
<th>F</th>
<th>T</th>
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<tr>
<td>#7</td>
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<td>#11</td>
<td>2 1/32&quot;</td>
<td>2 1/32&quot;</td>
<td>2 1/4&quot;</td>
</tr>
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</table>

### DEFORMED REINF. BAR

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

### THREADED REINF. BAR

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

### SLOT FOR ANCHOR BOLT (TYP.)

- ANCHOR BOLT DIAM. = 1/4" X 2 1/2"
- BASE PLATE = T X 10" X 1-1/2"
- AASHTO M 183, GALVANIZED, 3/4" CHAMFER ALL
  CORNERS (EMBEDDED WITH GROUT)

### ELEVATION VIEW

- 6" MIN.
- 2' - 0" MAX.
- TOP OF PILASTER
- LEVEL (TYP.)
- TOP OF ADJACENT PANEL

### BASE PLATE

- BAR "B" AND BASE PLATE DETAILS
- HOLE FOR BAR "B" (TYP.)
  (TAPERED FOR WEDGE HEAD SHOWN)

### SHEAR-KEY DETAIL

- ANCHOR BOLT (TYP.) - ASTM F 1554-04
  GRADE 55 MATERIAL (SEE TABLE FOR DIAMETER)
- HARDENED WASHERS OR PLATE WASHERS 1/4" X
  2 1/4" X 2 1/4"
- AASHTO M 183 (TYP.)

### STANDARD PLAN D-2.36-02

**NOISE BARRIER WALL**

**TYPE 11**

**PRECAST CONCRETE WALL**

ON SHAFT FOUNDATION

**NOTE**

ANCHOR BOLTS, NUTS, WASHERS, BASE PLATE,
AND BAR "B" SHALL HAVE A PROTECTIVE COATING
OF ONE OF THE FOLLOWING: HOT DIPPED
GALVANIZING AASHTO M 232 FOR HARDWARE;
AASHTO M 111 FOR WASHERS AND PLATES;
MECHANICAL GALVANIZING AASHTO M 258
CL. 55, OR ZINC RICH PAINT, PAINT THREADS
AND NUTS AFTER INSTALLATION.
ANGLE POINT - CANTILEVERED

ANGLE POINT - ON SHAFT

ANGLE POINT - ON SHAFT

PRECAST CONCRETE WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL

STANDARD PLAN D-2.36-02

APPLICATION: STATE DESIGN ENGINEER

DATE: 01-06-09

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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.

---

**REINFORCEMENT SECTION**

- **BAR "D" OR "C"**
  - WALL: 2" ID. WITH ROUGHENED SURFACE, OR RIGID POST-TENSIONED DUCT, OR CORROUGATED STEEL PIPE
  - **FILL VOID WITH GROUT**
  - **BAR "E" OR "I"**

**DETAIL A**

- **FOOTING**
- **WALL**
- **GROUT DUCT**
- **GROUT PAD**
- **REACTION SECTION**

**CONTRACT H**

- **3/4" X HOLE FOR ALL "E" AND "G" SPACES AS SHOWN ON TABLES**
- **SEE NOTE 4**

**TYPICAL SECTION**

- **GROUNDED LEVELING COURSE**
- **SET PANEL IMMEDIATELY AFTER PLACING GROUT**

**LEVEL**

- **6" MIN. 2'-0" MAX.**

**BENDING DIAGRAM**

- **NOISE SEALER 1/2" (TYP.)**

**NOISE BARRIER WALL**

- **TYPE 13**

**STANDARD PLAN D-2.42-00**
ANGLE POINT PLAN
ADJUST REINFORCEMENT AS NECESSARY TO ACCOMODATE ANGLE POINT

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)

TRAFFIC SIDE

NOISE WALL

NOISE SEALER 1/2" (TYP.)

BASE PLATE DETAIL

END OF PANEL

DETAIL C

TAPERED HOLE FOR 3/8" BAR (TYP.) - SEE BAR "B" PLATE 1 3/4" x 1 3/4" FOR 1 1/4" ANCHOR BOLT (TYP.)

NOISE SEALER 1/2" (TYP.)

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

SEE SHEAR-KEY DETAIL

BASE PLATE DETAIL

END OF PANEL

DETAIL D

DEFORMED REINFORCEMENT BAR

DEFORMED REINFORCEMENT BAR

R = 4 1/2'

3/8" MIN.

3" MIN.

TRAFFIC SIDE

NOISE BARRIER WALL
TYPE 14
STANDARD PLAN D-2.46-00
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION

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

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
**ANGLE POINT PLAN**

Adjust reinforcement as necessary to accommodate angle point.

**LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)**

- 1 1/2" (TYP.)
- 4" (TYP.)

See Detail C.

**TYPICAL INTERMEDIATE AND END PANEL**

- 1/2" (TYP.)
- 12' 0" x 3" x 3" WASHER (TYP.)
- 1 1/4" ANCHOR BOLT

See Detail C.

**NOISE SEALER**

1/2" (TYP.)

**BASE PLATE DETAIL**

- 1/2" (TYP.)
- 2" (TYP.)
- 2' 0" x 5' 0"
- 1 1/4" ANCHOR BOLT (TYP.)

See Detail C.

**DETAIL C**

- TAPERED HOLE FOR #6 BAR (TYP.) - SEE BAR "B"
- PLATE 1 3/4" x 5" x 1 - 1/2"/5" ASTMI A 36 GALVANIZED EMBEDDED IN GROUT. 3/4" CHAMFER ALL CORNERS.
- SLOT 1 3/8" x 1 3/4" FOR 1 1/4" ANCHOR BOLT (TYP.)

**END OF PANEL**

1 1/4" ANCHOR BOLT (TYP.)

**DETAIL D**

- 3/4" CHAMFER (TYP.)
- 1/2" (TYP.)

See Shear-Key Detail.

**NOISE BARRIER WALL TYPE 14SS**

**STANDARD PLAN D-2.48-00**

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

- BLOCK-OUT 8' LONG - ENCASE BASEPLATE & BLOCK-OUT W/ GROUT AFTER FINAL ALIGNMENT OF WALL PANEL.
- 1/4" x 3" x 3" WASHER (TYP.)
- SET ELEVATION OF LEVELING NUT BEFORE SETTING PANEL.
- 1 1/4" ANCHOR BOLT

**DETAILED COORDINATE DIMENSIONS**

- 3/4" CHAMFER (TYP.)
- 1/2" (TYP.)

See Shear-Key Detail.

Washington State Department of Transportation

Harold J. Peterfeso

11-10-05

State Design Engineer

**PRELIMINARY**

- EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
1. Walls to be designated Noise Barrier Wall Type 16A, 16B, 16C or 16D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. Construction joints in the trench footing shall be spaced at 120 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.
Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

Traffic side

8" or 10" CMU

#5 (TYP.)

Plan view

Typical expansion joint

Detail A

Typical both sides of wall

Backer rod

Polyurethane sealant

Expansion joint filler placed in sash block recesses.

Traffic side

8" CMU

10" CMU

#5 (TYP.)

Plan view

Expansion joint at width step

Bond beam detail

Bond beam grouting limit

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

Noise barrier wall

Type 16

Standard plan D-2.60-00

Effective: August 6, 2012 to August 4, 2013

Approved for publication

Harold J. Peterfeso 11-10-05

State Design Engineer

Washington State Department of Transportation
Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

5" or 10" CMU

Traffic side

8" or 10" CMU

See detail A

Plan view

Typical expansion joint

Bond beam units

Bond beam grouting limit

#5@ 4' - 0" max. (typ.)

Sash block recesses.

8" or 10" CMU

Traffic side

Typical expansion joint at width step

Footing width transition detail

(for locations without footing step)

Note: transverse bars not shown

N = 8" (typ.)

W2

Footing width

W1

3" clr. (typ.)

3'-0' min. (typ.)

1'-0' min. (typ.)

Bar "A" (typ.)
**Plan View**

Typical Expansion Joint

Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

8" or 10" CMU

Traffic Side

See Detail A

**Bond Beam Detail**

Bond beam units

Bond beam grouting limit

#5 @ 4'-0" max. (Typ.)

Traffic Side

1/2" Joint

Polyurethane sealant

**Detail A**

Typical both sides of wall

**Traffic Side**

Plan View

Expansion Joint at Width Step

#5 (Typ.)

8" CMU

10" CMU

Traffic Side

See Detail A

**Masonry Wall on Offset Spread Footing**

Noise Barrier Wall Type 18

Standard Plan D-2.64-01

Sheet 2 of 2 sheets

Approved for Publication

Pasco Bakotich III 01-06-09

State Design Engineer

Washington State Department of Transportation

Effective: August 6, 2012 to August 4, 2013

Note: Transverse bars not shown

Footing Width Transition Detail

3" CLR (Typ.)

1'-0" Min. (Typ.)

Bar "A" (Typ.)
### 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 the 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 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.

### Soil Data

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<tr>
<th>Soil Type</th>
<th>Angle of Internal Friction (°)</th>
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<tr>
<td>D1</td>
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<tr>
<td>D2</td>
<td>38</td>
</tr>
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### Wind Exposure & Velocity

<table>
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<th>Noise Barrier Type</th>
<th>Wind Exposure</th>
<th>Wind Velocity (MPH)</th>
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<tbody>
<tr>
<td>19A</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>19B</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>19C</td>
<td>B2</td>
<td>90</td>
</tr>
<tr>
<td>19D</td>
<td>B2</td>
<td>90</td>
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### Effectiveness

**August 6, 2012 to August 4, 2013**

---

### Diagram and Table

#### Typical Section

**Effectiveness:** AUGUST 6, 2012 TO August 4, 2013
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT.

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" CMU

10" CMU

TRAFFIC SIDE

#5 (TYP.)

PLATE VIEW

TYPICAL EXPANSION JOINT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

135° HOOK (TYP.)

2" CLR

3" - #4 STIRRUP SPACING @ 12"

3 - #4 STIRRUP SPACING @ 6"

SECTION A

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

CONCRETE SHAFT

W/ 3.5 SPIRAL @ 6" PITCH

EVEN MULTIPLES OF 6"

#4 @ 1'-0"

4'-0" MAX

8" OR 10" CMU

1/2" JOINT

POLYURETHANE SEALANT

BACKER ROD

HOTTS PARALLEL TO WALL LAYOUT LINE

MASONRY WALL ON SHAFT W/ GRADE BEAM FOUNDATION

NOISE BARRIER WALL

TYPE 19

STANDARD PLAN D-2.66-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
### Notes
1. Wall to be designated Noise Barrier Wall Type 20A, 20B, 20C, or 20D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
8. The Contract specifies actual foundation requirements D1 or D2.

---

### Table 1: Barrier Exposure Velocity

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<th>Soil Type</th>
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<tr>
<td>D2</td>
<td>38</td>
</tr>
</tbody>
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### Table 2: Tie Spacing

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<th>Bar &quot;A&quot; Size Spacing</th>
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<tbody>
<tr>
<td>#4 6&quot; O.C.</td>
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</tr>
<tr>
<td>#5 6&quot; O.C.</td>
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<tr>
<td>#7, #8, #9, #10 4&quot; O.C.</td>
<td></td>
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</tbody>
</table>

### Diagram

- **Legend:**
  - CMU = Concrete Masonry Unit
  - D-2.68-00 = Standard Plan D-2.68-00
  - Elevation = Tie or Pilaster Spacing L
  - Level (Typ.) = Pilaster Spacing L
  - Expansion Joint = Pilaster Spacing L
  - Final Ground Line = Pilaster Spacing L
  - Top of Wall = Pilaster Spacing L
  - Bottom of Wall = Pilaster Spacing L
  - Construction Joint with Roughened Surface
  - Dowel Embedment Length = 40 x Bar "B" Dia.
  - Two Blocks Min, Three Blocks Max
  - 3'-0" Min.
  - 6'-0" Min.

---

TRAFFIC SIDE

EXPANSION JOINT FILLED WITH NOISE SEALER

WI NOISE SEALER

#5 FULL HEIGHT BAR "C"

04" TYP.

3/4" DIAM x 1'-0" SCHED. 40 PIPE WITH #6 x 30" GRADE 40 WELDED TAIL AS SHOWN LAPPED 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 SPLICES AND AT THE TOP AND BOTTOM OF SHAFT.

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

GROUT ALL CELLS BELOW GRADE SOLID, MIN. TWO COURSES TYP.

BAR "C" @ CENTER OF WALL

GROUT TOP COURSE W GROUT

6" CMU (TYP.)

4" COMPACTED LEVEL CRUSHED GRAVEL BASE

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

MASONRY WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL TYPE 20

STANDARD PLAN D-2.68-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 11-10-05

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO AUGUST 4, 2013

EXPRESS AUGUST 23, 2006
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.
1. All rebar shall have a minimum 1 1/2" cover.

FOR CAST-IN-PLACE WALL W/ TRAFFIC BARRIER
NOISE BARRIER WALL ACCESS DOOR TYPE 2
STANDARD PLAN D-2.82-00

DEPARTMENT OF TRANSPORTATION
Washington State

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

APPROVED FOR PUBLICATION
Harold J. Peterfeso 11-10-05
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
CONCRETE SLAB

SECTION A

CONCRETE SLAB NOT SHOWN

DOOR DETAIL (SEE NOTE 2)

EXPANSION JOINT

BENDING DIAGRAM

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

CONCRETE SLAB

FINISHED GRADE

DOOR FRAME

(SEE NOTE 2)

BAR "A"

BAR "E"

4' CONCRETE SLAB

5' - 0"

4' - 0"

4' - 0"

48' DOOR OPENING

NOTE 3

FOR PRECAST WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 3

STANDARD PLAN D-2.84-00

ISOMETRIC CUTAWAY VIEW

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

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

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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.

CONCRETE SLAB DETAIL

SOLID GROUT CAP
All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.
16 GAGE STEEL DOOR FRAME

HINGE & ANCHOR PIN REINFORCEMENT PLATE (TYP.) - (CHANNEL, WIDTH x 12' x 1/4'), WELDED TO FRAME

5' x 10" S.S. PLATE W/ 10" x 1" DAM DIA. S.S. HANDLE

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

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

GROUND LINE

1/2" TIE BAR

FRONT VIEW

SIDE VIEW

WELD ANCHOR PIN TO HINGE REINFORCEMENT PLATE (TYP.)

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

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

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

ANCHOR BOLT HOLES - 1/2" DAM.

SIDE VIEW

GROUND LINE

1/2" TIE BAR

FRONT VIEW

GROUND LINE

SIDE VIEW

NOISE BARRIER WALL
ACCESS DOOR & FRAME

STANDARD PLAN D-2.92-00

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

APPROVED FOR PUBLICATION

Harold J. Peterfeso 11-10-05

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPRESS AUGUST 23, 2006
NOTES

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

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

PERMANENT GEOSYNTHETIC WALL

STANDARD PLAN D-3.09-00

SHEET 1 OF 4 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 05/17/12

STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
## 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_V (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>
<th>GEOSYNTHETIC WALL TYPES 6 AND 8</th>
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<td>631</td>
<td>300</td>
<td>275</td>
</tr>
<tr>
<td>5</td>
<td>0 to 10</td>
<td>1.25</td>
<td>860</td>
<td>630</td>
<td>590</td>
<td>860</td>
<td>609</td>
<td>575</td>
</tr>
<tr>
<td>5</td>
<td>0 to 10</td>
<td>1.25</td>
<td>760</td>
<td>780</td>
<td>740</td>
<td>760</td>
<td>780</td>
<td>719</td>
</tr>
<tr>
<td>10 &lt; H ≤ 15</td>
<td>0 to 10</td>
<td>1.0</td>
<td>580</td>
<td>620</td>
<td>570</td>
<td>584</td>
<td>586</td>
<td>545</td>
</tr>
<tr>
<td>10 &lt; H ≤ 15</td>
<td>0 to 10</td>
<td>1.25</td>
<td>730</td>
<td>770</td>
<td>710</td>
<td>730</td>
<td>732</td>
<td>681</td>
</tr>
<tr>
<td>10 &lt; H ≤ 15</td>
<td>0 to 10</td>
<td>1.25</td>
<td>950</td>
<td>980</td>
<td>920</td>
<td>950</td>
<td>950</td>
<td>899</td>
</tr>
<tr>
<td>15 &lt; H ≤ 20</td>
<td>0 to 10</td>
<td>1.0</td>
<td>584</td>
<td>572</td>
<td>616</td>
<td>584</td>
<td>626</td>
<td>572</td>
</tr>
<tr>
<td>15 &lt; H ≤ 20</td>
<td>0 to 10</td>
<td>1.25</td>
<td>992</td>
<td>1072</td>
<td>1000</td>
<td>962</td>
<td>1032</td>
<td>976</td>
</tr>
<tr>
<td>15 &lt; H ≤ 20</td>
<td>0 to 10</td>
<td>1.25</td>
<td>730</td>
<td>840</td>
<td>770</td>
<td>730</td>
<td>783</td>
<td>715</td>
</tr>
<tr>
<td>20 &lt; H ≤ 25</td>
<td>0 to 10</td>
<td>1.0</td>
<td>580</td>
<td>720</td>
<td>660</td>
<td>584</td>
<td>667</td>
<td>599</td>
</tr>
<tr>
<td>20 &lt; H ≤ 25</td>
<td>0 to 10</td>
<td>1.25</td>
<td>730</td>
<td>900</td>
<td>820</td>
<td>730</td>
<td>834</td>
<td>749</td>
</tr>
<tr>
<td>20 &lt; H ≤ 25</td>
<td>0 to 10</td>
<td>1.25</td>
<td>1530</td>
<td>1690</td>
<td>1590</td>
<td>1530</td>
<td>1630</td>
<td>1550</td>
</tr>
<tr>
<td>25 &lt; H ≤ 30</td>
<td>0 to 10</td>
<td>1.0</td>
<td>580</td>
<td>780</td>
<td>700</td>
<td>584</td>
<td>708</td>
<td>628</td>
</tr>
<tr>
<td>25 &lt; H ≤ 30</td>
<td>0 to 10</td>
<td>1.25</td>
<td>730</td>
<td>980</td>
<td>870</td>
<td>730</td>
<td>880</td>
<td>782</td>
</tr>
<tr>
<td>25 &lt; H ≤ 30</td>
<td>0 to 10</td>
<td>1.25</td>
<td>1310</td>
<td>1470</td>
<td>1380</td>
<td>1310</td>
<td>1480</td>
<td>1360</td>
</tr>
<tr>
<td>30 &lt; H ≤ 35</td>
<td>0 to 10</td>
<td>1.0</td>
<td>580</td>
<td>830</td>
<td>740</td>
<td>584</td>
<td>749</td>
<td>653</td>
</tr>
<tr>
<td>30 &lt; H ≤ 35</td>
<td>0 to 10</td>
<td>1.25</td>
<td>1510</td>
<td>1740</td>
<td>1630</td>
<td>1512</td>
<td>1680</td>
<td>1584</td>
</tr>
<tr>
<td>30 &lt; H ≤ 35</td>
<td>0 to 10</td>
<td>1.25</td>
<td>1650</td>
<td>1820</td>
<td>1800</td>
<td>1688</td>
<td>1848</td>
<td>1752</td>
</tr>
<tr>
<td>30 &lt; H ≤ 35</td>
<td>0 to 10</td>
<td>1.25</td>
<td>1890</td>
<td>2180</td>
<td>2040</td>
<td>1890</td>
<td>2100</td>
<td>1980</td>
</tr>
<tr>
<td>30 &lt; H ≤ 35</td>
<td>0 to 10</td>
<td>1.25</td>
<td>2110</td>
<td>2400</td>
<td>2250</td>
<td>2110</td>
<td>2310</td>
<td>2190</td>
</tr>
</tbody>
</table>

**NOTE:** See Note 4, sheet 1.
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

PERMANENT GEOSYNTHETIC WALL- EXTERNAL STABILITY DESIGN

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EFFECTI
VE: AUGUST 6,2012 TO

August4,2013

0

TOTAL
WALL
HEIGHT,
H (ft)

5
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15
16
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30
31
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34
35

GEOSYNTHETIC WALL TYPE 2

GEOSYNTHETIC WALL TYPE 1
MAX. FACTORED BEARING STRESS (psf)
L (FT)

SERVICE
1

STRENGTH
1

EXTREME
EVENT I

11
11
11
11
11
11
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13
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15
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18
19
19
20
21
22
23
24
25
25

847
1081
1248
1415
1582
1768
1916
2083
2250
2417
2650
2751
2918
3085
3252
3412
3586
3753
3920
4087
4268
4421
4588
4755
4922
5123
5256
5423
5590
5757
5863

1220
1566
1800
2034
2268
2531
2736
2970
3204
3438
3783
3906
4140
4374
4608
4835
5076
5310
5544
5778
6038
6246
6480
6714
6948
7238
7416
7650
7884
8118
8251

1011
1388
1685
1982
2279
2609
2873
3170
3467
3764
4198
4358
4655
4952
5249
5424
5843
6140
6437
6734
7040
7328
7625
7922
8219
8698
8813
9110
9407
9704
9874

GEOSYNTHETIC WALL TYPE 3

MAX. FACTORED BEARING STRESS (psf)

EXTREME
EVENT II

L (FT)

SERVICE
1

STRENGTH
1

1192
1949
2165
2381
2597
3278
3029
3245
3461
3677
4176
4238
4325
4541
4757
4927
5189
5405
5621
5837
6027
6269
6485
6701
6917
7148
7349
7565
7781
7997
8080

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18
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21
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22
23
24
25
25
26
27
28
29
30
30
31
32
32

1057
1295
1469
1643
1817
2069
2165
2339
2513
2687
2800
3035
3209
3383
3557
3811
3905
4079
4253
4427
4629
4775
4949
5123
5297
5446
5645
5819
5993
6167
6320

1535
1862
2099
2336
2573
2968
3047
3284
3521
3758
3872
4232
4469
4706
4943
5286
5417
5654
5891
6128
6404
6602
6839
7076
7313
7523
7787
8024
8261
8498
8737

GEOSYNTHETIC WALL TYPE 4

MAX. FACTORED BEARING STRESS (psf)

EXTREME
EVENT I

L(FT)

SERVICE
1

STRENGTH
1

1391
1671
1981
2291
2601
3006
3221
3531
3841
4151
4374
4771
5081
5391
5701
5975
6321
6631
6941
7251
7505
7871
8181
8491
8801
9093
9421
9731
10041
10351
10766

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23
23
24
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27
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29
30
31
32
33
34

852
1028
1203
1378
1553
1738
1903
2078
2253
2428
2607
2778
2953
3128
3303
3476
3653
3828
4003
4178
4375
4528
4703
4878
5053
5244
5403
5578
5753
5928
6112

1168
1415
1657
1899
2141
2394
2625
2867
3109
3351
3590
3835
4077
4319
4561
4787
5045
5287
5529
5771
6032
6255
6497
6739
6981
7228
7465
7707
7949
8191
8425

MAX. FACTORED BEARING STRESS (psf)

EXTREME
EVENT I

L (FT)

SERVICE
1

STRENGTH
1

EXTREME
EVENT I

1284
1598
1890
2182
2474
2811
3058
3350
3642
3934
4216
4518
4810
5102
5394
5621
5978
6270
6562
6854
7230
7438
7730
8022
8314
8632
8898
9190
9482
9774
10035

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975
1171
1366
1561
1756
1951
2146
2341
2536
2731
2924
3121
3316
3511
3706
3899
4096
4291
4486
4681
4873
5071
5266
5461
5656
5848
6046
6241
6436
6631
6823

1343
1613
1882
2151
2420
2685
2958
3227
3496
3765
4029
4303
4572
4841
5110
5371
5648
5917
6186
6455
6716
6993
7262
7531
7800
8057
8338
8607
8876
9145
9403

1473
1756
2058
2360
2662
2947
3266
3568
3870
4172
4494
4776
5078
5380
5682
5965
6286
6588
6890
7192
7519
7796
8098
8400
8702
8988
9306
9608
9910
10212
10544

August4,2013

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....1

(INCLUDES SEISMIC DESIGN FOR LARGE EARTHQUAKE: AsS 0.51g)

EFFECTI
VE: AUGUST 6,2012 TO

w
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w
m

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

NOTE: See General Note 5, sheet 1.

PERMANENT GEOSYNTHETIC WALL- EXTERNAL STABILITY DESIGN
(INCLUDES SEISMIC DESIGN FOR LARGE EARTHQUAKE:
TOTAL
WALL
HEIGHT,
H (ft)

5
6
7
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GEOSYNTHETIC WALL TYPE 6

GEOSYNTHETIC WALL TYPE 5
MAX. FACTORED BEARING STRESS (psf)
L (FT)

SERVICE
1

STRENGTH
1

EXTEME
EVENT I

11
11
11
10
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23
24
25
25

847
1105
1273
1441
1609
1768
1945
2113
2281
2449
2711
2785
2953
3121
3289
3522
3625
3793
3961
4129
4325
4465
4633
4801
4969
5123
5305
5473
5641
5809
5918

1220
1607
1843
2079
2315
2531
2787
3023
3259
3495
3884
3967
4203
4439
4675
5015
5147
5383
5619
5855
6131
6327
6563
6799
7035
7238
7507
7743
7979
8215
8341

992
1320
1553
1786
2019
2229
2485
2718
2951
3184
3516
3650
3883
4116
4349
4642
4815
5048
5281
5514
5763
5980
6213
6446
6679
6881
7145
7378
7611
7844
7998

EXTEME
EVENT II

SERVICE
1

STRENGTH
1

1192
1688
2090
2463
2808
3278
3424
3699
3954
4190
4396
4616
4809
4990
5163
5201
5489
5646
5801
5955
6146
6272
6438
6611
6793
7148
7192
7412
7649
7904
8177

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24
25
25

1057
1358
1569
1780
1991
2266
2413
2624
2835
3046
3245
3468
3679
3890
4101
4326
4523
4734
4945
5156
5417
5578
5789
6000
6211
6577
6633
6844
7055
7266
7311

1535
1928
2226
2527
2831
3372
3445
3755
4066
4378
4598
5004
5316
5628
5939
6125
6557
6863
7166
7466
7683
8057
8346
8631
8912
9408
9457
9720
9978
10229
10373

0.20g)

GEOSYNTHETIC WALL TYPE 7

MAX. FACTORED BEARING STRESS (psf)
L (FT)

As~

GEOSYNTHETIC WALL TYPE 8
MAX. FACTORED BEARING STRESS (psf)

MAX. FACTORED BEARING STRESS (psf)

EXTREME
EVENT I

L (FT)

SERVICE
1

STRENGTH
1

1294
1574
1889
2211
2540
2776
3213
3555
3901
4249
4737
4948
5297
5644
5990
6321
6672
7006
7335
7657
7891
8280
8578
8866
9144
9515
9664
9905
10131
10343
10550

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6
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17
18
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19
20
21
21
22
23
24
25
25

852
1107
1302
1497
1692
1924
2082
2277
2472
2667
2886
3057
3252
3447
3642
3848
4032
4227
4422
4617
4810
5007
5202
5397
5592
5773
5982
6177
6372
6567
6735

1168
1536
1809
2082
2355
2692
2901
3174
3447
3720
4037
4266
4539
4812
5085
5383
5631
5904
6177
6450
6729
6996
7269
7542
7815
8075
8361
8634
8907
9180
9421

EXTREME
EVENT I

L(FT)

SERVICE
1

STRENGTH
1

EXTREME
EVENT I

1155
1560
1842
2124
2406
2773
2970
3252
3534
3816
4159
4380
4662
4944
5226
5546
5790
6072
6354
6636
6932
7200
7482
7764
8046
8319
8610
8892
9174
9456
9705

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977
1278
1504
1730
1956
2228
2408
2634
2860
3086
3342
3538
3764
3990
4216
4456
4668
4894
5120
5346
5570
5798
6024
6250
6476
6684
6928
7154
7380
7606
7798

1349
1786
2105
2424
2743
3145
3381
3700
4019
4338
4718
4976
5295
5614
5933
6291
6571
6890
7209
7528
7863
8166
8485
8804
9123
9436
9761
10080
10399
10718
11009

1326
1868
2214
2560
2906
3381
3598
3944
4290
4636
5072
5328
5674
6020
6366
6762
7058
7404
7750
8096
8453
8788
9134
9480
9826
10143
10518
10864
11210
11556
11834

PERMANENT
GEOSYNTHETIC WALL
STANDARD PLAN D-3.09-00
SHEET 3 OF 4 SHEETS
APPROVED FOR PUBLICATION

Pasco Bakotich Ill

.....

05117112
DATE

~· Washington State Department of Transportation

NOTE: See Note 5, sheet 1.

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STATE DESIGN ENGINEER

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013


1. **Set form on completed lift.**

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

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

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

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

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

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

---

**Notes:**

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

2. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.
NOTE:
1. All bars shown on this plan shall be ASTM A706 unless otherwise specified in the Contract.

== EPOXY COATED

CAST-IN-PLACE PERMANENT GEOSYNTHETIC WALL
FASCIA AND FACING

STANDARD PLAN D-3.10-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-16-10

STATE DESIGN ENGINEER

Washington State Department of Transportation
PLANS

FRONT BRIDGE APPROACH SLAB

PLAN

FASCIA TRAFFIC BARRIER ON BRIDGE APPROACH SLAB

TYPICAL SECTION

WITH "EXPANSION JOINT DETAIL", AT 120' BEYOND CENTERLINE FOR FASCIA FINISH JOINTS 1/2". INCREASE COVER AS REQUIRED TO

BACKFILL VOID BEHIND GRADE BEAM. UNLESS OTHERWISE SHOWN, MINIMUM CONCRETE COVER FOR

AS MANDATED IN "D-3.15"" OR "D-3.17" WALL STUDIES. WHEN 1" DIAM. STEEL CABLES ARE USED, THE

CONCRETE PRESSURE ALONG THE DIAM. CABLES IS 500 PSI. USE STAY IN PLACE PRECAST CONCRETE PANELS TO ACCOMMODATE ARCHITECTURAL FINISH JOINTS 1/2".

WHEN CONCRETE COVER IS REQUIRED TO

SPECIFICATION IN "D-3.15" SLAB, THE Sheet2. CONSTRUCTION JOINTS SHALL BE SPACED AT 12" MAX.

CONCRETE BEAM AND GRADE BEAM ARE CAST IN PLACE ON GRADE."D-3.15" SLAB, THE VERTICAL WALLS OF THE PANELS SHALL BE PLACED AT 12" MAX.

MATERIAL SPECIFIED ADJACENT TO THE PANEL. SEE "WALL SECTION WITH STATE BRIDGE FACADE DESIGN MANUAL", PAGE 54.

WALL SECTION WITH STATE BRIDGE FACADE DESIGN MANUAL", PAGE 54.

ENCASE RODS WITH "H" CABLE FENCE, AT GRADE BEAM CENTERLINE. KEY NOTES

FOR REFERENCE, USE 1" DIAM. CABLES. WHEN 1" DIAM. STEEL CABLES ARE USED, THE CONCRETE PRESSURE ALONG THE DIAM. CABLES IS 500 PSI. USE STAY IN PLACE PRECAST CONCRETE PANELS TO ACCOMMODATE ARCHITECTURAL FINISH JOINTS 1/2".

CONCRETE BEAM AND GRADE BEAM ARE CAST IN PLACE ON GRADE. "D-3.15" SLAB, THE VERTICAL WALLS OF THE PANELS SHALL BE PLACED AT 12" MAX.

MATERIAL SPECIFIED ADJACENT TO THE PANEL. SEE "WALL SECTION WITH STATE BRIDGE FACADE DESIGN MANUAL", PAGE 54.

ENCASE RODS WITH "H" CABLE FENCE, AT GRADE BEAM CENTERLINE. KEY NOTES

FOR REFERENCE, USE 1" DIAM. CABLES. WHEN 1" DIAM. STEEL CABLES ARE USED, THE CONCRETE PRESSURE ALONG THE DIAM. CABLES IS 500 PSI. USE STAY IN PLACE PRECAST CONCRETE PANELS TO ACCOMMODATE ARCHITECTURAL FINISH JOINTS 1/2".

CONCRETE BEAM AND GRADE BEAM ARE CAST IN PLACE ON GRADE. "D-3.15" SLAB, THE VERTICAL WALLS OF THE PANELS SHALL BE PLACED AT 12" MAX.

MATERIAL SPECIFIED ADJACENT TO THE PANEL. SEE "WALL SECTION WITH STATE BRIDGE FACADE DESIGN MANUAL", PAGE 54.

ENCASE RODS WITH "H" CABLE FENCE, AT GRADE BEAM CENTERLINE. KEY NOTES

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CONCRETE BEAM AND GRADE BEAM ARE CAST IN PLACE ON GRADE. "D-3.15" SLAB, THE VERTICAL WALLS OF THE PANELS SHALL BE PLACED AT 12" MAX.
Note:

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

GRAVEL BACKFILL FOR WALLS 3'' DIA WEEP HOLE

CONDITION A

GRAVEL BACKFILL FOR DRAINAGE UNDERDRAIN PIPE

CONDITION B

Cement concrete grout WHERE SHOWN ON PLANS

Native Material

ALTERNATE DETAIL

TYPICAL FOR CONSTRUCTION WITH SHORING

CONDITION A OR CONDITION B WITH GEOTEXTILE

CONSTRUCTION GEOTEXTILE FOR UNDERGROUND DRAINAGE, MODERATE SURVIVABILITY.

GRAVEL BACKFILL FOR DRAINS UNDERDRAIN PIPE

NOTES

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

UNIT A - 2 cell gabion = 6'
Unit B - 3 cell gabion = 5'
Unit C - 4 cell gabion = 10'

CROSS-CONNECTING WIRE PLACEMENT, END CELLS

FASTENING ADJACENT BASKETS

TWISTED FABRIC

SIX INDEPENDENT WIRE ENCOMPASSED

WELDED FABRIC

THREE VERTICAL AND TWO HORIZONTAL WIRE ENCOMPASSED

LACING DETAIL

Double loop
Single loop
Double loop

Gabions

Standard Plan D-6

Effective: August 6, 2012 to August 4, 2013

Clifford E. Mansfield
Deputy State Design Engineer

Washington State Department of Transportation

Olympia, Washington

Expires July 4, 1999

Approved for Publication

6/19/98
**VERTICAL FACE WALL DESIGN**

WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

**NOTES**

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

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

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

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

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

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


---

**TYPICAL SECTION**

- **OFFSET** - SET TOP OF WALL BACK
  
<table>
<thead>
<tr>
<th>WALL HEIGHT (in)</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤16&quot;</td>
<td>6</td>
</tr>
<tr>
<td>16 ≤ 23</td>
<td>7</td>
</tr>
<tr>
<td>23 ≤ 35</td>
<td>9</td>
</tr>
<tr>
<td>35 ≤ 50</td>
<td>11</td>
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<td>5</td>
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<td>7</td>
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<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

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

1. If traffic barrier is used, add 0.100 CY of concrete class 4000 for barrier alternate 1.
   Add 0.123 CY of concrete class 4000 for barrier alternate 2. See standard plan D-15-10.

2. Add 28 Lbf of reinforcing steel for barrier alternate 1 or 19 Lbf of reinforcing steel

### VERTICAL FACE WALL DESIGN WITH A 250 PSI SURFACECHARGE OR TRAFFIC BARRIER

<table>
<thead>
<tr>
<th>WALL</th>
<th>HT</th>
<th>N</th>
<th>ANCHOR BAR</th>
<th>BAR N</th>
<th>MIN. SPICE</th>
<th>BAR RADIUS</th>
<th>BAR</th>
<th>MIN. SPICE</th>
<th>BAR RADIUS</th>
<th>MATERIAL</th>
<th>QTY</th>
</tr>
</thead>
</table>

**APPROVED FOR PUBLICATION**

Washinngton State Department of Transportation

**PASCO BAKOTICH III**

12-02-08

**STANDARD PLAN D-10.10-01**

Sheet 2 of 2

**REINFORCED CONCRETE RETAINING WALL TYPE 1 AND 1SW**

**MAXIMUM SOIL PRESSURE (PSF)**

**CONC. OF STEEL FOR BARRIER**

---

The page contains a table with various columns and rows, representing different specifications and measurements for a project, likely related to construction or engineering. The table includes dimensions, bar sizes, reinforcement notes, and other relevant details. The page also contains a diagram of a face wall design, illustrating various components and their respective measurements. There are references to effective dates, such as "EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013." The text is dense with technical information, making it challenging to extract all details without visual inspection.
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, the concrete in the table column "Material Quantity" shall be increased by \( 0.003 \times H \) CY/LF.

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

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


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

Pasco Bakotich III 12-02-08

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

---

**TYPICAL SECTION**

1. OFFSET - SET TOP OF WALL BACK
   - H ≥ 27" OFFSET = 10" H ≥ 26" OFFSET (inches) = H/10 - 2

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

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

4. CONSTRUCTION JOINTS IN FOOTING

---

**SPLIT ELEVATION VIEW**

(SHOWING SEPARATE REBAR LAYERS)

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**BAR #4**

<table>
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<tr>
<th>LOCATION</th>
<th>WALL HEIGHT</th>
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<td>TOP OF FOOTING</td>
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<td>5</td>
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<tr>
<td></td>
<td>13 ≤ 19&quot;</td>
<td>6</td>
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<tr>
<td></td>
<td>17 ≤ 22&quot;</td>
<td>7</td>
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<td></td>
<td>23 ≤ 25&quot;</td>
<td>9</td>
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<tr>
<td></td>
<td>27 ≤ 29&quot;</td>
<td>11</td>
</tr>
<tr>
<td>BOTTOM OF FOOTING</td>
<td>≤ 12&quot;</td>
<td>5</td>
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<td>13 ≤ 19&quot;</td>
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<td>9</td>
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<tr>
<td></td>
<td>27 ≤ 30&quot;</td>
<td>11</td>
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### FOOTING REINFORCEMENT

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<th>B</th>
<th>C</th>
<th>D</th>
<th>LENGTH</th>
<th>A</th>
<th>SIZE</th>
<th>SPA.</th>
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<th>размеры и длины</th>
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<th>SIZE</th>
<th>SPA.</th>
<th>LENGTH</th>
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<th>SIZE</th>
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<th>LENGTH</th>
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<tr>
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<td>6'-9&quot;</td>
<td>3'-0&quot;</td>
<td>1'-0&quot;</td>
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<td>2'-7&quot;</td>
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<td>6'-9&quot;</td>
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</table>

### STEEL REINFORCEMENT

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**MAXIMUM SOIL PRESSURE (PSF)**

<table>
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<th>EXTREME</th>
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<td>1463</td>
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<td>2388</td>
<td>3014</td>
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### REINFORCEMENT NOTES

1. **IF TRAFFIC BARRIER IS USED, ADD 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1. ADD 0.102 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10**

2. **ADD 16 LB/FT OF REINFORCING STEEL FOR BARRIER ALTERNATE 1 OR 23 LB/FT OF REINFORCING STEEL FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10**
# Vertical Face Wall Design with 2:1 Backslope

## Footing Reinforcement

- **BARS**: #6, #6, and #6
- **Sizes**: 6" 6" 6" 6" 6" 6" 6" 6" 6" 6"
- **Spans**: 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0"
- **Materials**: #9 1' 1' 1' 1' 1' 1' 1' 1' 1' 1'

## Stem Reinforcement

- **BARS**: #10, #10, and #10
- **Sizes**: 6" 7" 7" 7" 7" 7" 7" 7" 7" 7"
- **Spans**: 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0" 20'-0"
- **Materials**: #11 1' 1' 1' 1' 1' 1' 1' 1' 1' 1'

## Drawn By: Bill Belyens

**Effective: August 6, 2012 to August 4, 2013**
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 2 : 1 BACKSLOPE**

**REINFORCED CONCRETE RETAINING WALL TYPE 5**

**STANDARD PLAN D-10.30-00**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 07-08-08

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
**REINFORCED CONCRETE RETAINING WALL**

**TYPE 5**

**STANDARD PLAN D-10.30-06**

**WITH 2' BACKSLOPE**

**DIMENSIONS**

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**FOOTING REINFORCEMENT**

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**STEM REINFORCEMENT**

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**WALL DIMENSIONS**

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**NOTE:** These plans are not for local engineering jurisdiction. Not for electronic duplication. The original, signed by the designer, and stamped for publication is kept by the Washington State Department of Transportation. A copy may be obtained upon request.
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.
FRONT BACK

FACE OF WALL

10 1/2" 8' 6" 3/4" - GROUT

250 PSF EQUIVALENT LIVE LOAD
SURCHARGE WHEN SPECIFIED IN CONTRACT

CEMENT CONC. GUTTER
(CL. 3000, 4" THICK)

1 1/2" CLR. 6" MAX.

CONSTRUCTION JOINT WITH
ROUGHENED SURFACE

1 1/2" CLR.

48' WALL SECTION
BETWEEN JOINTS

48' WALL SECTION
BETWEEN JOINTS

3" CLR.

48' WALL SECTION
BETWEEN JOINTS

24" MIN. VERTICAL CURVE AT
ALL ANGLE OR (BREAK) POINTS
IN TOP OF WALL PROFILE

1 1/2" CLR. MIN.

3" CLR.

1/2" CLR.

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

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

SHEET 1 OF 2 SHEETS
APPROVED FOR PUBLICATION
Pasco Bakotich III 12-02-08
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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**FOOTING REINFORCEMENT**

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**REINFORCED CONCRETE**

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**DESIGN ENGINEER**

Pasco Bakotich

**DATE**

12/02/08

**APPROVED FOR PUBLICATION**

Sheet 7 of 2 Sheets

**NOTES**

- The plan is not to be scaled or reproduced for use in construction without written permission from the Washington State Department of Transportation.
- The plan is not to be used for public distribution.
- The plan is not to be used for any purpose other than its intended purpose.

**EFFECTIVE:**

AUGUST 6, 2012 TO August 4, 2013
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.
### EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

#### WALL HT H

| WALL HT H | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|-----------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| B   | 8' | 9' | 10' | 11' | 12' | 13' | 14' | 15' | 16' | 17' | 18' | 19' | 20' | 21' | 22' | 23' | 24' | 25' | 26' | 27' | 28' | 29' | 30' | 31' | 32' | 33' | 34' |
| D   | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' | 3' |
| A   | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' |
| LENGTH | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' | 36' |

#### FOOTING REINFORCEMENT

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#### REINFORCEMENT NOTES

1. **IF TRAFFIC BARRIER IS USED, ADD 0.110 CFY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1. ADD 0.120 CYFY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10**

2. **ADD 15 LB/FL. OF REINFORCING STEEL FOR BARRIER ALTERNATE 1 OR 23 LB/FL. 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**

#### SHEET 2 OF 2 SHEETS

- **APPROVED FOR PUBLICATION**
- **Pasco Bakotich III**
- **12-02-08**

**STATE DESIGN OFFICE**

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**N/A**: Not Applicable

**CONCRETE STEELS**: #5 & #6

**CONCRETE**: #6 & #7
TRAFFIC BARRIER DETAILS
FOR REINFORCED CONCRETE RETAINING WALLS

STANDARD PLAN D-15.10-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakotich III 12-02-08
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

TOP OF ROADWAY

PLAN

SECTION A

ELEVATION

SECTION B

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

TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS

STANDARD PLAN D-15.10-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakotich III 12-02-08
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
REINFORCING STEEL BENDING DIAGRAM

USED WITH SLOPED FACE RETAINING WALL

USED WITH VERTICAL FACE RETAINING WALL

CONSTRUCTION JOINT – LEVEL TRANSVERSE WITH ROUGHENED SURFACE

USED WITH SLOPED FACE RETAINING WALL

USED WITH VERTICAL FACE 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

1 1/2"x1/4"
1/4" TO 1/2" DEEP IRREGULAR FRACTURE

R = 1/4"

1"x1/4"
TRAFFIC BARRIER DETAILS FOR REINFORCED CONCRETE RETAINING WALLS
STANDARD PLAN D-15.20-02

ELEVATION

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

SINGLE SLOPE TRAFFIC BARRIER ON RETAINING WALL

BEAM GUARDRAIL TRANSITION TYPE 20 CONNECTION

PERSPECTIVE VIEW

BEAM GUARDRAIL TRANSITION TYPE 21 CONNECTION

PERSPECTIVE VIEW

CONSTRUCTION JOINT = LEVEL TRANSVERSE WITH ROUGHENED SURFACE
CONSTRUCTION JOINT – LEVEL TRANSVERSE WITH ROUGHENED SURFACE

NOTE
SEE ELEVATION FOR LAP SPlice REQUIREMENTS

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

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

PLAN VIEW
FRACTURED FIN FINISH DETAIL

DUMMY JOINT DETAIL

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

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

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

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

DRAWN BY: BILL BERGEND
NOTE
FOR GUARDRAIL DETAILS NOT SHOWN - SEE BEAM GUARDRAIL TYPE 21, STANDARD PLAN C-25.20

REINFORCING STEEL BENDING DIAGRAM

CONSTRUCTION JOINT - LEVEL TRANSVERSE WITH ROUGHENED SURFACE

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

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

SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION
Pasco Bakotic III 12-02-08
STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BENSON

DATE: 09-03-08

120213

 Pasco Bakotic III 12-02-08
 STATE DESIGN ENGINEER
 Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL BENSON

DATE: 09-03-08

120213
1. All numerals are approx. 3 1/4" wide except numeral "11" which is approx. 5/8" wide.
2. Spacing between the numeral "11" 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.
1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
3. All pilings shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, ungalvanized.
6. Each deck plate shall be nailed to each stringer with two 1" spikes, number 1 or larger.
7. In 17 spans, stringers shall be #1 or better. In 15 spans, stringers shall be #2 or better.
8. Overlay thickness must be sufficient to cover bolts.Us
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<th>PERIMETER (in.)</th>
<th>UNIT WEIGHT (lbs./ft.)</th>
<th>AREA (in.²)</th>
<th>MOMENT OF INERTIA (in.⁴)</th>
<th>RADIUS OF GYRATION (in.)</th>
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<td>256</td>
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<td>18</td>
<td>64.7</td>
<td>247</td>
<td>226</td>
<td>4067</td>
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<td>20</td>
<td>66.3</td>
<td>364</td>
<td>331</td>
<td>8758</td>
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<td>24</td>
<td>79.5</td>
<td>524</td>
<td>477</td>
<td>18161</td>
<td>6.2</td>
<td>13</td>
</tr>
</tbody>
</table>

### SQUARE

- **Diameter:** 12, 14, 16 (in.)
- **Perimeter:** 48.0, 55.0, 64.0 (in.)
- **Unit Weight:** 158, 215, 281 (lbs./ft.)
- **Area:** 144, 196, 256 (in.²)
- **Moment of Inertia:** 1728, 3201, 5451 (in.⁴)
- **Radius of Gyration:** 3.5, 4.0, 4.6 (in.)
- **Number of Strands:** 4, 6, 7

### OCTAGONAL

- **Diameter:** 18, 20, 24 (in.)
- **Perimeter:** 64.7, 66.3, 79.5 (in.)
- **Unit Weight:** 247, 331, 477 (lbs./ft.)
- **Area:** 226, 331, 477 (in.²)
- **Moment of Inertia:** 4067, 8758, 18161 (in.⁴)
- **Radius of Gyration:** 4.2, 5.1, 6.2 (in.)
- **Number of Strands:** 7, 9, 13

#### SPIRAL REINFORCEMENT

<table>
<thead>
<tr>
<th>Deformed Bar</th>
<th>Plain Steel Bar</th>
<th>Cold Drawn Wire</th>
<th>Deformed Wire</th>
<th>Weld Dimensions</th>
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<tr>
<td>AASHTO M 31</td>
<td>AASHTO M 31 OR 80</td>
<td>AASHTO M 32</td>
<td>AASHTO M 225</td>
<td>B E LENGTH (L)</td>
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<td>W 20</td>
<td>D 20</td>
<td>6 3 4&quot;</td>
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<td>W 31</td>
<td>D 31</td>
<td>8 5 6&quot;</td>
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**FRAGMENTS:**

- See Spiral Welded Lap Splice Details
- See Table for Weld Dimensions

**NOTES:**

1. Place lifting loops at the lifting points shown in the PILE HANDLING DIAGRAM, Standard Plan E-4a, for the case stated in the contract.
2. Spirals shall be spliced either by lapping one full turn and bending the end of the spiral to a 135° seismic hook, by welding, or by the use of a mechanical connector that develops 125% of the minimum yield strength of the spiral. Welding shall meet the requirements of Standard Specification 6-02.3.24(E).
3. All prestressing strands are 1/2" or 0.6" diameter (d<sub>p</sub>). Grade 270, uncoated strands, AASHTO M203, jack to 0.75 Fp max.
4. Strength of concrete shall be 5.0 ksi at release and 7.0 ksi at final.
5. 2 1/2" cover if pile is exposed to salt water.
1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.

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

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

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

5. The length of the formed or drilled hole shall allow for potential cut-off and full development length of the steel reinforcement. The holes must be roughened and filled with epoxy resin.

6. Expose the spiral reinforcement at the pile head and splice with new spiral in accordance with Standard Plan E-4, Note 2.

7. For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E4.

8. Piles stored on the ground should be bunked on level dunnage at no more than 20' on center, with a maximum overhang of 10'.
DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

FACE OF CURB
MATCH ROADWAY SLOPE
ROADWAY

1/2" R. 

VARIES 12" TO 24" 
VARIES 10" TO 22" 
(SEE CONTRACT)

1 1/2" 

FACE OF CURB
MATCH ROADWAY SLOPE
ROADWAY

1/2" R. 

NOTE:


CEMENT CONCRETE TRAFFIC CURB AND GUTTER

CEMENT CONCRETE PEDESTRIAN CURB

AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

CEMENT CONCRETE PEDESTRIAN CURB

AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

NOTE:


MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE TRAFFIC CURB

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB
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.
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-2010.

7. For extruded curb details, see Standard Plan F-10.42.
TYPE 1
(HOT MIX ASPHALT)

TYPE 2
(HOT MIX ASPHALT)

TYPE 3
(HOT MIX ASPHALT)

TYPE 4
(CEMENT CONCRETE)

TYPE 5
(CEMENT CONCRETE)

TYPE 6
(CEMENT CONCRETE)

NOTE:
Joints may be formed during installation using a rigid divider or sawcut after concrete cures to minimum strength.

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

CEMENT CONCRETE EXTRUDED CURB

#3 BAR

10'-0" BETWEEN JOINTS (TYP.)
TOP VIEW
INSIDE CORNER BLOCK

TOP VIEW
OUTSIDE CORNER BLOCK

TOP VIEW
18" RADIUS BLOCK

TOP VIEW
30" RADIUS BLOCK

TYPICAL OF ALL END VIEW

#3 REBAR – REQUIRED ONLY IN TANGENT BLOCK, WHEN LENGTH EXCEEDS 30" (1 1/2" CLR. BOTH ENDS)

ISOMETRIC VIEW TANGENT BLOCK

ISOMETRIC VIEWS

INSIDE CORNER BLOCK

18" RADIUS BLOCK

OUTSIDE CORNER BLOCK

30" RADIUS BLOCK

PRECAST CONCRETE SLOPED MOUNTABLE CURB
STANDARD PLAN F-10.62-01

WASHINGTON PROJECT NO. 34767
STATE DESIGN ENGINEER
Pasco Bakotich III
EXPIRES JUNE 18, 2008
APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 2 SHEETS

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

PRECAST CONCRETE SLOPED MOUNTABLE CURB
STANDARD PLAN F-10.62-01

WASHINGTON PROJECT NO. 34767
STATE DESIGN ENGINEER
Pasco Bakotich III
EXPIRES JUNE 18, 2008
APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 2 SHEETS

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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.
NOTE
The dual faced curb may be constructed by using two precast concrete sloped mountable curbs (longitudinal halves) so long as the installation is consistent with the dimensions shown in the plan.

ISOMETRIC VIEW
PRECAST CONCRETE
DUAL FACED
SLOPED MOUNTABLE CURB
STANDARD PLAN F-10.64-02
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

Pasco Bakotich III 07-03-08
STATE DESIGN ENGINEER
WASHTINGTON STATE DEPARTMENT OF TRANSPORTATION
APPROVED FOR PUBLICATION
PREPARED BY WASH. DEPT. OF TRANSP., DIV. OF HIGHWAYS
EXPIRES JUNE 30, 2008
NOTE

1. Four feet of the sidewalk width shall be the minimum pedestrian accessible route free of vertical and horizontal obstructions. Gratings, access covers, junction boxes, cable vaults, pull boxes and other appurtenances within the sidewalk must have slip resistant surfaces and be flush with surface and match grade of the sidewalk.
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, Pedestrian Curb or Sidewalks.
7. The curb ramp maximum running slope shall not require the ramp length to exceed 15 feet to avoid chosing 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.

LEGEND
SLOPE IN EITHER DIRECTION

PARALLEL CURB RAMP
STANDARD PLAN F-40.12-01
APPROVED FOR PUBLICATION
**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, 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.


---

**PLAN VIEW**

**TYPE COMBINATION**

**WITH BUFFER**

- CEMENT CONCRETE PEDESTRIAN CURB - SEE NOTE 4
- CEMENT CONCRETE CURB & GUTTER - SEE NOTE 4
- DETECTABLE WARNING SURFACE SEE - STANDARD PLAN F-46.10
- 3/8" EXPANSION JOINT (TYP.) - SEE STANDARD PLAN F-30.10
- BUFFER STRIP (TYP.) - SEE CONTRACT PLANS

---

**SECTION A**

- CURB RAMP
- SEE CONTRACT PLANS - 4' - 0" MIN.
- LANDING
- CURB RAMP
- MATCH SIDEWALK SEE CONTRACT PLANS - 4' - 0" MIN.
- CEMENT CONCRETE PEDESTRIAN CURB - SEE NOTE 4

---

**SECTION B**

- CURB RAMP
- SEE CONTRACT PLANS - 4' - 0" MIN.
- CEMENT CONCRETE PEDESTRIAN CURB - SEE NOTE 4 (TYP.)
- LANDING
- CURB RAMP
- BUFFER STRIP
- CEMENT CONCRETE CURB & GUTTER - SEE NOTE 6

---

**SECTION C**

- CURB RAMP
- SEE CONTRACT PLANS - 4' - 0" MIN.
- CURB RAMP
- SEE CONTRACT PLANS - 3' - 0" MIN.
- TOP OF ROADWAY
- CURB RAMP
- SEE CONTRACT PLANS - 4' - 0" MIN.
- CURB RAMP
- SEE CONTRACT PLANS - 4' - 0" MIN.
- CURB RAMP
- SEE CONTRACT PLANS - 4' - 0" MIN.
- CURB RAMP
- SEE CONTRACT PLANS - 4' - 0" MIN.

---

**CURB RADIUS DETAIL 1**

- CEMENT CONCRETE CURB AND GUTTER - SEE NOTE 4
- DETECTABLE WARNING SURFACE SEE - STANDARD PLAN F-46.10
- 3' R. (TYP.)
- DEPRESSED CURB & GUTTER
- DEPRESSED CURB & GUTTER

---

**ISOMETRIC VIEW**

**TYPE COMBINATION**

**PAY LIMIT = SEE NOTE 6**

---

**COMBINATION CURB RAMP**

**STANDARD PLAN F-40.14-01**

---

**APPROVED FOR PUBLICATION**

Washington State Department of Transportation

Pasco Bakotich III 06-03-10

STATE DESIGN ENGINEER
1. Provide a separate curb ramp for each marked or unmarked crosswalk. Curb ramp location shall be placed within the width of the associated crosswalk, 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.

4. See the Contract plans for the curb design specified. See Standard Plan F-10.12 for Curb, Curb and Gutter, and Pedestrian Curb details.


6. The Bid Item “Cement Concrete Curb Ramp Type ___” does not include the adjacent Curb, Curb and Gutter, Pedestrian Curb or Sidewalk.

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


NOTES

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

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

3. Do not place gratings, junction boxes, access covers, or other appurtenances in front of the curb ramp or on any part of the curb ramp or landing.

4. See the Contract plans for the curb design specified. See Standard Plan F-10.12 for Curb, Curb and Gutter, and Pedestrian Curb details.


6. The Bid Item “Cement Concrete Curb Ramp Type ___” does not include the adjacent Curb, Curb and Gutter, Pedestrian Curb or Sidewalk.

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

NOTE:

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, and Pedestrian Curb details.


7. The bid item “Cement Concrete Curb Ramp Type…” does not include the adjacent Curb or (Curb and Gutter). See Standard Plan F-30.10 for Curb or Curb and Gutter, 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.


STATE OF WASHINGTON
Washington State Department of Transportation

PLAN VIEW

TYPE SINGLE DIRECTION A

PLAN VIEW

TYPE SINGLE DIRECTION B

SECTION A

SECTION B

DETAIL 1

SINGLE DIRECTION CURB RAMP

STANDARD PLAN F-40.16-01

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-03-10

STATE DESIGN ENGINEER

June 19, 2010

Washington State Department of Transportation
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.
1. Attach the Milepost Sign Panel to a timber sign post using two 3/8" diameter lag bolts, with washers; see Standard Plan G-22.10. For post and attachment details on steel sign posts, see Standard Plan G-24.5.0, Type ST-1.

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

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

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

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

NOTES

TYPICAL INSTALLATION FOR SINGLE-FACED SIGNS

TYPICAL INSTALLATION FOR DOUBLE-FACED SIGNS

SUPPLEMENTAL PLAQUE – MOUNTING DETAIL

SEE NOTE 2
NOTE:

1. Refer to the Sign Specification Sheet of the Contract for the ‘V’ and ‘W’ distances.

2. The minimum vertical distance from the bottom of the sign to the ground shall not be less than 7” for signs located within the Design Clear Zone.
NOTES

1. Notch is only required with multiple post installations.

2. 6x10, 8x10, and 8x12 Timber Sign Posts cannot be made breakaway and do not have holes or notches. These posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

3. Signs with a width less than 12 feet and supported on three 6x6 or 6x8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

4. Signs with a width less than 17 feet and supported on four 6x6 or 6x8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.


6. For 6x6 posts and larger, 7 feet minimum spacing is required between posts.

POST INSTALLATION TABLE

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<tr>
<th>POST SIZE (NOM.)</th>
<th>DEPTH</th>
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<th>NOTCH DIAMETER</th>
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<td>NOT REQUIRED</td>
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<td>4’-0”</td>
<td>1”-1/2”</td>
<td>1”-1/2”</td>
</tr>
<tr>
<td>6x8</td>
<td>5’-0”</td>
<td>SEE NOTE 3 &amp; 4</td>
<td>SEE NOTE 3 &amp; 4</td>
</tr>
<tr>
<td>8x8</td>
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<td>SEE NOTE 3 &amp; 4</td>
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</tr>
<tr>
<td>8x12</td>
<td>7’-0”</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
</tbody>
</table>

FINISHED GROUND LINE

SIGN PANEL

SIGN BRACE - WHEN REQUIRED
(Std. Plan G-00.10)

TIMBER SIGN POST

SIGN POST - SEE STD. SPEC. 6-28

SIGN POST - SEE STD. PLAN G-20.10

NOTE 1

POST INSTALLATION TABLE

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<thead>
<tr>
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<td>SEE NOTE 2</td>
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</table>

FINISHED GROUND LINE

SIGN PANEL

SIGN BRACE - WHEN REQUIRED
(Std. Plan G-00.10)

TIMBER SIGN POST

SIGN POST - SEE STD. SPEC. 6-28

SIGN POST - SEE STD. PLAN G-20.10

NOTE 1
MAJOR AND SECONDARY SIGN INSTALLATION

SIGN POST (TYP.)

MAJOR SIGN

WINDBEAM (TYP.)

WIDTH SIGN

POST DIMENSION

STEEL OR ALUMINUM

ANGLE (TYP.)

WINDBEAM

SIGN PANEL

POST CLIP (TYP.)

STEEL OR ALUMINUM

ANGLE (TYP.)

WINDBEAM

CONCRETE FOUNDATION SLEEVE DETAIL

TO BE USED WHEN PLACING TIMBER POST IN A PAVED AREA

APPROVED FOR PUBLICATION

Pasco Bakotich III
07-03-08

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

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

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

4. Mounting brackets with steel straps shall be the stainless steel one bolt, flared leg bracket and 3/4" wide, 0.030" thick strap "Band-it" products or an approved equal.
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.

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

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

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

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

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

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

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

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pre-tightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.
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.

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

NOTES

1. Per TRANSPO: 5’ to 8” square steel posts are acceptable and require type TP-B foundations.


KEY NOTES

- Foundation depths 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-25.10-03

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION

Pasco Bakitch III 03-15-12
State Design Engineer
Washington State Department of Transportation
**Notes**

1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/4" wide and 0.030" thick.

2. All signs installed on mast arms or standards (poles) require windbeams. All signs shall be installed with horizontal edges level. A skewed windbeam is required only when the sign is mounted within 12" of the mast arm base (see Detail "A").

3. The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3 feet.

---

**TYPICAL MAST ARM INSTALLATION**

**UNIVERSAL CHANNEL CLAMP**

**STEEL STRAP**

**WINDBEAM**

**BACK OF SIGN PANEL**

---

**SIGNAL INSTALLATION ON SIGNAL AND LIGHT STANDARDS**

**STANDARD PLAN G-30.10-01**

Sheet 1 of 2 sheets

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-16-11

Washington State Department of Transportation

Effective: August 6, 2012 to August 4, 2013
NOTES

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

2. Sign braces are only installed when specified in the contract.

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

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type 3 or 4 sheeting.
**SIGN BRACE DIMENSIONS**

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

**SIGN POST TYPE**

<table>
<thead>
<tr>
<th>4X6 OR 6X8 TIMBER POST</th>
<th>5 1/2&quot;</th>
<th>7 1/2&quot;</th>
<th>4 3/4&quot;</th>
<th>2 1/2&quot; SQUARE TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6X8 TIMBER POST</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3&quot; DIAM. STEEL PIPE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/2&quot; SQUARE TUBE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SIGNAL BRACE DETAIL**

- **YIELD SIGN**
- **SMALL RECTANGULAR SIGN**
- **LARGE RECTANGULAR SIGN**
- **DIAMOND-SHAPED SIGN**
- **RAILROAD WARNING SIGN**
- **STOP SIGN**
- **SCHOOL ZONE SIGN**
- **NO PASSING ZONE SIGN**

**SIGN BRACE PLACEMENT**

**STANDARD PLAN G-50.10-00**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 11-8-07

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
**MATERIAL SPECIFICATIONS**

| PIPE (CHORDS, DIAGONALS, STRUTS AND POSTS) | ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR 500 GRADE 8 |
| PLATES | ASTM A 36 |
| SHAPES | ASTM A 36 ASTM A 992 |
| BOLTS, NUTS, & WASHERS | STD. SPEC. 9-06.5(3) |
| PIPE, PLATE & SHAPE GALVANIZING | AASHTO M 111 |
| FASTENER GALVANIZING | AASHTO M 232 |

**PIPE SIZES & WALL THICKNESS**

| TOTAL SIGN AREA (X TIMES Y) (FT²) | D.O. WALL |
| 50 OR LESS | 18" 0.438" |
| 50 TO 100 | 18" 0.438" |
| 100+ TO 150 | 24" 0.375" |
| 150+ TO 200 | 24" 0.375" |
| 200+ TO 250 | 24" 0.375" |
| 250+ TO 300 | 24" 0.375" |
| 300+ TO 350 | 24" 0.438" |
| 350+ TO 400 | 24" 0.500" |

**CHORD SELECTION**

| SIGN AREA (X TIMES Y) (FT²) | CHORD SIZE |
| 50 OR LESS | 2" 0.154" |
| 50 TO 100 | 2" 0.215" |
| 100+ TO 150 | 2 1/2" 0.203" |
| 150+ TO 200 | 3" 0.210" |

**NOTES**

1. Vertical and horizontal clearance requirements shall be as shown on the contract plans.
2. No post splices permitted in lower third of height, nor closer than 3' - 0" to bottom chord, except as otherwise noted. No chord shop splices permitted in first two-thirds of the span, except as otherwise noted. A maximum of two splices are permitted in the post. For post or chord shop splice details, see Standard Plan G-70.10.
3. The back-up plates or rings for all full penetration welds shall be welded continuously to the joined pieces. This can be done by either a continuous fillet weld on the back side of the piece, or by a continuous weld in the root of the full penetration weld.
4. All bolt holes shall be drilled and the diameter shall be 1/16" larger than the nominal bolt diameter, except as noted.
5. The design and analysis of the structures has been done in accordance with AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals Dated 2001, using 50 MPH wind velocity and fatigue category - I.
6. Adjust post alignment in plane normal to roadway centerline by means of leveling nuts located below base plate to maintain upward slope in cantilever arm(s). Tighten anchor nuts above base plate in accordance with Standard Specification 6-03.3(33).
7. Variable Message Signs (VMS) exceeding 700 lbs. and/or 200 sq ft shall not be installed on cantilever structure.
**ELEVATION**

**DOUBLE CANTILEVER SIGN STRUCTURE**

- **PANEL LENGTH (4'-3" MAX.)** TO BE CONSTANT THROUGHOUT SPAN
- **VERTICAL "FAR" TRUSS DIAGONAL (TYP.)**
- **VERTICAL "NEAR" TRUSS DIAGONAL (TYP.)**
- **TRUSS & SIGN**
- **CAMBER EACH TRUSS 0.002 FT/FT FOR DOUBLE CANTILEVER (TYP.)**
- **BOTTOM OF LUMINAIRE BRACKET, WHEN SIGN LIGHTING IS SHOWN IN THE CONTRACT**
- **HAND HOLE ON SIDE AWAY FROM TRAFFIC**
- **VISIBLE FROM TRAFFIC**
- **BOTTOM OF BASE PLATE**
- **BASE ELEVATION**
- **0.0 MIN. TO 1'-6" MAX.**
- **X/2**
- **L = 21'-0" MAX.**

**NOTE:**
- The centerline of the sign may vary from the truss centerline to provide minimum vertical clearance.
- The panel length is constant throughout the span.
- Each truss has a camber of 0.002 ft/ft for the double cantilever structure.
- The bottom of the luminaire bracket will be visible from traffic.

**APPENDIX:**
- **SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE.**

**EFFECTIVE:** AUGUST 6, 2012 TO August 4, 2013

**APPROVED FOR PUBLICATION**

Pasco Bakotich III
06-27-11

Washington State Department of Transportation
HEMISPHERICAL POST FINIAL, 1/8" MIN. THICKNESS. INSTALL AFTER GALVANIZING
3/8" ALLEN HOLLOW SET SCREW WITH DOG POINT (TYP.) (CORROSION RESISTANT METAL OR COATING) AT 90° INTERVALS

CUT HOLE IN POST FOR WIDE FLANGE; 1/8" MAX. CLEARANCE ALL AROUND

ELEVATION
ROTATED 90° TO SHOW CUTOUT

FINIAL BRACKET
15/16" DIA. HOLE (TYP.) (OMIT HOLES IN OPPOSITE FLANGE FOR SINGLE CANTILEVER)

DIAGONAL CONNECTION DETAIL
TYPICAL OF ALL DIAGONALS

BASE - SIDE
3" DIAM. PIPE (t = 0.306) SPLICE WITH 3" DIAM. PIPE (t = 0.216) (SEE CHORD SELECTION TABLE)
2 1/2" DIAM. PIPE (t = 0.276) SPLICE WITH 2 1/2" DIAM. PIPE (t = 0.203) (SEE CHORD SELECTION TABLE)

END OF CHORD
8" DAM. BOLT CIRCLE
PIECE O.D.
BACK-UP RING

SYMMETRICAL ABOUT POST II

DETAIL "D"
3/4" R. (TYP.)
8" DAM. BOLT CIRCLE
15/16" DAM. HOLES FOR FOUR 7/8" DAM. BOLTS (ASTM A 325)

TOP
CHORD TO POST CONNECTION DETAIL
7/8" DAM. BOLTS x 2 1/2" LONG (STD. SPEC. B36.5.3)
HEAVY DUTY NUT AND 2 WASHERS (TYP.) - INSTALL BOLTS WITH HEAD TOWARD CHORD

SECTION THROUGH FINIAL AND POST
1/8" PLATE MIN.
5/16" x 1/2" SLOT FOR 3/8" ALLEN SET SCREW

ELEVATION
1/8" PLATE MIN.
1/8" BEND FOR SNUG FIT

ISOMETRIC
DIAGONALS
CHORD
BASE
PIPE WALL

CANTILEVER SIGN STRUCTURE
(TRUSS-TYPE)
STANDARD PLAN G-60.10-01
SHEET 3 OF 4 SHEETS
APPROVED FOR PUBLICATION
Pasco Bakotich III 06-27-11
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

TOTAL TRUSS DETAILS
ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CANTILEVER SIGN STRUCTURE
(TRUSS-TYPE)
STANDARD PLAN G-60.10-01
SHEET 3 OF 4 SHEETS
APPROVED FOR PUBLICATION
Pasco Bakotich III 06-27-11
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

TOTAL TRUSS DETAILS
ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CANTILEVER SIGN STRUCTURE
(TRUSS-TYPE)
STANDARD PLAN G-60.10-01
SHEET 3 OF 4 SHEETS
APPROVED FOR PUBLICATION
Pasco Bakotich III 06-27-11
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

TOTAL TRUSS DETAILS
ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
PROVIDE SCREEN AROUND BASE – SEE SCREEN DETAIL, STANDARD PLAN G-60.10, SHEET 4

FINISH GROUND LINE

1" STEEL CONDUIT OR AS PER CONTRACT – WHEN REQUIRED, CAP EACH END

VIEW A

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>
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</tr>
<tr>
<td>Z</td>
<td>Z</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>13'-0&quot;</td>
<td>18'-0&quot;</td>
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<tr>
<td></td>
<td>1500 AND UP</td>
<td>1000 - 1499</td>
</tr>
<tr>
<td>16'-0&quot;</td>
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</tbody>
</table>

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

ANCHOR ROD - 1 3/4" DIAM, x 4'-4" LONG, THREADED 8" MIN. EACH END, W/ 2 WASHERS & 4 HEAVY HEX NUTS – GALVANIZE EXPOSED ANCHOR ROD END FOR 1'-0" MIN.

CONSTRUCTION JOINT W/ ROUGHENED SURFACE

CONCRETE CLASS 4000

CONCRETE OR CASING, IF REQUIRED SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH

ANCHOR PLATE (TYP.) – SEE DETAIL, SHEET 2

CONCRETE CLASS 6000

CONCRETE OR CASING, IF REQUIRED SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH

ANCHOR PLATE (TYP.) – SEE DETAIL, SHEET 2

STANDARD PLAN G-60.20-01 SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakitch III 06-27-11
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1

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.
2' - 6" BOLT CIRCLE

1/2" PLATE (ASTM A 36) (NO GALVANIZING REQUIRED)

2" DIAM. HOLE FOR ANCHOR BOLT (TYP.)

ANCHOR PLATE DETAIL

FIELD WELD OR SHOP WELD

MAY BE FIELD BENT (TYP.)

SPIRAL WELDED LAP SPlice DETAIL

SPIRAL LAP SPlice DETAIL

WELDING SHALL MEET THE REQUIREMENTS OF STD. SPEC. 6-02.3(24)E
FOR WELD DIMENSIONS - SEE TABLE BELOW

COLUMN AND SHAFT SPIRAL OPTIONS

DEFORMED BAR
AASHTO M 31 GRADE 60
PLAIN STEEL BAR
AASHTO M 31 GRADE 60
COLD DRAWN WIRE
AASHTO M 32
DEFORMED WIRE
AASHTO M 225
WELD DIMENSIONS (INCHES)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>SHEET METAL</th>
<th>WELD</th>
<th>WELD</th>
<th>WELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4 1/2&quot; DIAM.</td>
<td>W20</td>
<td>D20</td>
<td>1/4</td>
<td>1/8</td>
</tr>
<tr>
<td>#5 5/8&quot; DIAM.</td>
<td>W31</td>
<td>D31</td>
<td>5/16</td>
<td>3/16</td>
</tr>
<tr>
<td>#6 3/4&quot; DIAM.</td>
<td>W44</td>
<td>D44</td>
<td>3/8</td>
<td>3/16</td>
</tr>
</tbody>
</table>

MATERIAL SPECIFICATIONS

SHAFT CONCRETE
CLASS 4000P
ALL CONCRETE
CLASS 4000
STEEL REINF. BAR
AASHTO M 31 GRADE 60
ANCHOR RODS
ASTM F 1554 GRADE 105
ANCHOR NUTS
AASHTO M 291
ANCHOR WASHERS
AASHTO M 293
ANCHORAGE GALVANIZING
AASHTO M 232
ANCHOR PLATE
ASTM A 36

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1
STANDARD PLAN G-60.20-01
SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-27-11
STATE DESIGN ENGINEER
WASHINGTON DEPARTMENT OF TRANSPORTATION
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTES

1. See Standard Specification 8-21.3(9) for construction requirements.

2. Grounding Conductor shall be non-insulated #4 AWG stranded copper. Provide a 3'-0" min. slack.
**BAR LIST ~ TYPES 2 AND 3**

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>TOTAL SIGN AREA</th>
<th>QTY.</th>
<th>SIZE</th>
<th>QTY.</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>200 SF OR LESS</td>
<td></td>
<td></td>
<td>+200 SF</td>
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<tr>
<td>①</td>
<td>PEDESTAL HOOP</td>
<td></td>
<td>5</td>
<td>#4</td>
<td>5</td>
<td>#4</td>
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<tr>
<td>②</td>
<td>FOUNDATION WALL TIES</td>
<td></td>
<td>6</td>
<td>#5</td>
<td>6</td>
<td>#5</td>
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<tr>
<td>③</td>
<td>FOUNDATION VERTICALS</td>
<td></td>
<td>14</td>
<td>#6</td>
<td>14</td>
<td>#6</td>
</tr>
<tr>
<td>④</td>
<td>PEDESTAL VERTICALS</td>
<td></td>
<td>16</td>
<td>#10</td>
<td>16</td>
<td>#10</td>
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<tr>
<td>⑤</td>
<td>FOUNDATION WALL HORIZONTALS AT SLOPE</td>
<td></td>
<td>2</td>
<td>#5</td>
<td>2</td>
<td>#5</td>
</tr>
<tr>
<td>⑥</td>
<td>FOUNDATION WALL HORIZONALS</td>
<td>VARIES SEE PLANS</td>
<td>#5</td>
<td>#5</td>
<td>VARIES SEE PLANS</td>
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</table>

**VALUES OF Z**

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<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>200 SF OR LESS</td>
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<tr>
<td>TYPE 2</td>
<td>9' - 0&quot;</td>
<td>11' - 0&quot;</td>
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<tr>
<td></td>
<td>2500 OR GREATER</td>
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<tr>
<td>TYPE 3</td>
<td>11' - 0&quot;</td>
<td>13' - 0&quot;</td>
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<td></td>
<td>NOT LESS THAN 1500</td>
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**MATERIAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>CONCRETE</th>
<th>CLASS 4000P</th>
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<tbody>
<tr>
<td>STEEL REINF. BAR</td>
<td>AASHTO M 31 GRADE 60</td>
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<tr>
<td>ANCHOR RODS</td>
<td>ASTM F 1554 GRADE 105</td>
</tr>
<tr>
<td>ANCHOR NUTS</td>
<td>AASHTO M 291</td>
</tr>
<tr>
<td>ANCHOR WASHERS</td>
<td>AASHTO M 293</td>
</tr>
<tr>
<td>ANCHORAGE GALVANIZING</td>
<td>AASHTO M 232</td>
</tr>
<tr>
<td>ANCHOR PLATE</td>
<td>ASTM A 35</td>
</tr>
</tbody>
</table>

**CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPES 2 & 3 STANDARD PLAN G-60.30-01**

Sheet 2 of 2 sheets

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-27-11

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
ELEVATION

Y1 = HEIGHT OF SHALLOWEST SIGN ON STRUCTURE, D + 1'- 0" MIN.

Y2 = HEIGHT OF ANY SIGN WITH HEIGHT GREATER THAN Y1.

NOTES

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

SPAN LENGTH S (S TO 10% OF END POSTS)

PANEL LENGTH P TO BE CONSTANT THROUGHOUT SPAN AND NOT TO EXCEED D + 2'.

BOTTOM OF LUMINAIRE BRACKET - WHEN SIGN LIGHTING IS SHOWN IN THE CONTRACT

SYMMETRICAL ABOUT END SPANS (EXCEPT FRAMING WITH ODD NUMBER OF PANELS)

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SIGN BRIDGE FOUNDATION - SEE STD. PLAN G-70.30 & G-70.30

STRUCTURE DIMENSIONS

<table>
<thead>
<tr>
<th>SPAN LENGTH S</th>
<th>DIMENSION D</th>
<th>TOP AND BOTTOM CHORDS</th>
<th>DIAGONALS</th>
<th>END TRUSS POSTS</th>
<th>END TRUSS STRUTS AND DIAGONALS</th>
<th>TOTAL SIGN AREA (MAX.) (SQ. FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>5'-0&quot;</td>
<td>3' x 216&quot;</td>
<td>1-1/4&quot; x 1-1/4&quot;</td>
<td>10' x 279&quot;</td>
<td>2'-11/2&quot; x 2'-23/2&quot;</td>
<td>384</td>
</tr>
<tr>
<td>61' to 66'</td>
<td>5'-0&quot;</td>
<td>4' x 227&quot;</td>
<td>2'-11/2&quot; x 1'-15/16&quot;</td>
<td>10' x 279&quot;</td>
<td>2'-11/2&quot; x 2'-23/2&quot;</td>
<td>524</td>
</tr>
<tr>
<td>67' to 120'</td>
<td>6'-0&quot;</td>
<td>5' x 258&quot;</td>
<td>2'-11/2&quot; x 1'-15/16&quot;</td>
<td>10' x 307&quot;</td>
<td>3'-0&quot; x 2'-11/2&quot;</td>
<td>944</td>
</tr>
<tr>
<td>121' to 150'</td>
<td>7'-0&quot;</td>
<td>6' x 280&quot;</td>
<td>2'-11/2&quot; x 2'-23/2&quot;</td>
<td>10' x 366&quot;</td>
<td>3'-11/2&quot; x 2'-22/2&quot;</td>
<td>1104</td>
</tr>
</tbody>
</table>

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

MATERIAL SPECIFICATIONS

PIPE (CHORDS, DIAGONALS, STRUTS AND POSTS) ASTM A 36 OR ASTM A 53 GRADE B.

PLATES ASTM A 36

SHAPES ASTM A 36 ASTM A 962

BOLTS, NUTS, & WASHERS STD. SPEC. 9-06.503

PIPE, PLATE & SHAPE GALVANIZING AASHTO M 111

FASTENER GALVANIZING AASHTO M 232

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Pasco Bakotich III 06-27-11

SIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
DRILLED HOLE IN CHORD AT EACH DIAGONAL AND STRUT SHALL BE 1" DIAMETER FOR SPANS OVER 60' - FOR SPANS 60' OR LESS, DIAMETER SHALL BE 3/4".

ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORD OR POST, FILLET WELD SIZE TO BE DIAGONAL TUBE OR PIPE THICKNESS PLUS 1/16".

ELEVATION SECTION

END POST OR CHORD SHOP SPLICE
NO POST SPLICES PERMITTED IN LOWER THIRD OF HEIGHT, NOR CLOSER THAN 5'-6" TO BOTTOM OF CHORD. NO CHORD SHOP SPLICES PERMITTED IN MIDDLE THIRD OF SPAN MAXIMUM OF ONE SPLICE IN EACH END POST.

TOP
ALTERNATE JOINT DETAIL
NOT FOR CONNECTIONS BETWEEN VERTICAL DIAGONALS AND CHORDS

ALTERNATE JOINT DATA

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>d</th>
<th>e</th>
<th>BOLT Q DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>2 1/2&quot;</td>
<td>1 1/4&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>91' TO 120'</td>
<td>3&quot;</td>
<td>1 1/2&quot;</td>
<td>7/8&quot;</td>
</tr>
<tr>
<td>120' TO 150'</td>
<td>3 1/2&quot;</td>
<td>1 3/4&quot;</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

FOR SPAN LENGTHS NOT LISTED, INTERPOLATE VALUES OF △

FABRICATE TRUSS WITH CHORDS CURVED TO PROVIDE CAMBER. DO NOT CAMBER BY USING SHIMS BETWEEN CHORDS AT SPLICES.

DEAD LOAD CAMBER

CHORD FIELD SPLICE DATA

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>F</th>
<th>T</th>
<th>BOLT K DIAMETER</th>
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<tbody>
<tr>
<td>60' OR LESS</td>
<td>6&quot;</td>
<td>3/4&quot;</td>
<td>1/2&quot;</td>
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<tr>
<td>61' TO 90'</td>
<td>7&quot;</td>
<td>7/8&quot;</td>
<td>5/8&quot;</td>
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<td>91' TO 120'</td>
<td>8 1/2&quot;</td>
<td>1&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>120' TO 150'</td>
<td>9 1/2&quot;</td>
<td>1 1/4&quot;</td>
<td>7/8&quot;</td>
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</tbody>
</table>

NO CHORD FIELD SPLICE PERMITTED IN MIDDLE THIRD OF SPAN LENGTH.
3/16" SHIMS ARE REQUIRED AT THE REMAINING TWO CHORD JOINTS WHEN INTERIOR DIAGONAL IS INSTALLED.

SIGN BRIDGE
(TRUSS-TYPE)
STANDARD PLAN G-70.10-01
POST BASE DETAILS

SECTION B

1/4" BACK-UP BAR
1/4" SEAL WELD

1/2" DIAM. HOLE FOR ANCHOR BOLT (TYP.)

BASE PLATE HOLE = 8" DIAM.
1" - 9" BOLT CIRCLE

TOP

VIEW C

POST ANCHOR BOLT
TOP OF FOUNDATION

1/4" X 7/16" SQ. WRAP AROUND BASE PLATE WITH 3" MIN. LAP

BASE PLATE DETAIL

1/16" x 7/16" SQ. GALV. CLOTH WRAP AROUND BASE PLATE

WELDED GALV. CLOTH

DRILL AND TAP FOR 1/4" DIAM. CAP SCREW, ASTM F 593 W.S. WASHER, SPACING = 9" O.C.

POST BASE DETAILS
**NOTES**

1. Install Sign Lighting Luminaire(s) (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.
1. Refer to Contract Plans for Monotube Beam Bracket element sizes, dimensions, and weld symbols.
3. Galvanize all non stainless steel parts.
5. Hand holes shall be installed at the time of fabrication. Only additional conduits for lighting accommodations to previously non illuminated structures may be installed in field as long as the proper repairs are made to the structure. For details not shown, see Standard Plan J-75.40.
6. For VMS mounting, the Contractor may substitute W6x12 steel or W6x13 steel sections for the Vertical Brace 4x13 steel.
7. 3' - 0" max. Vertical Brace and Monotube Beam Bracket spacing for walk-in cabinet Type VMS installation.
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.
**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 Grade B, Type E OR 5</td>
</tr>
<tr>
<td>PLATES AND SHAPES</td>
<td>OR ASTM A 500 Grade B</td>
</tr>
<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 500 Grade B</td>
</tr>
<tr>
<td>GALVANIZING FOR PIPE</td>
<td>AASHTO M 111</td>
</tr>
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<td>PLATES AND SHAPES</td>
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<td>GALVANIZING</td>
<td>STD SPEC. 9-08.5(0)</td>
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<tr>
<td>HIGH STRENGTH BOLTS,</td>
<td>AASHTO M 232</td>
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<tr>
<td>NUTS &amp; WASHERS, INCL.</td>
<td>FASTENER GALVANIZING</td>
</tr>
<tr>
<td>MOUNTING BEAM BOLTS</td>
<td>STEEL GRATING</td>
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<tr>
<td>ALL OTHER BOLTS</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>FASTENER GALVANIZING</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

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

**INSTALLATION**

- Provide 2 hinges w/ 1/4" S.S. Screws
- Gate stop (attach to frame)

**MAINTENANCE WALKWAY FOR SIGN BRIDGES**

**STANDARD PLAN G-95.10-01**

**SHEET 1 OF 3 SHEETS**

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-02-11

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

**PLAN MAINTENANCE WALKWAY**

**ELEVATION MAINTENANCE WALKWAY**

**END VIEW A**

**END VIEW B**

**NOTE:** MODIFY DIMENSION AS REQUIRED FOR PROPER FIT-UP WITH THE VMS DOOR OPENING.
**PLAN**

- **PLATE & POST**: W4 x 13
- **PLATE & POST**: 3/4" x 4" x 5" PLATE
- **PLATE & POST**: 2" DIA. STD. PIPE WALL
- **PLATE & POST**: 3/4" PLATE

**SECTION C**

- **3/8" PLATE**
- **HOLE**: 3/4"
- **PLATE**: 3/8" PLATE

**ELEVATION**

- **3/8" PLATE**
- **HOLE**: 3/4"
- **PLATE**: 3/8" PLATE

**DETAIL "A"**

- **3/8" PLATE**
- **HOLE**: 3/4"
- **PLATE**: 3/8" PLATE

**SECTION D**

- **3/8" PLATE**
- **HOLE**: 3/4"
- **PLATE**: 3/8" PLATE

**ELEVATION**

- **PLATE**: 3/8" PLATE

**DETAIL "B"**

- **3/8" PLATE**
- **HOLE**: 3/4"
- **PLATE**: 3/8" PLATE

**RAILING SPlice DETAIL**

- **1/2" DIA. STD. PIPE RAILING**
- **DRIVE PIN HOLES**: 3/8" MIN. TO 3/8" MAX.
- **4"**: 2" STD. PIPE (RAILING)
- **INSIDE OF RAIL**: 1/16"
- **OUTSIDE OF RAIL**: 1/16"
- **DRIVE PIN HOLES**: 3/8" MIN. TO 3/8" MAX.
- **2" DIA. STD. PIPE RAILING**
- **1/2" DIA. STD. PIPE RAILING SPLICE SECTION**

**RAILING SPLICE DETAIL**

- **1/2" DIA. STD. PIPE RAILING**
- **DRIVE PIN HOLES**: 3/8" MIN. TO 3/8" MAX.
- **4"**: 2" STD. PIPE (RAILING)
- **INSIDE OF RAIL**: 1/16"
- **OUTSIDE OF RAIL**: 1/16"
- **DRIVE PIN HOLES**: 3/8" MIN. TO 3/8" MAX.
- **2" DIA. STD. PIPE RAILING**
- **1/2" DIA. STD. PIPE RAILING SPLICE SECTION**

**DRIVE PIN DETAIL**

- **SLOTTED TYPE SPRING PIN**
- **(ANSI B16.2, TYPE 304 STAINLESS STEEL)**
- **3/8" CHAMFER**
- **(TYP.)**

**STIFFENER**

- **STIFFENER**
- **(TYP.)**
- **3/8" CHAMFER**
- **(TYP.)**

**CONNECTION PLATE DETAIL**

- **3/8" PLATE**
- **HOLE**: 3/4"
- **PLATE**: 3/8" PLATE

**SOLUTION**

- **SOLUTION**
- **(TYP.)**
- **3/8" CHAMFER**
- **(TYP.)**

**MAINTENANCE WALKWAY FOR SIGN BRIDGES**

- **STANDARD PLAN G-95.10-01**
- **WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
- **APPROVED FOR PUBLICATION**
- **Pasco Bakotich III 06-02-11**
- **WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
- **EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**
MAINTENANCE WALKWAY INSTALLED ON MONOTUBE SIGN BRIDGE

WALKWAY IN THIS ZONE IS REQUIRED FOR VARIABLE MESSAGE SIGN WITH DOORS ON EACH END

ELEVATION

MAINTENANCE WALKWAY LAYOUT

NOTES
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" DIAM. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 5" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.
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.)

STRUCTURAL LUGS (SIZE TO FIT ROPE SPELTER SOCKET) (TYP.) SEE DETAIL "A"

FIELD LOCATE 1 1/8" DIAM. HOLES @ FRONT AND BACK OF MONOTUBE (TYP.)

3/4" x 13" x 1' - 8" PLATE

EXISTING MONOTUBE BEAM AND BRACKET PLATE

1/4"

TS6-4 x 5/16

1/4" COVER PLATE TOP & BOTTOM (TYP.)

3/8"

TS6-4 x 5/16

1/8"

3" THREAD EACH END (TYP.)

1" DIAM. ROD W/ 2 LOCK- NUTS & WASHERS, GALV. (ASTM A-449) (TYP.) - 4 SETS REQUIRED PER BRACKET

STRUCTURAL LUG (INTERMEDIATE SUPPORT) SEE DETAIL "B" (SEE NOTE 3)

SECTION A

STRUCTURAL LUG SEE DETAIL "A"

SECTION B

1/4" COVER PLATE TOP & BOTTOM

TS6-4 x 5/16

3/4" H.S. BOLT W/NUT & 2 WASHERS, GALV. (TYP.)

MONOTUBE

FABRICATED FROM L4x4 x 3/16

STRUCTURAL LUG (INTERMEDIATE SUPPORT) SEE DETAIL "B" (SEE NOTE 3)

SECTION B

MONOTUBE BEAM

PROVIDE A 3/4" DRAIN HOLE FOR GALVANIZING, TOP & BOTTOM (TYP.)

STRUCTURAL LUGS (SIZE TO FIT ROPE SPELTER SOCKET) (TYP.) SEE DETAIL "A"

ELEVATION VIEW

FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN BRIDGE

FABRICATED FROM L4x4 x 3/8

ELEVATION VIEW

FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN BRIDGE

1 1/2" (TYP.)

3 1/16" (TYP.)

6: 0' MIN. FROM TOP OF GRATING

2" (TYP.)

EXISTING MONOTUBE

2" (TYP.)

TS6-4 x 5/16

3/8"

TS6-4 x 5/16

3/8"

2" (TYP.)

1 1/8" DIAM. HOLE (TYP.)

ELEVATION VIEW

FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN BRIDGE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE SIGN BRIDGE

STANDARD PLAN G-95.20-02

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III
06-02-11

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STATE DESIGN ENGINEER

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
**SHRUB, TREE AND GROUND COVER PLANTING DETAIL**

1. **MULCH & COMPOST TO SPECIFIED DEPTH ~ FEATHER TO BASE OF PLANT**
2. **MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE**
3. **UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE**

**SECTION**

**BULB PLANTING DETAIL**

1. **MULCH & COMPOST TO SPECIFIED DEPTH ~ FEATHER TO BASE OF PLANT**
2. **MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE**
3. **UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE**

**SLOPE PLANTING DETAIL**

1. **PLANT RHIZOME WITH CROWN / GROWTH POINTS AT FINISHED GRADE**
2. **FINISHED GRADE**
3. **EXISTING SOIL**

**STREET TREE PLANTING AND STAKING DETAIL**

1. **MULCH & COMPOST TO SPECIFIED DEPTH ~ FEATHER TO BASE OF PLANT**
2. **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**
3. **MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE**
4. **UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE**

**EMERGENT PLANTING DETAIL**

1. **SPREAD ROOTS OUT**
2. **PLANTING HOLE 3 TIMES THE ROOT SPREAD**
3. **BREAK UP ROOTBALL OF CONTAINER PLANTS, INCLUDING PLUGS, PRUNE CIRCULATING ROOTS**

**TUBER OR RHIZOME PLANTING DETAIL**

1. **EXISTING SOIL**
2. **SEE NOTE**
3. **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**
4. **MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE**
5. **UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE**

**NOTE**

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

**STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT**

SALLY A. ANDERSON
CERTIFICATE NO. 000372

**TREE AND SHRUB PLANTING DETAILS**

STANDARD PLAN H-10.10-00

APPROVED FOR PUBLICATION

Pasco Bakotich 07-03-08

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

**EFFECTIVE:** AUGUST 6, 2012 TO August 4, 2013
**LIVE STAKE INSTALLATION IN RIPRAP**

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.

**TYPICAL LIVE STAKE INSTALLATION**

- Cut damaged end to leave two buds exposed.
- Fill voids with native soil.
- See notes.

**LIVE STAKE INSTALLATION IN QUARRY SPALLS**

**LIVE STAKE INSTALLATION ON SLOPES**

- Cut damaged end to leave two buds exposed.
- See notes.

**NOTES**

1. See Plant Material List for size and type of live stake.
2. Do not use axe or sledge for driving stakes.
3. In hard ground use an iron bar or star drill to prepare the holes for the stake.
4. Avoid stripping bark or bruising stakes during installation.
5. Fill void around cutting with soil.
NOTES

1. All Angle Irons and Steel Straps shall be galvanized in accordance with AASHTO M 232.

2. Pipe, Caps, and T-Adapter shall be 1" I.D. white PVC, or Primed Steel, except the water intake pipe shall be white PVC. Pipe shall be Sch. 40. All pipe joints shall be threaded.

3. Gage assembly pipe, fiberglass rod, and angle iron can be extended as needed to fit site requirements. Extra Pipe Clamps shall be added for security.

4. Score the water intake pipe 1/4" deep, 1/32" wide (width of saw blade), every 1/2", alternating cuts on top and bottom for drainage. Place at lowest water level.

5. Water level may vary, depending on season.

6. Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.

CREST GAGE
STANDARD PLAN H-30.10-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Pasco Bakotich III 10-12-07

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
SANDRA L. SALISBURY
CERTIFICATE NO. 000860
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
POST BASE ASSEMBLY
FINISHED GRADE 1/8" CONCRETE FOOTING - COMMERCIAL CONCRETE GRANULAR, FREE DRAINING MATERIAL

SECTION "A"

BASE ASSEMBLY
FINISHED GRADE
CONCRETE FOOTING - COMMERCIAL CONCRETE PIPE DRAIN - 3/4" I.D. 7" LONG GRANULAR, FREE DRAINING MATERIAL

PLAN VIEW

ROUND FOOTING

SQUARE FOOTING

SECTION "A"

TOP PLATE
1/8" X 4 1/2" DIAM. STEEL PLATE 1 1/4" X 2", FULL SURFACE, HEAVY DUTY, WELD-ON HINGE

COVER PLATE
1/8" X 1 7/8" SQUARE PLATE

BASE PLATE
1/8" X 1 7/8" SQUARE PLATE

POST SLEEVE
BASE PLATE

BASE ASSEMBLY

1/8" PLATE 1/8" PLATE 3 3/16" DIAM.

4 3/4" DIAM. 1 1/4" 1 1/4"

1/8" CHAMFER (TYP.)

NOTE

This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

BOLLARD TYPE 1

STANDARD PLAN H-60.10-01 SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakitch III 07-03-08
STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

EXPRESS RIDE PROGRAM
STATE HIGHWAY DEPARTMENT

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

**NOTE**

**CONCRETE FOOTING - COMMERCIAL CONCRETE**

- 6" x 1/4" diam. steel bar
- 1' - 2 1/2" diam.

**SECTION A**

- 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

**PLAN VIEW**

- Round footing
- Square footing

**SIDE VIEW**

- Paint assembly with a "highly visible" color. (Safety yellow is acceptable)
NOTES

1. A socket and wedge anchoring system that meets the NCHRP 350 crash test criteria may be substituted in lieu of the anti-twist plate designs shown. Anti-twist plates are not required for wood post installations.

2. The platform design shown on this plan features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this design, but it must fit the bracket design shown on this plan. Brackets are required for all single-post installations. Field drilling may be necessary.

3. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners (see ALIGNMENT DETAIL, Sheet 2). Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

4. Attach a newspaper box to a steel post with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Use 2 1/2" x 1/4" lag bolts to attach newspaper boxes to wood posts. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

5. A Type 2 Support (Standard Plan H-70.20) is required when 2 or more mailboxes are to be installed on one support.

MAILBOX SUPPORT

TYPE 1

STANDARD PLAN H-70.10-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 02-07-12

State Design Engineer
Washington State Department of Transportation
## Mailbox & Platform Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>Mailbox Dimensions</th>
<th>Platform Dimensions</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>W (in.)</td>
<td>H (in.)</td>
</tr>
<tr>
<td>1A</td>
<td>21&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>2</td>
<td>24&quot;</td>
<td>11 1/2&quot;</td>
</tr>
</tbody>
</table>

### Mailbox Placement Sections

- **At Edge of Shoulder**
- **Behind Curb**
  - Steel or Wood Post
  - Curb Type Varies
- **Behind Sidewalk**
  - Steel or Wood Post

### Mailbox Support - Type 1

**Standard Plan H-70.10-01**

**Alignment Detail**

**Bracket Detail**

**Post Placement Detail**

**Effective: August 6, 2012 to August 4, 2013**
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.
NOTES

1. The insert pipe is 1" nominal diameter, Schedule 40 steel pipe, as indicated; all other pipe shown on this plan is 1 1/4" nominal diameter, Schedule 40 steel pipe. All pipe, couplings, and elbows shall be galvanized in accordance with ASTM A 153.

2. The vertical support may be cast in a concrete foundation, or bolted to a U-channel post, (see PLACEMENT DETAIL, Sheet 2). Avoid placing the vertical support in the flow line of a ditch.

3. The pipe angles required in this design may be achieved by using pipe fittings or by bending the pipes. See DETAIL "A," Sheet 2.

4. Coat the 1" diam. pipe with grease (petroleum) before sliding the 1 1/4" diam. pipe (cantilever arm) onto it, to aid rotation and to guard against corrosion.

5. The Platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.10, Sheet 2. The design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required.

6. Match the edge of the mailbox platform to the end of the horizontal pipe mount. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners. Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform, (see ALIGNMENT DETAIL).

7. Attach a newspaper box to the pipe with two 1 3/4" muffler clamps spaced 4" apart. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.
VERTICAL SUPPORT

PLACEMENT DETAIL
SECTION VIEW

VERTICAL SUPPORT

U-CHANNEL POST
3 LBF/FT

U-CHANNEL POST
3 LBF/FT

COMMERCIAL CONCRETE

SPACING DETAIL
ELEVATION VIEW

PIPE FITTING ANGLES

PIPE BENDING ANGLES

MAILBOX SUPPORT

TYPE 3

STANDARD PLAN H-70.30-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakich III 02-07-12

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTE

1. Post shall have sufficient strength and durability to support the fence through the life of the project.
NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS.

SECTION A

TYPICAL SPLICE – SEE DETAIL

SPLICE DETAIL

SPliced Fence Sections Shall Be Close Enough Together To Prevent Silt Laden Water From Escaping Through The Fence At The Overlap. Joining Sections Shall Not Be Placed In Low Spots Or In Sump Locations.

NOTES
1. Maximize detention of stormwater by placing fence as far away from toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.
2. Install silt fencing along contours.
3. Install the ends of the silt fence to point slightly up-slope to prevent sediment from flowing around the ends of the fence.
4. Perform maintenance in accordance with Standard Specifications 8.01.3(9)A and 8.01.3(15).
NOTES

1. Maximize detention of stormwater by placing fence as far away from toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.

2. Install silt fencing along contours.

3. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

4. Perform maintenance in accordance with Standard Specifications 8.01.3(9)A and 8.01.3(16).

NOTE: DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS.

SILT FENCE

STATE DESIGN ENGINEER

Pasco Bakotich III 02-07-12

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

MARK W. MAUER
CERTIFICATE NO. 000598
PLACE SAND BAGS AS REQUIRED AROUND CULVERT TO PROVIDE SUPPORT FOR SILT FENCE.

SILT FENCE - SEE STD. PLAN 1-30.10

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

POST - SEE STD. SPEC. 8-01.3(RA)

EMBED POSTS INTO SAND BAGS AS REQUIRED

GEOTEXTILE FOR TEMPORARY SILT FENCE - SEE STD. SPEC. 9-33.2(1), TABLE 6

COMPOST BERM - SEE STD. PLAN 1-80.10

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

NOTE

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

FLOW

EDGE OF GEOTEXTILE

SECTION A

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

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

EROSION CONTROL AT CULVERT ENDS

STANDARD PLAN I-30.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III 09-20-07
STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
STAGGER JOINTS (TYP.) - SEE NOTE 2

WATTLE INSTALLATION ON SLOPE

SHEET 1 OF 1 SHEET

NOTE:
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. Abut adjacent Wattles tightly, end to end, without overlapping the ends.

3. Pilot holes may be driven through the Wattles and into the soil when soil conditions require.

4. Live stakes may be used for permanent installation and shall be in accordance with Standard Specification 9-14.5(6).

5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.

6. Perform maintenance in accordance with Standard Specification 8-01.3(15).

WATTLE SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>2:1</td>
<td>20'-0&quot;</td>
</tr>
<tr>
<td>3:1</td>
<td>30'-0&quot;</td>
</tr>
<tr>
<td>4:1</td>
<td>40'-0&quot;</td>
</tr>
</tbody>
</table>

STATE OF WASHINGTON
LICENSED LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

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Pasco Bakotich III 09-20-07
STATE DESIGN ENGINEER
NOTES

1. Compost Sock shall be in accordance with Standard Specification 9-14.5(6). Compost Sock shall be a minimum of 8" in diameter or sized to suit conditions as specified by the Engineer or Contract.

2. Compost material to be dispersed on site, as determined by the Engineer.


4. Always install Compost Sock perpendicular to slope and along contour lines.

5. 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.

6. Live stakes can be used in addition to wooden stakes and shall be in accordance with Standard Specification 9-14.6(1). See plans for species selection and spacing.
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).

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

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TEMPORARY SILT FENCE FOR INLET PROTECTION IN UNPAVED AREAS

STANDARD PLAN I-40.10-00

APPROVED FOR PUBLICATION

Pasco Bakotic III
09-20-07
STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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).
NOTES

1. Geotextile-encased Check Dams shall meet the requirements of Standard Specifications 8-01.3(6)A and 9-14.5(4).

2. Install the sloped ends of the Check Dam a minimum of 3" higher than the top of the check dam in the channel to ensure that water flows over the dam and not around it.

3. Flat bottom ditch design shown, Check Dam installation details are similar for "V" bottom ditches.

4. Perform maintenance in accordance with Standard Specifications 8-01.3(15).
Elevation

**Space Check Dams**

**The Distance Apart Where Points "A" and "B" Are the Same Elevation**

**Extended Section (A)**

**Side Protection**

**Spillway**

**Effective Dam Height 16**

**Quarry Spalls (STD. SPEC. 9-13.6)**

**Extended Section (C)**

**Wattle or Compost Sock (Typ.)**

**3/4" + 3/4" Wooden Stake (Typ.)**

**2" - 0" Max. Between Stakes**

**6" Min.**

**1" - 6" Min. Penetration (Typ.)**

**State of Washington Registered Landscape Architect**

**Mark W. Maurer**

**Certificate No. 000598**

**Check Dams**

**Standard Plan I-50.20-00**

**Sheet 1 of 1 Sheet**

**Approved for Publication**

Pasco Bakotich III 08-31-07

Washington State Department of Transportation

**Effective: August 6, 2012 to August 4, 2013**
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).
EROSION CONTROL BLANKET

TAMPED NATIVE SOIL

FASTENER - 6" MAX. CTRS.

FLOW

INITIAL ANCHOR - SECTION A

6" MIN

TAMPED NATIVE SOIL

FASTENER - 3'-0" MAX. CTRS.

CHECK SLOT - SECTION B

6" MIN END OVERLAP

EROSION CONTROL BLANKET

FLOW

SHINGLE SPlice - SECTION C

6" MIN. END OR END OVERLAP

EROSION CONTROL BLANKET

FASTENER

FASTENER

TAMPED NATIVE SOIL

SHINGLE SPLICE

PERSPECTIVE VIEW

3'-0" MAX. CTRS. (TYP.)

BLANKET ENDS

5'-0" MAX. CTRS. (TYP.)

BLANKET EDGES

ANCHOR TRENCH - SECTION D

6'-0" MAX. CTRS. (TYP.)

ANCHOR TRENCH

5'-0" MIN. EDGE OVERLAP

EROSION CONTROL BLANKET

FASTENER

FASTENER

6'-0" MAX. CTRS.

SHINGLE SPLICE

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. Provide Check Slots per manufacturer’s recommendations.

3. Roll ends may be spliced in a check slot.

GROUND LINE

OUTFLOW CHANNEL IS CONSTRUCTED BY EXCAVATION

SECTION

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

TEMPORARY SEDIMENT TRAP

EXISTING ROAD

ISOMETRIC VIEW

STABILIZED CONSTRUCTION ENTRANCE

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.

26' - 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.

1' - 0" MIN.

PROVIDE FULL WIDTH OF INGRESS / EGRESS AREA ~ 15' - 0" MIN.

TYPICAL SECTION

COMPOST BERM DETAIL

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

COARSE COMPOST

NOTE

TEMPORARY SILT FENCE OR COMPOST SOCK

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

SECTION A

COARSE COMPOST

TYPICAL SECTION

COMPOST BERM DETAIL

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

MARK W. MAUER

CERTIFICATE NO. 000598

MISCELLANEOUS EROSION CONTROL DETAILS

STANDARD PLAN I-80.10-01

APPROVED FOR PUBLICATION

Pasco Bakotich III

STATE DESIGN ENGINEER

WASHINGTON State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

08-11-09
1. Metering arrangements may vary with different serving utilities. The contractor shall verify the requirements of the utility prior to installing the service equipment.

2. All service pole conduit shall be secured to the pole with conduit strap at 5' centers.

3. All risers and service equipment shall be installed on side of pole that is away from traffic.

4. Where required by the serving utility, service breakers shall be installed above the meter socket in a separate right-light enclosure.

5. Bend and attach to pole within 1' of enclosure. See Standard Plan "Typical Grounding Details."

6. For Type B service wiring diagram, use Standard Plan "Modified Type B Service."

7. For Type C service wiring diagram, use Standard Plan, "Type E Service."

150 VA 480/120 VAC
(Dry transformer 150 VA)
(If flasher used)
Jack mounted flasher (where required)
Neutral busbar

Service

Control breaker

120 VAC service breaker

SECTION A-A

SECTION A-A

Type B Service Cabinet

Type C Service Cabinet

TYPE A WIRING DIAGRAM

TYPE A, B AND C SERVICE
LIGHTING DETAILS

STANDARD PLAN J-3

Clifford E. Mansfield
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

Sheet 2 of 2 Sheets

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
1. **Verify alignment of service cabinets to the framework.**

2. **Adjustment of the service cabinet to the framework.**

3. **Adjustment of the service cabinet to the framework.**

4. **Attach the service cabinet to the framework.**

5. **Install the service cabinet to the framework.**

6. **Secure the service cabinet to the framework.**

7. **Finish the installation of the service cabinet.**

8. **Final inspection of the service cabinet installation.**

9. **Complete the installation of the service cabinet.**

10. **Ensure the service cabinet is properly installed.**

---

**Service Cabinet Type B Modified (0 - 200 Amp Type 120/240 Single Phase Standard PLAN J-3b)**

**WIRING SCHEMATIC**

---

**SHEET 1 OF 2 SHEETS**

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**APPROVED FOR PUBLICATION**

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**Harold J. Petefeso 03-04-05**

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**Washington State Department of Transportation**

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**EXPRESS: MAY 5, 2005**

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**REVISED SERVICE SOCKET BOX MOUNTING DETAIL: CB**

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**DRAWN BY: MARK SUJKA**

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**REVISED: 03-04-05**

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**REVISION BY:**

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**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

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**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

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**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

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GENERAL NOTES

200 AMP TYPE 120/240 16 SERVICE CABINET

1. SEE STD. SPECIFICATION 9-29.24, SERVICE CABINETS.
2. HINGES SHALL HAVE STAINLESS STEEL OR BRASS PINS.
3. CABINETS SHALL BE RATE HMA E93R AND SHALL INCLUDE TWO RAIN TIGHT VENTS.
4. METERING EQUIPMENT DOOR SHALL BE PAD LOCKABLE. EACH DOOR SHALL BE GASKETTED, INSTALL BEST CX CONSTRUCTION CORE ON BOTTOM DOOR. SEE DOOR HINGE DETAIL, STANDARD PLAN J-3b. CONCEALED HEAVY DUTY STAINLESS STEEL LIFT OFF HINGES ARE ALLOWED AS AN ALTERNATIVE TO DOOR HINGE DETAIL SHOWN ON STANDARD PLAN J-3b. UPPER DOOR SHALL HAVE 2 Hinges and LOWER DOOR SHALL HAVE 3 Hinges. THE LOWER DOOR SHALL HAVE A TWO POSITION DOOR STOP ASSEMBLY.
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, 16 AND 21
   - KEY NUMBER 4 NAME PLATE SHALL READ: "PHOTOCELL, BYPASS TEST ON" AND "PHOTOCELL TEST OFF-AUTOMATIC" SEE SERVICE CABINET DETAIL.
7. DIMENSIONS SHOWN ARE MINIMUM AND SHALL BE ADJUSTED TO ACCOMMODATE THE VARIOUS SIZES OF EQUIPMENT INSTALLED.
8. ALL BUSWORK SHALL BE HIGH GRADE COPPER AND SHALL EQUAL OR EXCEED THE MAIN BREAKER RATING. ALL BREAKERS SHALL BOLT ONTO THE BUSWORK. JUMPERING OF BREAKERS SHALL NOT BE ALLOWED. BUSWORK SHALL ACCOMMODATE ALL FUTURE EQUIPMENT AS SHOWN IN THE BREAKER SCHEDULE.
9. THE PHOTOCELL UNIT TO BE CENTERED IN THE PHOTOCELL ENCLOSURE TO PERMIT 360 DEGREE ROTATION OF THE PHOTOCELL WITHOUT REMOVAL OF THE PHOTOCELL UNIT OR PHOTOCELL ENCLOSURE.
10. THE INTERNAL WIRE RUNS SHALL BE IDENTIFIED TO "FROM" - "TO" FRAMES Labeled WITH THE CODE LETTERS AND OR NUMBERS SHOWN ON THE INSTRUCTIONS. WIRE Axial POLYOLEFIN WIRE MARKING SLEEVES SHALL BE USED.
11. ALL NUTS, BOLTS AND WASHERS USED FOR MOUNTING THE PHOTOCELL ENCLOSURE SHALL BE STAINLESS STEEL.
12. A 1% TOLERANCE IS ALLOWED FOR ALL DIMENSIONS.
13. THE PHOTOCELL CIRCUIT SHALL BE INSTALLED IN FLEX CONDUIT WITHIN THE METER COMPARTMENT.
14. INSTALL CONDUIT COUPLINGS ON ALL CONDUITS. PLACE COUPLINGS Flush WITH TOP OF CONCRETE FOUNDATION.
15. SEE PLANS FOR BREAKER SCHEDULE.
16. SEAL CABINET TO FOUNDATION WITH A 1/2" BEAD OF SEALING COMPOUND AND TOP OF CONCRETE FOUNDATION.
17. THE METER BASE PORTION OF THIS SERVICE WAS DESIGNED TO MEET METERING PORTION OF EUSEC DRAWING 309 REQUIREMENTS.

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SERVICE CABINET TYPE D

0 - 200 AMP TYPE
120/240 SINGLE PHASE

STANDARD PLAN J-3c

WIRING SCHEME

DETAIL A

#6 INSULATED STRANDED

SERVICE CABINET

平面图

CONDUCT TO FENCE POST BINDING POST CONDUC TO SERVICE CABINET METER BASE

CONDUIT TO FENCE POST BINDING POST CONDUC TO SERVICE CABINET METER BASE

PHOTOCELL BYPASS TEST ON "PHOTOCELL TEST OFF-AUTOMATIC"

SERIAL NUMBER: J-3b

SERVICE CABINET TYPE D
0 - 200 AMP TYPE
120/240 SINGLE PHASE
STANDARD PLAN J-3c

WIRING SCHEME

DETAIL A

#6 INSULATED STRANDED
**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" minimum clearance between ground rod and 6" from foundation edge as detailed on Standard Plan J-60.05.

2. GRS conduits penetrating all cabinets shall be terminated with grounding bushing and bonded to the cabinet grounding bus. All PVC conduits penetrating cabinet shall be terminated with end bell bushing.

3. Install conduit couplings on all conduits. Place couplings flush with top of cabinet. If PVC conduits are cemented, the conduit stub and end bell bushing shall not be glued to the coupling.

4. 4" diam. x 1/2" deep sump. Slope foundation within cabient footprint toward sump. Drainpipe shall be 3/8" diam. polyethylene or copper tubing.

5. The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2" or 9" cabinet footing.

6. Cabinet power supply conduit.

7. Conduits for service grounding electrodes.

---

**TABLE OF CONTENTS**

- EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
- **NOTES**
  1. The cabinets shown in these details are shown for illustrative purposes only. The Contractor shall verify the plans and substitute those cabinets in place of the cabinets shown in these details. The Contractor shall install each cabinet type in the locations and orientations shown in these details.
  2. The Contractor shall install the conduits in the locations shown. Conduits shall extend 2' min. above the ceiling. The conduit containing unfused utility conductors shall extend into the utility chase.
  3. The ground rods, drain tiles, associated conduits, and #4 rebar, 90° with 30" legs, may be omitted if no transformer or service cabinet is to be installed.
  4. The cabinets shall be attached to the foundation with 4 each: 1/2" x 12" x 2" x 4" hole dip gal. anchor bolts, washers, and nuts. Stainless steel epoxy anchors may be used as an alternative, and shall be 1/2" diam. x 9", or 5/8" diam. x 8". Bolts shall extend 1 1/2" min. to 2" max. above the concrete pad.
  5. All reinforcing steel shall be embedded 2" below surface of concrete. The Contractor shall verify the plans and substitute those cabinets in place of the cabinets shown in these details.
  6. Place 1/2" 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.
  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.

---

**CABINET ORIENTATION CONDUIT LAYOUT AND FOUNDATION DETAIL STANDARD PLAN J-10.10-01**

**APPROVED FOR PUBLICATION**

Pasco Baskitych III 05-11-11

Washington State Department of Transportation
With Meter Base mounted on inside of Service Cabinet, allow 6" between Cabinets
With Meter Base mounted on outside of Service Cabinet, allow 30" from face of meter to adjacent Cabinet. See Standard Plan J-3c

1/4" PREMOLDED JOINT FILLER TO UTILITY

#4 REBAR - 30" WITH 30" LESS (2 PLACES)

#4 REBAR - EACH CORNER (SEE NOTE 14)

18" X 18" X 18" DRAINAGE WELL

GROUND LINE

TO UTILITY

NOTES:

S 0 5-11-11
STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
24" CABINET CABINET
BASE BASE
1"

 UTILITY GENERATOR TRANSFER SWITCH

24"

1/4" PREMOLDED JOINT FILLER
TYPE 332
UNINTERRUPTABLE POWER SUPPLY CABINET

7.5 KVA TRANSFORMER
TYPE E SERVICE CABINET

NEMA P44 CONTROLLER CABINET

24"

PLAN VIEW

POLICE PANEL

20"

GENERATOR ANTI-THEFT TIE DOWN UNIT (TYP.)

6" MIN. (TYP.)

3/4" CHAMFER (TYP.)

1/4" PREMOLDED JOINT FILLER

#4 HOOP - SEE NOTE 14

#4 REBAR - 90° WITH 30" LEGS (2 PLACES)

TO UTILITY

ELEVATION VIEW

FOUR CABINET FOUNDATION
(TYPE 332 UNINTERRUPTABLE POWER SUPPLY CABINET, TYPE E SERVICE CABINET, 7.5 KVA TRANSFORMER AND NEMA P44 CONTROLLER CABINET SHOWN)

SIX" MIN. (TYP.)

3/4" CHAMFER (TYP.)

1/4" PREMOLDED JOINT FILLER

#4 HOOP - SEE NOTE 14

#4 REBAR - EACH CORNER (SEE NOTE 18)

18" X 18" X 18"
DRAINAGE WELL (TYP.)

TO UTILITY

SPARE CONDUIT TO ADJACENT JUNCTION BOX - SEE CONTRACT PLANS

SECTION C

CONDUIT TO ADJACENT JUNCTION BOX - SEE CONTRACT PLANS
FOR NUMBER AND SIZE OF CONDUIT (TYP.)

TO SERVICE CABINET

SPARE CONDUIT TO ADJACENT JUNCTION BOX - SEE CONTRACT PLANS

SECTION D

GENERATOR ANTI-THEFT TIE DOWN UNIT

#4 REBAR - 90° WITH 30" LEGS (2 PLACES)

18" X 18" X 18"
DRAINAGE WELL

GENERATOR ANTI-THEFT TIE DOWN UNIT

CABINET ORIENTATION
CONDUIT LAYOUT AND FOUNDATION DETAIL
STANDARD PLAN J-10.10-01

APPROVED FOR PUBLICATION
Pasco Bakotich III 05-11-11 STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
UTILITY / GENERATOR TRANSFER SWITCH
INSTALL IN STANDARD POLICE PANEL LOCATION

UTILITY / GENERATOR TRANSFER SWITCH
- TO BE INSTALLED BY REGION MAINTENANCE PERSONNEL. PROVIDE A 15' PIGTAIL (SEE NOTE 12)

UTILITY / GENERATOR TRANSFER SWITCH

GENERATOR

GROUND BUS

AC-BUS (NEUTRAL BUS)

ELECTRICAL SERVICE OR TRANSFORMER

AC INPUT TERMINAL BLOCK

W G B

TRANSFER SWITCH CONNECTION
TYPICAL WIRING DIAGRAM

CABINET ORIENTATION
CONDUIT LAYOUT AND FOUNDATION DETAIL
STANDARD PLAN J-10.10-01
SHEET 5 OF 5 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Pasco Bakotich III 05-11-11

STATE DESIGN ENGINEER
1. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Obtain Engineer's approval of maintenance pad orientation prior to proceeding with construction.

2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications 6th Edition, 2012.

3. Concrete for walls and bases shall be class 4000.

4. Height of wall varies to match slope of existing grade. Contractor shall field determine wall height and each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.

5. 3/4" chamfer for all exposed corners.

6. For grounding details, see Standard Plan J-60.05.

7. For cabinet and conduit details not shown, see Standard Plan J-10.10.

8. The Cabinets shall be attached to the foundation with 4 anchor bolts and located per the Cabinet supplier. Stainless steel epoxy anchor bolts may be used as an alternative and shall be 1/2" diameter by 9" long.

REINFORCING STEEL BENDING DIAGRAM
SEE STD. SPEC. 9-07.12(TYP.) FOR BENDING DIAM.

ANCHOR BOLT
ASTM A307 WITH WASHER AND NUT - GALVANIZED PER AASHTO M 232

PLAN VIEW
CABINETS SHOWN FOR DISPLAY PURPOSES ONLY
SEE CONTRACT PLANS FOR CABINET LAYOUT

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" chamfer for all exposed corners.

6. For grounding details, see Standard Plan J-60.05.

7. For cabinet and conduit details not shown, see Standard Plan J-10.10.

8. The Cabinets shall be attached to the foundation with 4 anchor bolts and located per the Cabinet supplier. Stainless steel epoxy anchor bolt may be used as an alternative and shall be 1/2" diameter by 9" long.
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

**TIMBER LUMINAIRE SUPPORT**

**KEY**
- 1. GALVANIZED STEEL OR ALUMINUM MAST ARM - CONFIGURATIONS VARY WITH MANUFACTURER
- 2. LUMINAIRE - SEE CONTRACT FOR TYPE AND NUMBER
- 3. MOUNTING HEIGHT - ROADWAY TO LUMINAIRE ELEVATION DIFFERENCE ± 2% - SEE CONTRACT
- 4. MAST ARM LENGTH - SEE CONTRACT
- 5. 5/8" GALVANIZED THIMBLE EYE BOLT (SINGLE OR DOUBLE) WITH WASHERS AND NUTS OR EYEJUT
- 6. BONING JUMPER
- 7. POLE AND BRACKET CABLE
- 8. EQUIPMENT GROUNDING CONDUCTOR - SEE STANDARD PLAN J-60.05
- 9. FROM GROUND LINE TO 1' ABOVE GROUND, ENCLOSE EQUIPMENT GROUNDING CONDUCTOR IN GALVANIZED STEEL CONDUIT, CODE SIZED, ABOVE 1' FROM GROUND, STAPLE EQUIPMENT GROUNDING CONDUCTOR TO POLE. CONNECT TO SUPPLEMENTAL GROUND, PER STANDARD PLAN J-60.05
- 10. SERVICE WEDGE CLAMP
- 11. ACSR TRIPLEX OR FOURPLEX CONDUCTORS - SEE CONTRACT
- 12. CU I/L SPLIT BOLT CONNECTOR
- 13. MESSENGER CABLE
- 14. INSULATING TAPE FOR WATERPROOF CONNECTION
- 15. FUSED QUICK DISCONNECT, PER STANDARD SPECIFICATION B-29.7 - USE 30 AMP FUSES FOR HIGH MAST SUPPORTS
- 16. WEATHERHEAD - SIZE AS REQUIRED

**HIGH MAST TIMBER LUMINAIRE SUPPORT**

- SHOWN FOR 480 VAC POWER FEED. INCREASE CONDUCTOR AND FUSE SIZE AS REQUIRED FOR 240 VAC POWER FEED.

**NOTES**
1. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.
2. When down guys are required, See Standard Plan J-15.15.

**STANDARD PLAN J-15.10-00**

Sheet 1 of 1 Sheet

Approved for Publication

Pasco Bakotich III 05/18/12

Washington State Department of Transportation

**PLAN VIEW**
LUMINAIRE SUPPORT BRACKET

**PLAN VIEW**
TYPICAL LUMINAIRE MOUNTING CONFIGURATIONS
NOTES

1. Install a Conduit Deflection (CD) Fitting "A" at the exit from the barrier. Install a Conduit Deflection Fitting "B" to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-16b for Conduit Deflection Fitting details.

2. Install Galvanized Rigid Steel (GRS) conduit between the Junction Box(es) Type 1 and the CD Fitting(s) "A". GRS conduit shall also be used from the CD Fitting(s) "A" to the PVC adaptor in the barrier.

PVC Conduit may be used only in stationary-form barriers. Connect to GRS using a PVC adaptor.

GRS Conduit may be used in stationary-form barriers, but it shall be used in slipform barriers.

3. See Standard Plan C-14a for additional information on Single Slope Concrete Barrier.

KEY NOTES

- Junction Box = 8" x 8" x 18" NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slipform barrier (junction box can be recessed up to 1/8"). See Standard Plan J-16a.

- 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 joint. Pipe-wrap tape shall be 2" wide, 20 mil thick, & installed w/ 1" min. overlap.

- 10' long section of GRS Conduit.
Notes:

2. Pole shall be galvanized per AASHTO M111.
3. When additional crossing time is provided by an extended pushbutton press, a "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" sign (R10.32P) shall be installed above the APS assembly. Leave a 2" space between signs.

Finished Grade

5/8" Diameter Hole (Typ.)

1/2" Diameter Hole

1/2" Steel Plate

Pipe Cap

Accessible Pedestrian Signal (APS) Assembly

10" or Less Desirable = 24" Maximum

Base Plate Assembly = 1/2" Diameter Steel Hex Nut, with 1 1/2" Flat Washer (2) Each Req'd. Per Anchor Bolt = Minimum of (2) Threads Above Top of Nut or 5/8" Max. (Typ.)

3/4" Chamfer (Typ.)

12" Steel Base Plate

Foundation Detail

1/4" Premolded Joint Filler

Commercial Concrete

Perspective View

Perspective View

ANCHOR BOLT TEMPLATE

ANCHOR BOLT TEMPLATE ASSEMBLY =
ANCHOR BOLT TEMPLATE = (2) REQUIRED
1/2" x 1/8" FULL THREAD, ASTM F 1554, GRADE 55
1/2" Hex Nuts, AASHTO M 291, GRADE A - (4) REQUIRED PER ANCHOR BOLT
Flat Washers, ASTM F 84 or ASTM F 436 - (4) REQUIRED PER ANCHOR BOLT

GROUNDING CONNECTION DETAIL

Full Circle Crimp-On Connector (Crimped with Manufacturer's Recommended Crimper)

Base Plate Assembly = 1/2" Diameter Steel Hex Nut, with 1/2" Flat Washer 2 Each Req'd. Per Anchor Bolt = Minimum of 2 Threads Above Top of Nut or 5/8" Max. (Typ.)

3/4" Drain Tube

3 1/2" Hollow

GROUT PAD = INSTALL AFTER PLUMBING STANDARD

LEVELING NUT NOT SHOWN FOR CLARITY

DETAIL A

Pole shall be galvanized per AASHTO M111.

When additional crossing time is provided by an extended pushbutton press, a "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" sign (R10.32P) shall be installed above the APS assembly. Leave a 2" space between signs.

Access to Pedestrian Pushbutton Post (PPB) and Foundation

Standard Plan J-20.10-01

Effective: August 6, 2012 to August 4, 2013

Joseph Shepherd, State Architect

Washington State Department of Transportation

Pasco Bakotich III, 7/12/12

State Engineer

WASHINGTON STATE GOVERNMENT

APPROVED FOR PUBLICATION

Sheet 1 of 1 Sheet
NOTES:

1. All Poles shall be hot dip galvanized per AASHTO M111.

2. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete. Provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with manufacturer's recommended crimper).


4. When additional crossing time is provided by an extended pushbutton press, a PUSH BUTTON FOR 2 SECONDS FOR EXTRA TIME CROSSING sign (R10.32P) shall be installed above the APS assembly. Leave a 2" space between signs and pole.
NOTES
1. See Standard Specification 9-06.16 for Breakaway Base Connectors details. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how parts are assembled.


EXPLODED VIEW
BREAKAWAY BASE CONNECTOR
(SEE NOTE 1)

FIELD DRILL AND TAP FOR 1/4-20 THREAD BOLT (TYP.)

ANCHOR COUPLING (TYP.)
PEDESTRIAN PUSHBUTTON POST - 3" DIAMETER STEEL PIPE

FOOTING DETAIL
3" PEDESTRIAN PUSHBUTTON POST
BRACKET ADAPTER (TYP.)
BRACKET (TYP.)
COUPLING BOLT (TYP.)
SHIM (TYP.) - NO MORE THAN 2 PER COUPLING
ANCHOR FERRULE (TYP.)

SECTION A

GROUNDING CONNECTION
DETAIL
WELD STUD TO POLE WALL TO MAXIMUM EXTENT AS POSSIBLE - 1/2" MINIMUM WELD

CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS
(SHOW EXPLODED FOR CLARITY)

EDGE OF PAVED SHOULDER
DETECTABLE WARNING SURFACE

FOG STRIPE

PERSPECTIVE VIEW
2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11 gage, 4 1/2" O.D. at slipfitter weld. Taper shall be 0.14 inches per foot.
3. All poles shall be hot dip galvanized per AASHTO M 111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
7. Hand holes shall include a removable, rain-tight cover and gasket, fastened with two stainless steel screws (ASTM 593)
8. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to vertical steel reinforcing bar with connector suitable for use embedded in concrete.
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).

5C PEDESTRIAN HEAD TERMINATIONS

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<td>G</td>
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7C PEDESTRIAN HEAD TERMINATIONS

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<tr>
<td>7 * 3</td>
<td>WB</td>
<td>NEUTRAL CONDUCTOR</td>
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</table>
WOOD POLE INSTALLATION
ALTERNATIVE 1
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

INSTALL FITTING WITH NYLON WASHER ON OUTSIDE OF HOUSING
- SEAL WITH SILICONE AFTER UNIT IS FULLY ASSEMBLED

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 + 1/8" HOLE THRU POLE
9. LIQUID-TITE FLEX CONDUIT
10. ONE PIECE TWO HOLE CLAMP
11. LAG BOLT
12. INSULINER SLEEVE

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
WOOD POLE INSTALLATION
ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

TEMPORARY TIMBER POLE

WOOD POST INSTALLATION
ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

COUNTERBORE = DIAMETER TO FIT CONDUIT

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 3
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

4 x 4 POST

STATE DESIGN ENGINEER
Washington State Department of Transportation
Pasco Bakotich III
7/12/12

APPROVED FOR PUBLICATION
MSD-001 SHEET 2 OF 2 SHEETS
STANDARD PLAN J-20.26-01

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTES:
1. Steel Shaft shall be tapered either round or odenic (12-sided), 11-gauge, 4 1/2" O.D. at slip fitting weld. Taper shall be 0.14 inches per foot.
2. Hand Holes shall include a removable, rain-tight cover and gasket, fastened with two stainless steel screws (ASTM F 593).
3. Clamping Bolts shall be tightened to 50 ft-lbs max torque. After state inspection, burr threads to prevent nut rotation. DO NOT OVERTIGHTEN.
4. The final height of the Anchor Bolts must be below the top of the Slip Plate Assembly to ensure proper function of the Slip Base.
5. All Poles shall be hot dip galvanized per AASHTO M111.
6. Grounding Conductor shall be non-insulated 84 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with 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 weld. 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.

1. See Standard Specification 9-29.3 for Cable Conductor requirements.


3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with listed connector suitable for use embedded in concrete.
NOTES
1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'- 0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. 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.

2. Steel shaft shall be tapered either round or dodecagon (12 sided), 11 gage, 4 1/2" O.D. at slipfitter weld. Taper shall be 0.14 inches per foot. Pedestrian signal displays mounted on 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.

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.

NOTES
2. See Standard Specifications 9-29.17 for additional Mounting Bracket and Fitting information not shown.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. Top of Leveling Nut height shall be 1" maximum above foundation.
5. Heat shrink cap all spare conductors not terminated on a terminal strip.

COLOR CODE  USE
R  RED DISPLAY
O  AMBER DISPLAY
G  GREEN DISPLAY
W  NEUTRAL CONDUCTOR
B  SPARE CONDUCTOR

GROUNDING NUT
SPARE WIRE (TYP.) - HEAT SHRINK CAPPED, CABLE TIE TO IMSA 20-1 5C #14 CABLE (SEE NOTE 5)
EQUIPMENT GROUNDING CONDUCTOR
LEVELING NUT (TYP.) - SEE NOTE 4

INSTALL 5 AMP QUICK DISCONNECT FOR R, O, & G CONDUCTORS.
INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR.
HEAT SHRINK CAP FOR B CONDUCTOR. SEE STANDARD SPEC. 9-29.7
PULL QUICK DISCONNECTS TIGHT TO CONDUIT.

IMSA 20-1 5C #14 CABLE CONTINUING TO UPPER TRAFFIC SIGNAL HEAD
FIELD DRILL HOLE AND INSERT AN INSULINER OR SIMILAR DEVICE TO PROTECT CONDUCTORS
IMSA 20-1 5C #14 CABLE CONTINUED FROM FOUNDATION WIRING

PULL QUICK DISCONNECTS TIGHT TO CONDUIT.

IMSA 20-1 5C #14 CABLE - CONTINUING TO LOWER TRAFFIC SIGNAL HEAD

GROUND CONDUCTOR - SEE NOTE 3

ELECTRICAL CONDUIT TO JUNCTION BOX - SEE CONTRACT PLANS FOR DIAMETER
# Foundation Reinforcement Detail

**Concrete Cast Directly Against Undisturbed Earth, Drilled Shaft**

**Alternate # 1**
- **CONDUCT SIZE AND QUANTITY AS SHOWN IN THE CONTRACT;**
- **CAP BOTH ENDS;**
- **ANCHOR BOLTS & ANCHOR PLATE SUPPLIED BY SIGNAL POLE MANUFACTURER;**
- **EVENLY SPACED **

**Alternate # 2**
- **CONCRETE CAST WITHIN A CORRUGATED METAL PIPE STAY-IN-PLACE FORM;**
- **ANCHOR BOLTS & ANCHOR PLATE SUPPLIED BY SIGNAL POLE MANUFACTURER;**
- **EVENLY SPACED;**

### Foundation Depth "D" Table

<table>
<thead>
<tr>
<th>Foundation Type</th>
<th>Ground Slope</th>
<th>Allowable Lateral Bearing Pressure</th>
<th>XYZ (ft)</th>
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<tbody>
<tr>
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<td>3H: 1V/1V</td>
<td>700 900 1360 1500 1600 2200 2300 2600 3000</td>
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<tr>
<td>1000 PSF</td>
<td>3'-0&quot; ROUND</td>
<td>10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot;</td>
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<tr>
<td></td>
<td>5'-0&quot; ROUND</td>
<td>10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8'-0&quot; ROUND</td>
<td>10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot; 10'-0&quot;</td>
<td></td>
</tr>
</tbody>
</table>

### Foundation Reinforcement and Backfill Detail

- **Concrete Cast Within a Corrugated Metal Pipe Stay-In-Place Form**
- **ANCHOR BOLTS & ANCHOR PLATE SUPPLIED BY SIGNAL POLE MANUFACTURER;**
- **EVENLY SPACED;**

**Alternate # 2 - Construction Method**

**Metal (Subsurface) Form Required**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

**Alternate # 2 - Construction Method**

**Metal (Subsurface) Form Required**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.

**Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2)**

### Notes

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signs. Basic wind velocity is 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.
2. Foundations are designed for Type II, Ill, and SD Signal Standards with a maximum mast arm length of 90'.
3. Foundations are designed for Single Mast Arm Standards and Double Mast Arm Standards with 90' between arms. Special foundation design is required for Double Arm Standards where the angle between mast arms is other than 90'. For Double Mast Arm Standards with 90' between arms, use larger Y2 value for foundation depth selection.
4. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office for the Engineer for Special Foundation Designs.
5. Foundations constructed within Ecology Embankments shall be increased in depth by the depth of the Ecology Embankment.
6. The top 2 feet of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.
7. For design parameters between the values listed in Table, depth requirements may be interpolated between the values provided.

SLOPE TO MEET FINISHED GRADE - See Sections For Slope

SLOPE TO DRAIN AWAY FROM THE FOUNDATION SLOPE NOT STEEPER THAN 5%

EXISTING GRADE OR CUT SLOPE FLAT TO 10H : 1V
CASE F

EXISTING GRADE OR CUT SLOPE 10H : 1V TO ≤ 3H : 1V
CASE G

EXISTING GRADE OR CUT SLOPE STEEPER THAN 3H : 1V (2H : 1V MAX.)
CASE H

NOTE
* 2" - 0" FOR 3" - 0" DIAM. FOUNDATION
* 2" - 6" FOR 4" - 0" DIAM. FOUNDATION
* 2" - 6" FOR 3" - 0" SQUARE FOUNDATION

(SHOWN REDUCED)

FOUNDATION IN OR NEAR SIDEWALK
CASE E

PLAN

ELEVATION

SIGNAL STANDARD FOUNDATION - See Standard Plan J-26.10

EXISTING GRADE OR CUT SLOPE FLAT TO 10H : 1V
SIGNAL STANDARD FOUNDATION - See Standard Plan J-26.10

PLAN

ELEVATION

EXISTING GRADE OR CUT SLOPE FLAT TO 10H : 1V
SIGNAL STANDARD FOUNDATION - See Standard Plan J-26.10

PLAN

ELEVATION

EXISTING GRADE OR CUT SLOPE FLAT TO 10H : 1V
SIGNAL STANDARD FOUNDATION - See Standard Plan J-26.10
**Cement Concrete Sidewalk**

- See Standard Plan J-26.10 or Asphalt Concrete Pavement

**Foundation**

- See Typical Section for Reinforcement

**Signal Standard Foundation**

- See Standard Plan J-26.10

**Foundation Partially Within Sidewalk Section**

**Foundation Within Sidewalk or Traffic Island Section**

**Single Pedestrian Push Button**

- See Contract Plans for Elect for Details

**Dual Pedestrian Push Button**

**Note**

- **\*** = Applies to the side of the foundation when Pedestrian Push Button is to be installed.

**Signal Foundation Identification Tag**

**Foundation Identification Tag**

**Oblique View**

**Reinforcing and Anchor Bolts Not Shown for Clarity**

**Grout Pad Option Shown**

**Material**

- See Typical Section for Reinforcement

**Foundation Reinforcing Only Partially Shown for Clarity.**


**Typical Section**

- SEE TYPICAL SECTION FOR REINFORCEMENT

**Effective:** August 6, 2012 to August 4, 2013
### ALTERNATE #1 DRILLED SHAFT-TYPE CONSTRUCTION - DEPTH “D”

#### FOR LATERAL BEARING PRESSURE = 2500 PSF & $\theta = 34^\circ$, 1500 PSF & $\theta = 28^\circ$, 1000 PSF & $\theta = 26^\circ$

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<tr>
<th>ALLOWABLE LATERAL BEARING PRESSURE</th>
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<th>GROUND SLOPE = 3H : 1V TO 2H : 1V</th>
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<tr>
<td>2500 OR GREATER</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
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### 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 & $\theta = 17^\circ$

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<tr>
<td>2500 OR GREATER</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
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### ALTERNATE #2 - CONSTRUCTION METHOD METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Forming up 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).

### ALTERNATE #2 - CONSTRUCTION METHOD METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36” or 48” diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming up 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).

### TYPE IV AND V STRAIN POLE FOUNDATION

#### STANDARD PLAN J-27.10-00

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**Pasco Bakotich**

03-15-12

**STATE DESIGN STANDARDS**

Washington State Department of Transportation
**NOTES**

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Basic wind velocity 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.

2. 2 1/2" diameter weatherhead may be substituted for the elbow and nipple assembly.

3. Pole shaft shall have 0.14" flaper.


5. Hand holes may be 6" x 4", oval or rectangle. Provide a "J" or "C" hook at 90° or 180° off upper hand hole.


---

**Type IV and V Strain Pole Standard**

**Standard Plan J-27.15-00**

**Sheet 1 of 1 Sheet**

**Approved for Publication**

Pasco Bakoticz III

State Design Engineer

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTES

1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50' (H1).

3. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

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.
SECTION VIEW
CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

EDGE OF SHOULDER
SLIP BASE
SLOPE 3H:1V THRU 2H:1V
FILL MATERIAL
SLOPE ROUNDED
HAND HOLE
STEEL LIGHT STANDARD FOUNDATION
 NOT STEEPER THAN 1.5H:1V
 NOT STEEPER THAN 10H:1V SLOPE
 VARIES WITH OFFSET DISTANCE (3.0' MIN.)

SECTION VIEW
CASE B
SLOPES FLATTER THAN 3H:1V

EDGE OF SHOULDER
SLIP BASE
SLOPE FLATTER THAN 3H:1V
FILL MATERIAL
SLOPE ROUNDED
HAND HOLE
STEEL LIGHT STANDARD FOUNDATION
 NOT STEEPER THAN 2H:1V
 NOT STEEPER THAN 10H:1V SLOPE
 VARIES WITH OFFSET DISTANCE (3.0' MIN.)

SECTION VIEW
CASE C
FORE SLOPES 4H:1V OR FLATTER

EDGE OF SHOULDER
SLIP BASE
HAND HOLE
BACK SLOPE
LEVEL
LEVEL
FILL MATERIAL
STEEL LIGHT STANDARD FOUNDATION
FORE SLOPE 4H:1V OR FLATTER
 CULVERT = SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)
 VARIES WITH OFFSET DISTANCE (3.0' MIN.)

SECTION VIEW
CASE D
FORE SLOPES STEEPER THAN 4H:1V (2H:1V MAX.)

EDGE OF SHOULDER
SLIP BASE
HAND HOLE
BACK SLOPE
LEVEL
LEVEL
FILL MATERIAL
STEEL LIGHT STANDARD FOUNDATION
FORE SLOPE STEEPER THAN 4H:1V (2H:1V MAX.)
 CULVERT = SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)
 VARIES WITH OFFSET DISTANCE (3.0' MIN.)

EMBANKMENTS

FILL MATERIAL
CULVERT = SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)
STEEL LIGHT STANDARD FOUNDATION
FORE SLOPES 4H:1V OR FLATTER
CULVERT = SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)
STEEL LIGHT STANDARD FOUNDATION
FORE SLOPES STEEPER THAN 4H:1V (2H:1V MAX.)

DITCH SECTIONS

PROVIDE 3.0 MIN. LEVEL GRADE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

STEEL LIGHT STANDARD PLACEMENT (SLIP BASE)
STANDARD PLAN J-28.22-00
SHEET 2 OF 2 SHEETS
NOTES

CASE E
SLOPES 2H:1V OR FLATTER BEHIND TRAFFIC BARRIER

CASE F
SLOPES STEEPER THAN 2H:1V BEHIND TRAFFIC BARRIER (SPECIAL DESIGN FOUNDATION)

EMBANKMENTS

CASE G
ROADSIDE DITCH WITH FORE SLOPE STEEPER THAN 4H:1V (2H:1V MAX.)

CASE H
CUT SECTION WITH BACK SLOPE STEEPER THAN 3H:1V (2H:1V MAX.)

BACK SLOPES
NOTES
NOTE

CONSTRUCTION METHODS

METHOD 1
NO SUBSURFACE FORM

This option is only used when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.
After concrete has cured, remove the paper or cardboard form portion.
Construct the embankment widening (if required).

METHOD 2
METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" diameter, corrugated metal (pipe) form. The corrugated metal form shall not extend more than 6" below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.
After concrete has cured, remove the paper or cardboard form portion.
Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
HEAVY HEX NUT (TYP.)
SIZE TO MATCH ANCHOR BOLT
SEE TABLE — STD. PLAN J-28.30

ROUND WASHER (TYP.)
SIZE TO MATCH ANCHOR BOLT

LUMINAIRE POLE
POLE BASE PLATE
KEEPER PLATE
ANCHOR SLIP PLATE ASSEMBLY
SEE STD. PLAN J-28.42
CAPPED CONDUIT
SLIP BASE FOUNDATION
SEE STD. PLAN J-28.30
3" DIAM. GROUT WELL
(TYP.)

EXPLODED VIEW

3/8" I.D. DRAIN TUBE
IN GROUT PAD

LUMINAIRE POLE
POLE BASE PLATE
LEAVE 6" HOLLOW IN CENTER OF THE GROUT PAD

EXPLODED VIEW

THE FINAL HEIGHT OF THE ANCHOR BOLTS MUST BE BELOW THE TOP OF THE ANCHOR SLIP PLATE ASSEMBLY TO ENSURE PROPER FUNCTION OF THE SLIP BASE. APPLY GROUT EVEN WITH THE BOTTOM OF THE ANCHOR PLATE AFTER PLUMBING THE LIGHT STANDARD.

SECTION A
(CONDUIT NOT SHOWN)

TOP OF ANCHOR SLIP PLATE ASSEMBLY

ASSEMBLED ISOMETRIC VIEW
SLIP BASE

ASSEMBLED ISOMETRIC VIEW
FIXED BASE

APPLY GROUT EVEN WITH THE BOTTOM OF THE POLE BASE PLATE AFTER PLUMBING THE LUMINAIRE POLE.

BOLT CAN PROTRUDE 5/8" MAX. WITH A MIN. OF TWO THREADS EXPOSED ABOVE NUT.

EXPLODED VIEW

N O T E S

1. 50’ (H1) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.

2. Galvanizing shall be in accordance with AASHTO M 111.

3. See Standard Plans C-4b, C-14h, and J-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.

4. See Standard Specification Section 6.03.(33) and B-20.3(4) for the torque requirements for all of the Anchor Bolt installations. Install 1-inch diameter Clamping Bolts in all Slip Bases to a torque of 95 Foot-Pounds — See Standard Specification Section B-20.3(13A). DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.

1. 50' (H1) poles with double mast arms or poles weighing in excess of 1000 lbs. shall not be installed on a Slip Base.

2. The Slip and Anchor Plates shall be manufactured from ASTM A572 GR 50 or ASTM A588. All Slip Plate notched surfaces shall be finished smooth.

3. The Clamping Bolts shall be high strength steel, manufactured from AASHTO M164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M232.


5. Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

6. Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or reusing a luminaire pole.
LUMINAIRE POLE

1" HEAVY HEX NUT (TYP.)
PLATE WASHER (TYP.) - SEE STD PLAN J-28.42

POLE BASE PLATE

TAP FOR BOLT (TYP.)

LOCK WASHER (TYP.)

1" DIAM HEAVY HEX BOLT (TYP.)
ELBOW MOUNTING ON POLE BASE PLATE REQUIREMENTS.

EXPLODED ISOMETRIC VIEW

STEEL LIGHT STANDARD ELBOW DETAIL
FOR LUMINAIRE POLES WITH SINGLE MAST ARM 12'-0" OR LESS AND DOUBLE MAST ARMS 8'-0" OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.

1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111.

HAND HOLE

PEDESTRIAN RAILING

1" DIAM H.S. BOLT W/HARDENED LOCK WASHER AND NUT (TYP.)
(STM A325 OR F 1554 GR. 105)
SEE BRIDGE PLANS FOR LUMINAIRE ANCHORAGE DETAIL

1" DIAM H.S. BOLT W/HARDENED LOCK WASHER AND NUT (TYP.)
(STM A325 OR F 1554 GR. 105)
SEE BRIDGE PLANS FOR LUMINAIRE ANCHORAGE DETAIL

HAND HOLE

Bands Not Shown For Clarity

ELBOW - SEE DETAIL

1" CONDUIT - SEE BRIDGE PLANS

LUMINAIRE POLE

Bands Not Shown For Clarity

ELBOW - SEE DETAIL

1" CONDUIT - SEE BRIDGE PLANS

LUMINAIRE POLE

Bands Not Shown For Clarity

ELBOW - SEE DETAIL

1" CONDUIT - SEE BRIDGE PLANS

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LUMINAIRE POLE

Bands Not Shown For Clarity

ELBOW - SEE DETAIL

1" CONDUIT - SEE BRIDGE PLANS

LUMINAIRE POLE

Bands Not Shown For Clarity

ELS
LUMINAIRE POLE

POLE BASE PLATE

ROUND AND SMOOTH INSIDE EDGES

POLE BASE PLATE

GROUNDING BOLT

REMOVABLE RAINTIGHT HAND HOLE COVER WITH GASKET

- FASTEN WITH TWO STAINLESS STEEL (ASTM F 593) SCREWS

TYPICAL HAND HOLE ORIENTATION

THE CONDUCTOR ATTACHMENT CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS. CONDUCTOR ATTACHMENTS ARE REQUIRED ON ALL POLES, FIXED OR SLIP BASE.

\[ T = \text{RIM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR.} \]

\[ \text{FIXED BASE: RADIUS} = (D/2+1/16") \text{(TYP.)} \]

\[ \text{SLIP BASE: RADIUS} = 9/16" \text{(TYP.)} \]

\[ \text{MATCH SLIP PLATE, STANDARD PLAN J-28.42} \]

LUMINAIRE POLE BASE PLATE DETAIL

FOR DETAILS NOT SHOWN, SEE VIEW A ABOVE

ORIENTATION FOR INSTALLATION ON BRIDGE OR RETAINING WALL - SEE STANDARD PLAN J-28.45

1/4" THICK OR NO THINNER THAN POLE WALL THICKNESS. TACK WELD OR SEAL WELD TO BASE PLATE.

\[ t = \text{SIZE OF FILLET WELD BY LUMINAIRE POLE FABRICATOR.} \]

POLE BASE PLATE

LUMINAIRE POLE

1/4" BACK-UP STRIP

VIEW C

VIEW B

VIEW A

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-8s.14, and J-28.60 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barrier.

REMOVABLE Raintight Hand Hole Cover With Gasket - Fasten With Two Stainless Steel (ASTM F 593) Screws

See Standard Plans C-8b and C-85.14 for foundation and anchor bolt details.

Round and smooth all edges around hand hole and along the wire-way to protect the conductors.


Install grout after plumbing the pole.

---

STEEL PLATE 1 3/4" (ASTM A 572 GR. 50 or ASTM A 588)

BACK-UP RING

5" DIAM. HOLE

CONDUCTOR ATTACHMENT - SEE DETAIL

POLE WALL

GROUNDING BOLT

HAND HOLE

1 1/4" DIAM. HOLE (TYP.)

SECTION B

T = RIM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR

r = SIZE OF FILLET WELD BY LUMINAIRE POLE FABRICATOR

CONDUCTOR ATTACHMENT DETAIL

CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS

---

LUMINAIRE POLE

HAND HOLE - CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS

ANCHOR BOLT (TYP.) - SEE NOTE 1

TOP OF POLE BASE PLATE

GROUT

TOP OF FOUNDATION / BARRIER

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STEEL LIGHT STANDARD BARRIER MOUNTED BASE

STANDARD PLAN J-28.60-01

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-02-11

STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

ISOMETRIC VIEW

POLE BASE PLATE

LUMINAIRE POLE

HAND HOLE

3/8" DRAIN TUBE

TOP OF FOUNDATION / BARRIER

SEE NOTE 4

PLACEMENT DETAIL

CONDUCTOR ATTACHMENT BRACKET = 1/4" THICK STEEL, 2" WIDE x 4" LONG

CLAMP = 1/8" THICK STEEL, 2" WIDE x 3" LONG

---


2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.


4. Install grout after plumbing the pole.
LUMINAIRE HEAD

INSTALL SIZED REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT END OF MAST ARM (TYP.)

REMOVE ALL SLACK BEFORE INSTALLING CABLE TIE

DETAIL "A" GRS CONDUIT

SEE DETAIL "A" OR "B" PER CONDUIT TYPE

CABLE TIE - 120 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 8" MIN.

BONDING JUMPER WIRE FOR GRS STEEL

EQUIPMENT GROUNDING CONDUCTOR

GROUNDING CONDUCTOR - FROM FOUNDATION

DOUBLE QUICK DISCONNECTS - PULL DOWN TIGHT TO CONDUIT (SHOWN LEFT UP FOR CLARITY)

BASE WIRING DETAIL FOR SINGLE MAST ARM
(SLIP BASE SHOWN)

TO GROUNDING NUT
CONDUCTOR WIRES

CONDUCTOR ATTACHMENT BRACKET

GROUNDING NUT

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

STEEL LIGHT STANDARD WIRING DETAILS
STANDARD PLAN J-28.70-01

Sheet 1 of 1

APPROVED FOR PUBLICATION
Pasco Bakotich III 05-11-11
State Design Engineer

NOTE
**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 less 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 a 0.4375" overlap. Contractor to form fit and install.

**DESIGN CRITERIA:**

This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Basic wind velocity is 90 MPH. Design Life/Recurrence interval 50 years and Fatigue Category III.

**WIND VELOCITY:**

90 MPH

Maximum Pole Deflection shall not exceed 0.7" in 30 MPH and 1.4" in 70 MPH wind.

**LOAD CASE # 1**

Camera (1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:

Dish (1) - 1' - 0" diameter @ pole top level.

**LOAD CASE # 2**

Camera (1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:

Camera (2) - EPA = 0.54 sq. ft. each @ 1' - 0" and 2' - 0" from pole top, and:

NEMA Cabinet (2) - EPA = 1.33 sq. ft. each @ 3' - 8" from pole top, install both NEMA cabinets back to back, and:

Radio Equipment (2) - EPA = 2.25 sq. ft. each @ 2' - 0" and 9' - 0" from pole top.

EPA = Effective Projected Area

**ALTERNATE # 2 - CONSTRUCTION METHOD**

Shoring or Extra Excavation as required. Excavated area shall be backfilled with Controlled-Density Fill or with soil in accordance with Standard Specification 8-20.9(2).
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-29.16.

2. Round and smooth all edges along wire-way to protect conductors; see Standard Plan J-28.70.

3. The manufacturer shall verify that the Elbow Top Plate matches the Camera Pole Base, and shall submit the shop drawings for approval.

4. Galvanize after fabrication according to AASHTO M111.

5. Install galvanized steel protective band (3/16" thick × 3 1/2" high (A36)) on all four sides after truing pole, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.

ELEVATION VIEW

SEE CONTRACT PLANS FOR SLOPE OF PARAPET FACE

CAMERA POLE ELBOW MOUNT - 25" SQUARE
NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. All lid thicknesses are minimum. The diamond pattern shall be 3/32" minimum thickness.

3. Lid stiffener plates shall bear on frame. Mill to bearing seat and perimeter bar for full even contact after fabrication of frame and lid. Lid and frame units with uneven bearing will be rejected.

4. The installed lid and frame shall fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation on the contact surfaces.

5. A 1/4-20 NC × 3/4" S. S. ground stud shall be welded to the bottom of each lid: include (2) each S. S. nuts and (2) each S. S. flat washers.

6. The hinges shall allow the lids to open 180°.

7. Bolts and nuts shall be liberally coated with anti-seize compound.

8. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-20 NC × 3/4" S. S. bolt, (2) each S. S. nuts, and (2) each S. S. flat washers. Equipment bonding jumper shall be #8 AWG min. × 4" of tinned braided copper.


11. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty. Heavy-Duty Junction Boxes shall not be installed in sidewalks, walkways, and shared use paths.

12. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" min. to 8" max. for final grade of new construction only. See Standard Specification 8-20.3(8). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" min. to 10" max. See Standard Specification 8-20.3(6).
HEAVY-DUTY JUNCTION BOX TYPES 4, 5, & 6

STANDARD PLAN J-40.20-01

SECTION F

STIFFENER PLATE (TYP.)

SECTION G

STIFFENER PLATE (TYP.)

COVER MARKING DETAIL

PLAN VIEW

LID

STIFFENER PLATE - SEE NOTE 3

SEE NOTE 9

3/8" BOLT HOLE

1 1/2" Diam. Hole

BOLT PLATE

HANDLE SLOT

PENTA HEAD BOLT

WASHER - S.S.
1 7/16" O.D. X 1/2" I.D. X 1/8"

S.S. CHANNEL NUT WITH S.S. SPRING

FRAME (OUTER)

L.2" X 2" X 1/4" - SEE NOTE 4

SEE NOTE 3

LID

GROUND STUD WITH NUT - SEE NOTE 5

FRAME STUD - 3/8" Diam. X 8"

EQUIPMENT BONDING JUMPER FROM OTHER LID

HEX COUPLING BOLT

(2) S.S. NUT (TYP.)

(3) S.S. WASHER (TYP.)

TERMINAL RING AND BONDING JUMPER

S. S. 5/16 NC X 1" HEX COUPLING BOLT

WWR - TIED IN 2 PLACES TO FRAME STUD (TYP.)

FRAME STUD - 3/8" DIAM. X 8"

WWR - TIED IN 2 PLACES TO FRAME STUD (TYP.)

FRAMING STUD - 3/8" DIAM. X 8"

(1) 1/2" DIAM. HOLE

STIFFENER PLATE

PLATE (TYP.)

3/8" (TYP.)

FRAME (INNER)

L.3" X 3" X 1/4"

EQUIPMENT BONDING JUMPER FROM OTHER LID

HEX COUPLING BOLT

(2) S.S. NUT (TYP.)

(3) S.S. WASHER (TYP.)

TERMINAL RING AND BONDING JUMPER

S. S. 5/16 NC X 1" HEX COUPLING BOLT

WWR - TIED IN 2 PLACES TO FRAME STUD (TYP.)

FRAME STUD - 3/8" DIAM. X 8"

EQUIPMENT BONDING JUMPER FROM OTHER LID

HEX COUPLING BOLT

(2) S.S. NUT (TYP.)

(3) S.S. WASHER (TYP.)

TERMINAL RING AND BONDING JUMPER

S. S. 5/16 NC X 1" HEX COUPLING BOLT

WWR - TIED IN 2 PLACES TO FRAME STUD (TYP.)

FRAME STUD - 3/8" DIAM. X 8"

FRAME (OUTER)

SEE NOTE 9

LID

EQUIPMENT BONDING JUMPER FROM OTHER LID

HEX COUPLING BOLT

(2) S.S. NUT (TYP.)

(3) S.S. WASHER (TYP.)

TERMINAL RING AND BONDING JUMPER

S. S. 5/16 NC X 1" HEX COUPLING BOLT

WWR - TIED IN 2 PLACES TO FRAME STUD (TYP.)

FRAME STUD - 3/8" DIAM. X 8"

EQUIPMENT BONDING JUMPER FROM OTHER LID

HEX COUPLING BOLT

(2) S.S. NUT (TYP.)

(3) S.S. WASHER (TYP.)

TERMINAL RING AND BONDING JUMPER

S. S. 5/16 NC X 1" HEX COUPLING BOLT

WWR - TIED IN 2 PLACES TO FRAME STUD (TYP.)

FRAME STUD - 3/8" DIAM. X 8"
**LOCKING LID STANDARD DUTY JUNCTION BOX**

**CONDUCTORS NOT SHOWN**

**GROUND STUD (TYP) → SEE NOTE**

**TOP OF SOIL SURFACE**

**TOP OF PAVED SURFACE**

**HEX COUPLING NUT (TYP) → SEE DETAIL "C"**

**1/2" STEEL COVER PLATE (TYP)**

**LIFT HOLE → 1" - 2" DIAM.**

**INSIDE WIDTH OF FOUNDATION**

**GROUND STUD**

**WELDED WIRE REINFORCEMENT (TYP) (WWIR) 4" x 4" x 2" B (8 GAGE)**

**WELDED WIRE HOOP (TYP) 3" x 3" x 2" B (8 GAGE)**

**NOTE 8**

**NOTES**

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. Minimum lid thicknesses are shown. The diamond pattern shall be a minimum of 28% of the overall thickness. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lip cover plate and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" inch line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

3. Lid support members shall be 3/16" min. thick steel C, L, or T shape, welded to the frame. Exact configurations vary among manufacturers.

4. A 1/4-20 NC x 3/4" S.S. ground stud shall be welded to the bottom of each lid; include (2) S.S. nuts and (2) S.S. flat washers.

5. The hinges shall allow the lids to open 180°.

6. Bolts and nuts shall be liberally coated with anti-seize compound.

7. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to the ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the 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 he #8 AWG min. x 4' of tin plated copper.


9. See the Standard Specifications for alternative reinforcement and class of concrete.


11. Capacity = conduit diameter = 24".

12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement, actual configurations of assembly will vary among manufacturers. See approved manufacturers' shop drawing for specifics.

13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults and Pull Boxes shall not be placed within the 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 8-20.3(5). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 8" min. to 10" max. See Standard Specification 8-20.3(6).
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

NOTE

1. Install the Junction Box on the Timber Sign Post or the Steel Sign Support that is farthest from the roadway.

FIELD DRILL 1/2" DIAM.
HOLE FOR DRAIN TUBE
(TYP.)
(ONE (LOW) SIDE ONLY)
2" CONDUIT
(TYP.)
CONCRETE-
TIGHT FITTING
(TYP.)
-SEE NOTE 3
NEOPRENE GASKET
S. S. MOUNTING TAB
(TYP.)
-SEE NOTE 3
1/4 - 20 NC x 3/4" S. S. GROUND STUD
1/4 - 20 NC x 1" S. S. SEALED WELL NUT
WITH A DAM AT REAR TO PREVENT CONCRETE INFILTRATION - TACK WELD 3 PLACES
POSSIBLE CONDUIT LOCATION FOR LUMINAIRE OR OTHER ELECTRICAL SYSTEM FEED
SO. S. MOUNTING TAB
(TYP.)
DRAIN TUBE - POLYETHYLENE, 3/8" DIAM.,
0.062" WALL THICKNESS, RATED FOR 110 PSI WORKING PRESSURE @ 73°F
PLAN VIEW
ISOMETRIC VIEW
SHOWN MOUNTED IN REINFORCING STEEL
SYSTEM IDENTIFICATION
- SEE NOTE 4
DRAIN TUBE APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
Pasco Bakotich III
06-03-10
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
1. Junction Box shall be constructed of Type 304 stainless steel, welded seam construction, 12 gage box with #28 finish, 12 gage adjustment tabs, and 12 gage mounting tabs.

2. Field drill or punch holes in the center of Junction Box ends. Additional holes may be required.

3. Use fittings that are 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 an end bell bushing on the inside for PVC conduit.

4. The System Identification letters shall be 1/16" line thickness formed by engraving, stamping or with a S.S. weld bead.

5. Liberally coat the threads of the cover fasteners with anti-sieze compound during construction and before final closure.

6. Detail shown for box installation in slip form barrier.

7. Conduit capacity = 8".

8. Conduits shall enter Junction Box from ends only.

9. Not to be used for Stainless Steel Junction Box that are traffic barrier mounted. See Standard Plan J-40.36.
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 3" edge distance to the centerline of anchor holes in concrete. Mount the stainless steel support using an approved resin-bonded anchor system, installed per manufacturers’ recommendation. Resin bonded anchors shall be stainless steel and shall be of 3/8" diameter. (Expansion Anchors are not allowed).

2. The System Identification letters on the box lid shall be 1/8" line thickness formed by engraving, stamping, or with a S. S. weld. See System Identification Detail and Standard Specifications 9-29.2(4).


4. Size Junction Box per NEC 314.28, with the exception that for all length and width calculations, use the 8 times multiplier instead of the 6 times.

5. Equipment Bonding Jumper shall be #8 AWG (min.) x 1 foot of tinned, braided copper.
1. For Installation Notes and 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 additional Induction Loop details, see Standard Plan J-50.15.
TYPE 2 STOP LINE LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

2C(SH) CABLE
JUNCTION BOX

LOOPS SERIES NUMBER (TYP.)

TRAFFIC FLOW

TYPE 2 SAMPLING LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

2C(SH) CABLE
JUNCTION BOX

LOOPS SERIES NUMBER (TYP.)

TRAFFIC FLOW

TYPE 2 ADVANCE LOOP WIRING DIAGRAM

2C(SH) CABLE
JUNCTION BOX

LOOPS SERIES NUMBER

TRAFFIC FLOW

LOOP NUMBERING LAYOUT DETAIL

SPLICE (TYP.)
OFFSET CRIMPS

SPLICE (TYP.)

LOOP SERIES NUMBER MARKING SLEEVE (TYP.)

LOOP SERIES START OR FINISH MARKING SLEEVE (TYP.)

S = START
F = FINISH
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.
Loop numbering layout will be similar to Loop Numbering Layout Detail, Sheet 3.
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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 burl 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 B-20.3(14D) once installation is complete.

12. Existing stubouts shall be upgraded as necessary to conform to the conduit size table shown on sheet 1.

13. All loop lead-in sawcuts parallel to lane edge shall be at least 12" from edge of pavement and within six inches outside of lane or fog line when possible. Maintain 12" separation between parallel cuts or joints.

14. The loop stub-out sleeve shall have an inside diameter 1" larger than the outside diameter of the End Bell Bushing. Plug conduit and fill sleeve with sand until loops are installed to keep out Hot Asphalt during paving operations.

INDUCTION PLAN LOOP DETAILS

STANDARD PLAN J-50.15-00

sheet 1 of 3 sheets

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-03-11
STATE DESIGN ENGINEER
Washington State Department of Transportation
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

NOTES

1. See Standard Plan J-50.30 for Piezo axle sensor General Installation instructions, and Modified Type 2 Loop wiring details.

2. The contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other, all piezo ohms readings shall be OIL from shield to center conductor. See piezo specifications for piezo capacitance readings.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @16 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete lanes, install the 4" and 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in the contract.

8. Use Schedule 40 PVC conduit from the Junction box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit in each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation see Standard Specification 8-20.3(6).

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 9.28.2(1B), for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets, according to the Color Code Identification Chart. For Wire Color Code Details see Standard Plan J-50.30.

12. Cabinet can be placed on either side of road depending on terrain/slope, etc. It does not have to be placed on increasing milepost side of the roadway.

13. For 6 - lane layouts and above, see Contract.

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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

**Plan View**

Typical 2 - Lane WIM Layout

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**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 microhens of each other. All piezo ohms readings shall be of shield to center conductor. Class WIM piezo capacitance shall be 8nf to 20nf.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @ 16" leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete pavement lanes, install the loops 4" to 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in Contract.

8. Use Schedule 40 PVC conduit from the Junction Box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit for each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation, see Standard Specification 8-20.35.

10. Junction Boxes installed in the paved shoulder or median shall be a Heavy Duty Junction Box. If box is installed in unpaved shoulder use type 1 or 2. See Standard Plan J-40.10 for size and type. See Standard Specification 8-20.35 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" piezos. For shoulders over 1", use 13" piezos.
**SAWCUT LAYOUT FOR PERMANENT TRAFFIC RECORDER SITE**

(MODIFIED TYPE 2 LOOP SHOWN)

**FEATURES**
- **SAWCUT EDGE**: 2 1/2" HOME EDGE SLOT
- **OF SHOULDER**: 3/8" HOME EDGE SLOT
- **OF LANE**: 3/8" HOME RUN SLOT (TYP.)
- **HOMERUN CONDUIT UNDER THE ROADWAY (TYP.)**
- **SHOULDER NOTCH**: 90° MIN
- **LEAD-INS OR HOME RUN CUTS SHALL NOT EXCEED SHOULDER DEPTH**
- **TOP OF EXISTING PAVEMENT OR LEVELING COURSE OF NEW PAVEMENT**
- **TOP OF ASPHALT OR CEMENT CONCRETE**
- **3/4" SLOT**
- **1/4" SLOT (TYP.)**
- **1/4" HOME RUN SENSOR SLOT**

**INSTALLATION INSTRUCTIONS**

1. **USING PAINT** and a straight edge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 8 ft. of cable inside the cabinet.

2. **USING A WET-CUTTING PAVEMENT SAW** with a 3/4" blade width, cut the piezo slot approximately 4 to 6 inches longer than the piezo length. The piezo slot depth must be a minimum of 1" to a maximum of 1 1/2".

3. **LEAD-IN CUTS FOR THE PIEZO COAX** should be 1/4" 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.


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 TOY) 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 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 8" for class 1 sensor, for the length of the sensor. Use the 3/4" brackets.
SECTION D

FILL SENSOR SLOT WITH GROUT ~ SEE NOTE 9
PIEZO AXLE SENSOR CLASS 1 OR 2 ~ SEE NOTES
TOP OF ROADWAY

LEVEL

SECTION

3/4"

3/8"

1/2"

4" TO 6"

3"

FILL SENSOR SLOT WITH GROUT ~ SEE NOTE 9

PIEZO AXLE SENSOR CLASS 1 OR 2

SENSOR LEAD ATTACHMENT END

HOME RUN SLOT

INSTALLATION BRACKET (TYP.)

SIDE VIEW

BRACKET AND PIEZO LAYOUT

PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS
STANDARD PLAN J-50.30-00

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotic III 06-03-11
STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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.

Required to supplement equipment grounding for luminaire standards with direct burial aerial feeds, or where required in the plans.

Required at all service and separately derived systems.

Type D service cabinet shown. Use this concept for Type E cabinet or transformer.

Type D service cabinet shall be installed on lower surface of foundation only.

Type B service cabinet and transformer cabinet shall be installed on raised surface of foundation only.

Type B modified service cabinet.

Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing.

RIGID PVC CONDUIT (PVC) APPLICATION

GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION
Weid all around lid bonding stud ~ 1/4 NC x 1" stainless steel ~ liberally coat entire assembly w/ anti-seize compound.

Stainless Steel Bonding Stud:
- Weld Bonding Stud to Frame Bonding Plate.
- Weld to lid support frame.
- 1/4" weld ~ 3 sides.
- Grind lid bearing surface flat after welding.
- All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (inch) chamfer or rounding.
- Protect conductors with fireproof cloth prior to welding.
- Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

Protect conductors with fireproof cloth prior to welding.

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.

Lid Bonding Detail:
- Welding details:
  - Weld bonding stud to frame bonding plate.
  - Weld to lid support frame.
  - 1/4" weld ~ 3 sides.
  - Grind lid bearing surface flat after welding.
- All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (inch) chamfer or rounding.
- Protect conductors with fireproof cloth prior to welding.
- Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

Grind lid bearing surface flat after welding.

All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (inch) chamfer or rounding.

Protect conductors with fireproof cloth prior to welding.

Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.
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 center line 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 plum to face of structure. Use Size spacer to maintain plumb line.

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

STAINLESS STEEL CHANNEL SUPPORT

CONDUIT SUPPORT DETAIL
(USE NEXT LARGER TRADE SIZE CONDUIT THAT ALLOWS FOR FREE MOVEMENT OF INNER CONDUIT (TYP.)

PVC CONDUIT SUPPORT DETAIL
(FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES, AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONSTRAINED)

STAINLESS STEEL CHANNEL SUPPORT DETAIL
(VERTICAL MOUNT SHOWN)
SIGNAL HEAD MOUNTING DETAILS ~ POLE AND POST TOP MOUNTINGS

STANDARD PLAN J-75.10-01

Pasco Bakotich III 05-11-11
Washington State Department of Transportation

NOTES

1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
6. Back plates shall be constructed of anodized aluminum and shall be mounted with stainless steel hardware. A 2"-wide strip of yellow retro-reflective, type IV prismatic sheeting, conforming to the requirements of Standard Specification 9-28.12, shall be applied in accordance with the manufacturer’s recommendations.
7. Drill a 1/4" drain hole in the bottom of each signal assembly, and one in the bottom of each pedestrian head. When signal assembly is mounted horizontally, drill a 1/4" drain hole at the lowest point of each section of the signal assembly.

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EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SIDE MOUNT

TYPE A - PEDESTRIAN

TYPE K - VEHICLE

TOP MOUNT

TYPE C - PEDESTRIAN

TYPE F - VEHICLE

PEDESTRIAN HEAD SIDE MOUNT

(LEFT SIDE SHOWN)

TYPE E - NEON GRID OR SIMILAR SIZE LED PEDESTRIAN HEAD

1. BRONZE COLLAR ~ 4 1/4" I.D. OFFSET OPENING WS SET SCREWS
2. DINNERTM CAP
3. WASHER
4. CONDUIT LOCKNUT
5. TYPE E HINGE MOUNT ~ LEFT OR RIGHT, SEE CONTRACT
6. FASTENER WITH SPACER ~
   (2) 1/2" LAG SCREWS ON WOOD POLE
   (2) 1/2" BOLTS TAPPED TO METAL POLE
7. FLATHEAD SOCKET BOLT
8. 1/2" INSERT HOLE FOR EXTERNAL WIRE ENTRANCE
   (REQUIRED ON TIMBER POLE MOUNTING ONLY)
9. TERMINAL BLOCK AND PHENOLIC TAG
10. INSULINER ~ 1" MIN. DIA. HOLE
11. SIGNAL HEAD WITH BACKPLATE

TOP MOUNT

TYPE D - PEDESTRIAN (SHOWN) ~

OFFSET BRONZE COLLAR TO FRONT
OFFSET BRONZE COLLAR TO BACK

ELEVATION MOUNTING DETAILS

SIDE MOUNT

TYPE B - PEDESTRIAN

TYPE H - VEHICLE

BRONZE TERMINAL COMPARTMENT WITH:
• GASKETED COVER
• FASTENERS
• WIRE LEADS
• MOUNTING SADDLE FOR SIDE MOUNTS
• 1/4" DIA. DRAIN HOLE
• 12 POSITION TERMINAL STRIP
• WIREWAY FOR SIDE MOUNTS

ORNAMENT CAP

NEOPRENE GASKET

CONDUIT LOCKNUT

TYPE E HINGE MOUNT - LEFT OR RIGHT, SEE CONTRACT

FASTENER WITH SPACER ~
(2) 1/2" LAG SCREWS ON WOOD POLE
(2) 1/2" BOLTS TAPPED TO METAL POLE
FLATHEAD SOCKET BOLT
1/2" INSERT HOLE FOR EXTERNAL WIRE ENTRANCE
(REQUIRED ON TIMBER POLE MOUNTING ONLY)
TERMINAL BLOCK AND PHENOLIC TAG
INSULINER ~ 1" MIN. DIA. HOLE
SIGNAL HEAD WITH BACKPLATE

SIDE MOUNT

TYPE A - PEDESTRIAN

TYPE H - VEHICLE

CENTER PIPE

LOCKNIPPLE (G)

LOCKNIPPLE (H)

TOP MOUNT

TYPE C - PEDESTRIAN

TYPE F - VEHICLE

PEDESTRIAN HEAD SIDE MOUNT

(LEFT SIDE SHOWN)

TYPE E - NEON GRID OR SIMILAR SIZE LED PEDESTRIAN HEAD

NOTES

1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
6. Back plates shall be constructed of anodized aluminum and shall be mounted with stainless steel hardware. A 2"-wide strip of yellow retro-reflective, type IV prismatic sheeting, conforming to the requirements of Standard Specification 9-28.12, shall be applied in accordance with the manufacturer’s recommendations.
7. Drill a 1/4" drain hole in the bottom of each signal assembly, and one in the bottom of each pedestrian head. When signal assembly is mounted horizontally, drill a 1/4" drain hole at the lowest point of each section of the signal assembly.

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EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SIDE MOUNT

TYPE A - PEDESTRIAN

TYPE H - VEHICLE

TOP MOUNT

TYPE C - PEDESTRIAN

TYPE F - VEHICLE

PEDESTRIAN HEAD SIDE MOUNT

(LEFT SIDE SHOWN)

TYPE E - NEON GRID OR SIMILAR SIZE LED PEDESTRIAN HEAD

NOTES

1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
6. Back plates shall be constructed of anodized aluminum and shall be mounted with stainless steel hardware. A 2"-wide strip of yellow retro-reflective, type IV prismatic sheeting, conforming to the requirements of Standard Specification 9-28.12, shall be applied in accordance with the manufacturer’s recommendations.
7. Drill a 1/4" drain hole in the bottom of each signal assembly, and one in the bottom of each pedestrian head. When signal assembly is mounted horizontally, drill a 1/4" drain hole at the lowest point of each section of the signal assembly.

---

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SIDE MOUNT

TYPE A - PEDESTRIAN

TYPE H - VEHICLE

TOP MOUNT

TYPE C - PEDESTRIAN

TYPE F - VEHICLE

PEDESTRIAN HEAD SIDE MOUNT

(LEFT SIDE SHOWN)

TYPE E - NEON GRID OR SIMILAR SIZE LED PEDESTRIAN HEAD

NOTES

1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
6. Back plates shall be constructed of anodized aluminum and shall be mounted with stainless steel hardware. A 2"-wide strip of yellow retro-reflective, type IV prismatic sheeting, conforming to the requirements of Standard Specification 9-28.12, shall be applied in accordance with the manufacturer’s recommendations.
7. Drill a 1/4" drain hole in the bottom of each signal assembly, and one in the bottom of each pedestrian head. When signal assembly is mounted horizontally, drill a 1/4" drain hole at the lowest point of each section of the signal assembly.

---

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

SIDE MOUNT

TYPE A - PEDESTRIAN

TYPE H - VEHICLE

TOP MOUNT

TYPE C - PEDESTRIAN

TYPE F - VEHICLE

PEDESTRIAN HEAD SIDE MOUNT

(LEFT SIDE SHOWN)

TYPE E - NEON GRID OR SIMILAR SIZE LED PEDESTRIAN HEAD

NOTES

1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
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7. Drill a 1/4" drain hole in the bottom of each signal assembly, and one in the bottom of each pedestrian head. When signal assembly is mounted horizontally, drill a 1/4" drain hole at the lowest point of each section of the signal assembly.
NOTES

1. Type M mounting shall have "O" ring groove and seal top and bottom of signal attachment.

2. Type M mounting for conventional heads shall have a 2" diameter opening at the signal attachment.

3. Type M mounting for optically programmed heads shall have a 3 1/2" diameter opening at the signal attachment.

4. Type N mounting with optically programmed heads shall be installed with 14" nominal arms.

5. See Standard Plan J-75.30 for tether wire, and backplate requirements.

6. Apply bead of silicone around the perimeter of all top end cap openings prior to installation of the end cap assembly.
NOTES
1. Typical view shown. Verify power source location, quantities, location of signs and sign structure fixtures in contract plans.

2. Route IMSA 20-1 3C #14 cable(s) from isolation switch along inside, bottom of the Monotube Mast Arm to the liquid-tight conduit connector(s) at hand hole(s).

3. Route Separate IMSA 20-1 3C #14 cable from load side of terminal strip to each additional light fixture (where applicable) and provides sufficient slack wire per Standard Specification 8-20.3(B).

4. Label all conductors with sign light and circuit number at isolation switch, hand hole(s) and ballast enclosure(s). Labels shall be a PVC or Polyolefin wire marking sleeve per Standard Specification 8-20.3(B).

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 20-1 3C #14 cable shall be black, red and white. The white conductor shall be permanently identified as an equipment grounding conductor, per the NEC.

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 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.

9. All nuts, bolts, washers, and other hardware shall be stainless steel.

10. All holes shall be drilled and tapped.

11. Use the Retrofit Details only when the following conditions apply:
   A. Existing W4 x 13 Luminaire Brackets are to be 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.
3/4" CHASE NIPPLE
WITH LOCKNUT WASHER

3/4" MALLEABLE LB
CONDUIT W/ COVER

1 5/8" x 1 5/8" STAINLESS STEEL
MOUNTING CHANNEL

VARYING NOT TO EXCEED 4'-0"

SECTION D
SIGN LIGHTING FIXTURE WITH RETROFIT
FOR DETAILS NOT SHOWN SEE STANDARD PLAN G-90.40

1 5/8" x 1 5/8" STAINLESS STEEL
MOUNTING CHANNEL

SECTION E
LUMINAIRE BRACKET (TYP.) = W4 x 13 STEEL

SECTION F
LUMINAIRE Bracket (TYP.) = W4 x 13 STEEL

SECTION G
SIGN LIGHTING FIXTURE HOUSING

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

OVERHEAD SIGN
ELECTRICAL DETAILS
(MONOTUBE STRUCTURE)
STANDARD PLAN J-75.40-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakotich III 10-14-09
STATE DESIGN ENGINEER
Washington State Department of Transportation
NOTES

1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder or the traveled way. Use a 6\" thick lid for new Pull Box installations. Use a 8\" thick Heavy Duty Lid when converting a Standard Duty Pull Box into a Heavy Duty Pull Box in the paved shoulder or the traveled way and no overlay is called for in the Contract. Otherwise, see Contract Plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Pull Box and Lid when placed in unpaved areas. Use Standard Duty Pull Box in sidewalks, walkways, and shared-use paths.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32\" thick.

4. Standard Duty Pull Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8\" inch line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

5. A 1/4-20 UNC x 3/4\" S. S. ground stud with (2) S. S. nuts and (2) S. S. flat washers shall be attached to the Standard Duty Lid and coated with anti-seize compound. Provide a 5/8\" diameter cored hole in the ductile iron lid gusset (Heavy Duty Lid) with 1/2-13 UNC x 1 1/4\" S. S. bolt, (3) S. S. flat washers, and (2) S. S. nuts for the Bonding Jumper.

6. Connect a Bonding Jumper to the steel conduit bushing for GRP conduit and connect the steel conduit bushing jumper to the equipment ground at the threaded brass ground insert. Connect the equipment grounding conductors in the PVC and/or GRP conduits to the brass ground insert. The Bonding Jumper shall be 88 min. x 4\" (ft) of tinned braided copper between the lid and the frame of the Heavy Duty tops and from the Heavy Duty top to the threaded brass ground insert. The Bonding Jumper shall be #8 min. x 4\" (ft) of tinned braided copper between the lid on a Standard Duty Pull Box and the threaded brass ground insert. See Contract Plans Sheets and Standard Plan J-60.05 for Bonding Jumper requirements.

7. The system identification letters shall be 1/8\" line thickness formed by engraving, casting, stamping, or with a S. S. weld bead. See COVER MARKING DETAIL. See Standard Specification 9-29.2(4). Ductile iron lid lettering shall be recessed.

8. Cement concrete shall be Class 4000.

9. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

10. Capacity - conduit diameter = 40\" (in.).

11. Excavate material, place 6\" crushed surfacing cad per Standard Specification Section 8-20.3(6). Field bend #3 reinforcing bar to allow conduit into the Pull Box. Field bend reinforcing bar back into place, wire tie in (2) pieces, and cast in commercial concrete (commercial concrete only allowed for box bottom/wall completion).

12. This drawing depicts a typical Pull Box assembly. Reinforcing not shown. Each manufacturer's Pull Box assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.

---

**PULL BOX**

**STANDARD PLAN J-90.10-01**

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 06-27-11

Washington State Department of Transportation

**SHEET 1 OF 2 SHEETS**
1. The Heavy Duty Lid shall be used when a Cable Vault is placed in the paved shoulder or the traveled way. Use a 9" thick lid for new Cable Vault installations. Use a 6" thick Heavy Duty Lid when converting a Standard Duty Cable Vault into a Heavy Duty Cable Vault in the paved shoulder or the traveled way and no overlay is called for in the Contract. Otherwise, see Contract Plans for overlay depth and fabricate lid thickness to match overlay depth.

2. Use Standard Duty Cable Vault and Lid when placed in unpaved areas. Use Standard Duty Pull Box in sidewalks, walkways, and shared-use paths.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" thick.

4. Standard Duty Cable Vaults installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" line thickness formed with a stainless steel weld bead and shall be placed prior to hot-dip galvanizing.

5. A 1/4 - 20 UNC x 3/4" S. S. ground stud with (2) S. S. nuts and (2) S. S. flat washers shall be attached to the Standard Duty Lid and coated with anti-seize compound. Provide a 5/8" diameter cored hole in the ductile iron gusset (Heavy Duty Lid) with 1/2 - 13 UNC x 1 1/4" S. S. bolt, (3) S. S. flat washers, and (2) S. S. nuts for the Bonding Jumper.

6. Connect a Bonding Jumper to the steel conduit bushing for GRS conduit and connect the steel conduit Bushing Jumper to the equipment ground at the threaded brass ground insert. Connect the equipment grounding conductors in the PVC and/or GRS conduits to the brass ground insert. The Bonding Jumper shall be #8 min. x 4" (ft.) of tinned 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 tinned braided copper between the lid on a Standard Duty Vault and the threaded brass ground insert. See Contract Plan Sheets and Standard Plan J-60.05 for Bonding Jumper requirements.

7. The system identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a S. S. weld bead. See COVER MARKING DETAIL, Standard Specification 9-29.2(4).

8. Cement concrete shall be Class 4000.

9. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

10. Capacity - conduit diameter = 60" (in.).

11. Excavate material, place 6" crushed surfacing pad per Standard Specification 8-20.3(6). Field bend #3 reinforcing bar to allow conduit into the Cable Vault. Field bend reinforcing bar to straighten into place, wire tie 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.
INTERNAL OBLIQUE VIEW

*LOCATION WIRE - PROVIDE 1'-0" DIAM. LOOP ABOVE CHANNEL SECTION SECURE IN BRIDLE RING

8" PIPE HANGER - SEE DETAIL

CABLE BUFFER (TYP.) - SEE PIPE HANGER DETAIL

SPICE CASE MOUNTING AT SPLICE LOCATION

AT NO TIME SHALL THE CABLE'S MINIMUM BENDING RADIUS LIMITATIONS BE COMPROMISED

CONDUIT WITHOUT INNERDUCT SHOWN - SEE SHEET 1 FOR CONDUIT WITH INNERDUCT

1/4-20 UNC x 1 11/16" MIN. LENGTH "THREADED BRASS GROUND TAP" INSERT WITH STEEL LEAD GROUND ROD BONDED TO FRAME AND REINFORCING

HEAVY DUTY LID - SEE NOTE 1

7.08" (TYP.)

6" (TYP.)

ISOMETRIC CUTAWAY

SPLIT CABLE VAULT (SHOWN WITH HEAVY DUTY LID)

SEE CABLE VAULT, SHEET 1, FOR DIMENSIONS NOT SHOWN

S. S. HEX HEAD BOLT - 1/2-13 UNC x 15/16"

S. S. CHANNEL, NUT WITH SPRING (PARTIAL CHANNEL SHOWN FOR CLARITY)

HARDWARE MOUNTING RACK - S. S. 1 5/8" SLOTTED CHANNEL

PIPE HANGER - S. S., 12 GAGE, 1" WIDE

CABLE BUFFER - FLEXIBLE PLASTIC PIPE, 8" DIAM., 1'-0" LONG, SPLIT

S. S. HEX BOLT 3/8 - 16 UNC x 9"

S. S. NUT

PIPE HANGER DETAIL

FABRICATE IF NOT AVAILABLE COMMERCIALLY

BRIDLE RING DETAIL

LOGO DETAIL
NOTES
1. Sign sequence is the same for both directions of travel. Adjust for the direction of roadway curves.
2. Flashing Warning Lights (Type B per MUTCD) and/or flags may be used to call attention to the advance Warning Signs.
3. Existing conflicting pavement markings and signs that are no longer applicable shall be removed or obliterated. Temporary pavement markings shall be used to delineate bypass detour.
4. Raised pavement markers and/or temporary guideposts may be used on bypass as directed by the Engineer.
5. Steady Burning Warning Light (Type C per MUTCD) shall be used to mark Channelizing Devices at night.
6. Where advisory speed is 30 mph or less, reverse turn signs should be used. Other curve or turn Warning Signs may be substituted to depict roadway alignment.
7. Temporary barriers and end treatments shall be crashworthy.
8. To improve visibility, consider use of temporary illumination at closure points.
10. Consider using a PCMS for additional advance warning.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

RURAL HIGHWAYS  80 / 85 MPH  800’ ±
RURAL ROADS   45 / 55 MPH  500’ ±
RURAL ROADS & URBAN ARTERIALS  35 / 40 MPH  350’ ±
RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS  25 / 30 MPH  200’ ±

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

SIGN SPACING = X

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
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<tr>
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</tr>
<tr>
<td>25 / 30</td>
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<td>40</td>
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STREAM OR OTHER OBSTRUCTION
TEMPORARY DOUBLE YELLOW CENTERLINE
TEMPORARY WHITE EDGE LINE

LEGEND
- CHANNELIZING DEVICES
- BARRICADE - TYPE 3 R
- BARRICADE - TYPE 3 L
- Temporary Impact Attenuator
- Sign Location
**SIGN SPACING = X (1)**

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<tr>
<th>Type</th>
<th>Speed Limit</th>
<th>Spacing</th>
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<tr>
<td>RURAL ROADS</td>
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<tr>
<td>RURAL ROADS &amp; URBAN ARTERRIALS</td>
<td>35 / 40 MPH</td>
<td>300' x</td>
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<td>RURAL ROADS, URBAN ARTERRIALS, RESIDENTIAL &amp; BUSINESS DISTRICTS</td>
<td>25 / 30 MPH</td>
<td>200' x</td>
</tr>
<tr>
<td>URBAN STREETS</td>
<td>25 MPH OR LESS</td>
<td>100' x</td>
</tr>
</tbody>
</table>

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**NOTES**

1. Modify Regulatory Traffic Control Devices, as needed, for the duration of the detour.
2. Two Flashing Warning Lights (Type A per MUTCD) may be used to mark each barricade at night.
3. Trail Blazers shall be installed throughout the detour, as appropriate.
4. Signing shown for the one direction only.
5. Coordinate with emergency services.
6. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**LEGEND**

- **SIGN LOCATION**
- **BARRICADE = TYPE 3 R**
- **BARRICADE = TYPE 3 L**
**LONGITUDINAL BUFFER SPACE** = B

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<td>50</td>
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</tbody>
</table>

**POSTED SPEED (MPH)**

**LENGTH B (FEET)**

- RURAL ROADS
- RURAL ROADS & URBAN ARTERIALS
- RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS
- URBAN STREETS

**LENGTH B (FEET)**

- 55
- 85
- 120
- 165
- 200
- 270

**SIGN SPACING** = X

- RURAL ROADS
- RURAL ROADS & URBAN ARTERIALS
- RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS
- URBAN STREETS

**SIGN SPACING** = X

- 45 / 55 MPH 500' ±
- 35 / 40 MPH 350' ±
- 25 / 30 MPH 200' ±
- 25 MPH OR LESS 100' ±

**ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE**

**CHANNELIZING DEVICE SPACING**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

**NOTES**

1. This plan is intended for use on roadways when traffic volumes create sufficient gaps for motor vehicles to yield.
2. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark Channelizing Devices at night.
3. Adequate sight distance shall be provided for drivers to see opposing traffic, otherwise use flaggers and/or Temporary Signal.
5. Post mount signs when in place for 3 days or longer.
6. For speed limit 35 mph or higher replace W1-3R with W1-4R.
7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M56-05.
8. Consider using a PCMS for additional advance warning.

**FOR LOCAL AGENCY USE ONLY**

**NOT FOR USE ON STATE ROUTES**

**LANE CLOSURE**

**WITHOUT FLAGGERS ~ LOW VOLUME ROAD**

**STANDARD PLAN K-20.20-01**

**APPROVED FOR PUBLICATION**

**Pasco Bakitch III**

**10-12-07**

**Washington State Department of Transportation**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**
NOTES
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll Ahead distance.
2. Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.
3. Extend Channelizing Device taper across shoulder ~ recommended.
4. Sign sequence is the same for both directions of travel on the roadway.
5. Channelizing Device spacing for the downstream taper option shall be 20’ O.C.
6. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

SIGN SPACING = X (1)

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<thead>
<tr>
<th>Category</th>
<th>Speed Range</th>
<th>Sign Spacing</th>
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<tbody>
<tr>
<td>RURAL HIGHWAYS</td>
<td>60/65 MPH</td>
<td>80’ ±</td>
</tr>
<tr>
<td>RURAL ROADS</td>
<td>45/55 MPH</td>
<td>50’ ±</td>
</tr>
<tr>
<td>RURAL ROADS &amp; URBAN ARTERIALS</td>
<td>35/40 MPH</td>
<td>350’ ±</td>
</tr>
<tr>
<td>RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL &amp; BUSINESS DISTRICTS</td>
<td>25/30 MPH</td>
<td>30’ ± (2)</td>
</tr>
<tr>
<td>URBAN STREETS</td>
<td>25 MPH OR LESS</td>
<td>100’ ± (2)</td>
</tr>
</tbody>
</table>

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.
(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.
NOTES

1. Channelizing Devices are recommended along centerline to separate traffic from work operation. Devices are required at tapers to shift traffic movement between lanes and to protect all flagging stations.

2. Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.

3. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

LONGITUDINAL BUFFER SPACE = B

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>LENGTH B (FEET)</th>
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<tr>
<td>60</td>
<td>570</td>
</tr>
</tbody>
</table>

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

RECOMMENDED

G20-501
RIGHT TWO LANES CLOSED AHEAD
W2-1
ROAD WORK AHEAD

NOTES
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.
2. Devices shall not encroach into adjacent lanes.
3. Extend device taper (U3) across shoulder ~ recommended
4. Portable Changeable Message Sign (PCMS) ~ recommended.
5. Use Transverse Devices in closed lane every 100' ± recommended.
6. Traffic Safety Drums for all tapers on high speed roadway ~ recommended.
7. Channelizing Device spacing for the downstream taper option shall be 20' O.C.
8. For signs size refer to Manual on Uniform Traffic Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

DOUBLE LANE CLOSURE
ON MULTILANE ROADWAY

STANDARD PLAN K-24.40-01

APPROVED FOR PUBLICATION
Pasco Bakotich III 10-12-07

Washington State Department of Transportation

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
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<tbody>
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<td>80</td>
</tr>
<tr>
<td>40 / 45</td>
<td>30</td>
<td>60</td>
</tr>
</tbody>
</table>

LEGEND

SIGN LOCATION
CHANNELIZING DEVICES
PCMS
PORTABLE CHANGEABLE MESSAGE SIGN
ARROW PANEL
**Effective: August 6, 2012 to August 4, 2013**

### Recommended

- A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

- Devices shall not encroach into adjacent lanes.

- Extend device taper (1/3) across shoulder ~ recommended.

- Portable Changeable Message Sign (PCMS) ~ recommended.

- Use Transverse Devices in closed lane every 1000' ~ recommended.

- Traffic Safety Drums for all tapers on high speed roadway ~ recommended.

- Channelizing Device spacing for the downstream taper option shall be 20' O.C.

- For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

### Buffer Data

**Typical Protective Vehicle with TMA** (See Note 1)

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Loaded Weight</th>
<th>Minimum Weight</th>
<th>Maximum Weight</th>
<th>Manufacturer Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Yard Dump Truck</td>
<td>55K</td>
<td>15,000 LBS</td>
<td>(Maximum weight shall be in accordance with manufacturer recommendation)</td>
<td></td>
</tr>
</tbody>
</table>

#### Roll Ahead Stopping Distance = 30 Feet Min.

(Dry pavement assumed)

---

### Minimum Taper Length = L (Feet)

<table>
<thead>
<tr>
<th>Lane Width (Feet)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>105</td>
<td>150</td>
<td>205</td>
<td>270</td>
<td>400</td>
<td>500</td>
<td>550</td>
<td>600</td>
</tr>
<tr>
<td>11</td>
<td>115</td>
<td>165</td>
<td>225</td>
<td>294</td>
<td>405</td>
<td>550</td>
<td>605</td>
<td>660</td>
</tr>
<tr>
<td>12</td>
<td>125</td>
<td>180</td>
<td>245</td>
<td>320</td>
<td>540</td>
<td>660</td>
<td>680</td>
<td>720</td>
</tr>
</tbody>
</table>

---

### Channelizing Device Spacing

<table>
<thead>
<tr>
<th>Post Speed (MPH)</th>
<th>In Taper (Feet)</th>
<th>In Tangent (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 70</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

---

**Notes**

1. **Construction Closure** - See Note 5

2. **End Road Work** - See Note 7

---

### Single Lane Closure on Multilane Roadway

**Plan View**

**Longitudinal Buffer Space = B**

- **Post Speed (MPH)**: 25, 30, 35, 40, 45, 50, 55, 60
- **Length B (Feet)**: 155, 200, 250, 305, 360, 425, 485, 540

---

### Legend

- **DI**: Sign Location
- **<** Channelizing Devices
- **PCMS**: Portable Changeable Message Sign
- **ARROW PANEL**: Field Locate 1 Mile in Advance of Lane Closure

---

### PCMS Sample Message

<table>
<thead>
<tr>
<th>Lane Closed</th>
<th>One Mile Ahead</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 Sec</td>
<td>1.5 Sec</td>
</tr>
</tbody>
</table>

---

### SIGN SPACING = X (1)

- **RURAL HIGHWAYS**: 60 / 65 MPH
- **RURAL ROADS**: 45 / 55 MPH
- **RURAL ROADS & URBAN ARTERIALS**: 35 / 40 MPH
- **RURAL ROADS & URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS**: 25 / 30 MPH
- **URBAN STREETS**: 25 MPH or less

---

### For Local Agency Use Only

- **All signs are back on orange unless designated otherwise**

---

### Field of Work

- **Work Area**
- **See Note 5**

---

**Single Lane Closure on Multilane Roadway**

**Standard Plan K-24.60-00**

### Notes

- **Speed Limit**
- **Channelizing Devices**
- **Sign Location**

---

**For Local Agency Use Only**

- **Not for Use on State Routes**

---

**Not For Publication**

- **Ken L. Smith 02-15-07**
- **Main Design Engineer**
- **W SDOT**
- **State of Washington Department of Transportation**

---

**Expiration Date**: August 4, 2013
LONGITUDINAL BUFFER SPACE = B

**POSTED SPEED (MPH)**
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70

**LENGTH (FEET)**
- 155
- 200
- 250
- 305
- 350
- 425
- 495
- 570
- 645
- 730

SIGN SPACING = X (1)

- RURAL HIGHWAYS: 60 / 65 MPH
- RURAL ROADS: 45 / 55 MPH
- RURAL ROADS & URBAN ARTERIALS: 35 / 40 MPH
- RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS Districts: 25 / 30 MPH
- URBAN STREETS: 25 MPH OR LESS

**LENGTH (FEET)**
- 155
- 200
- 250
- 305
- 360
- 425
- 495
- 570
- 645
- 730

SIGN SPACING = X (2)

- RURAL ROADS, URBAN ARTERIALS, 25 / 30 MPH
- RESIDENTIAL & BUSINESS DISTRICTS: 200' ±

NOTES
1. Existing conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
2. Steady-Burn Warning Lights (Type C, MUTCD) shall be used to mark Channelizing Devices at night.
3. Exposed ends of Concrete Barriers shall be tapered outside the clear zone or fitted with impact attenuators.
4. Roadside Barrier and End Treatment shall be crashworthy. Refer to Design Manual, Chapter 710 & 720, for barrier and attenuator information.
5. Temporary concrete barrier may be Type 2 (see Standard Plan C-8) or Alternative (see Standard Plan K-80.30). Anchoring may be required (see Standard Plans K-80.35 and K-80.37).
6. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

MINIMUM TAPER LENGTH = L (FEET)

**LANE WIDTH**
- (FEET)
- 10
- 11
- 12

**POSTED SPEED (MPH)**
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70

**IN TAPER (FEET)**
- 105
- 115
- 125

**IN TANGENT (FEET)**
- 150
- 180
- 246

50 / 65
- 40
- 80

35 / 40
- 40
- 50

25 / 30
- 20
- 40

MINIMUM TAPER LENGTH = L (FEET)

**LANE WIDTH**
- (FEET)
- 10
- 11
- 12

**POSTED SPEED (MPH)**
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70

**IN TAPER (FEET)**
- 105
- 115
- 125

**IN TANGENT (FEET)**
- 150
- 180
- 246

LONGITUDINAL BARRIER FLARE RATES

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>ANCHORED BARRIER</th>
<th>UNANCHORED BARRIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>18 : 1</td>
<td>16 : 1</td>
</tr>
<tr>
<td>55</td>
<td>16 : 1</td>
<td>14 : 1</td>
</tr>
<tr>
<td>50</td>
<td>14 : 1</td>
<td>12 : 1</td>
</tr>
<tr>
<td>45</td>
<td>12 : 1</td>
<td>11 : 1</td>
</tr>
<tr>
<td>40 OR BELOW</td>
<td>11 : 1</td>
<td>10 : 1</td>
</tr>
</tbody>
</table>

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

LEGEND

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>■</td>
<td>SIGN LOCATION</td>
</tr>
<tr>
<td>☐ ☐ ☐ channelizing devices</td>
<td>temporary concrete barrier with reflectors</td>
</tr>
<tr>
<td>☐</td>
<td>portable changeable message sign</td>
</tr>
<tr>
<td>☐</td>
<td>arrow panel</td>
</tr>
<tr>
<td>☐</td>
<td>traffic safety drum</td>
</tr>
<tr>
<td>☐</td>
<td>temporary impact attenuator</td>
</tr>
</tbody>
</table>

PCMS SAMPLE MESSAGE

1
1.5 SEC
1.5 SEC

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

SINGLE LANE CLOSURE WITH TEMPORARY CONCRETE BARRIER

STANDARD PLAN K-24.80-01

APPROVED FOR PUBLICATION

Pasco Bakotich III
10-12-07
Washington State Department of Transportation

EXPIRES AUGUST 5, 2023

PCMS FIELD LOCATE IN ADVANCE OF LANE CLOSURE SIGNING

SINGLE LANE CLOSURE

WITH TEMPORARY CONCRETE BARRIER

STANDARD PLAN K-24.80-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Pasco Bakotich III
10-12-07
Washington State Department of Transportation

EXPIRES AUGUST 5, 2023

PCMS FIELD LOCATE IN ADVANCE OF LANE CLOSURE SIGNING
### Buffer Data

#### Longitudinal Buffer Space = B

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH B (FEET)</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>305</td>
<td>360</td>
<td>425</td>
</tr>
</tbody>
</table>

- **Recommended.**

#### Typical Protective Vehicle with TMA (See Note 1)

- **Vehicle Type:**
  - Loaded Weight: 4 Yard Dump Truck, Service Truck, Flat Bed, etc.
  - Minimum Weight: 15,000 lbs. (Maximum weight shall be in accordance with manuf. factorer recommendation)

- **Roll Ahead Stopping Distance = 30 Feet Min.** (Dry Pavement Assumed)

### Sign Spacing = X

#### Rural Roads

- 45/55 MPH: 500' ±

#### Rural Roads & Urban Arterials

- 35/40 MPH: 300' ±

#### Rural Roads, Urban Arterials, Residential & Business Districts

- 25/30 MPH: 200' ±

All signs are black on orange unless designated otherwise.

### Effectiveness

- August 6, 2012 to August 4, 2013

### Minimum Taper Length = L (Feet)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED SPEED (MPH)</td>
<td>105</td>
<td>150</td>
<td>205</td>
<td>260</td>
<td>300</td>
<td>360</td>
<td>420</td>
<td>460</td>
<td>500</td>
</tr>
</tbody>
</table>

### Channelizing Device Spacing

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>50</th>
<th>40</th>
<th>30</th>
<th>20</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN TAPER (FEET)</td>
<td>80</td>
<td>60</td>
<td>40</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

### Notes

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll Ahead distance.

2. Extend device taper (L3) across shoulder ~ recommended.

3. Portable Changeable Message Sign (PCMS) ~ recommended.

4. If the lane shift is short and has minimal radius curve (30mph or less) use sign W1-3 in lieu of sign W1-4.

5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
LONGITUDINAL BUFFER SPACE = B

POSTED SPEED (MPH)
25 30 35 40 45 50
LENGTH B (FEET)
115 200 250 305 360 425

BUFFER DATA

TYPICAL PROTECTIVE VEHICLE WITH TMA

VEHICLE TYPE
YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.

MINIMUM WEIGHT 15,000 LBS.
(MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN.
(DRY PAVEMENT ASSUMED)

LANE WIDTH 10' MIN. - SEE STANDARD PLAN K-24.20 FOR ALTERNATE ENCROACHMENT

SIGN SPACING = X

RURAL ROADS 45 / 55 MPH 500 ±
RURAL ROADS & URBAN ARTERIALS 35 / 40 MPH 300 ±
RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS 25 / 30 MPH 200 ±
ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (FEET)
POSTED SPEED (MPH)
10 25 105 165 225 245 320 540 600
11 30 150 205 270 450 550
12 45 150 305 40 45 50
25 / 30 20 40

CHANNELIZING DEVICE SPACING

POSTED SPEED (MPH)
50 35 / 45 30 60
12 / 15 40 40

SIGN SPACING

RURAL ROADS 45/55 MPH 500' ±
RURAL ROADS & URBAN ARTICULARS 35/40 MPH 350' ±
RESIDENTIAL & BUSINESS DISTRICTS 25/30 MPH 200' ±

NOTES

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Portable Changeable Message Sign (PCMS) is recommended.

3. Prohibit turns as necessary for traffic conditions.

4. For signs size refer to Manual on Uniform Traffic Control Device (MUTCD) and WSDOT Sign Fabrication Manual M65-05.
SIGN SPACING = x

<table>
<thead>
<tr>
<th>SIGN LOCATION</th>
<th>ROAD WORK AHEAD</th>
<th>ROAD WORK AHEAD</th>
<th>ROAD WORK AHEAD</th>
<th>ROAD WORK AHEAD</th>
</tr>
</thead>
</table>

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 / 55</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>21</td>
<td>40</td>
</tr>
</tbody>
</table>

MINIMUM TAPER LENGTH = L (FEET)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>66</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td>106</td>
<td>150</td>
<td>205</td>
<td>270</td>
<td>345</td>
<td>400</td>
<td>450</td>
<td>505</td>
<td>560</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>115</td>
<td>155</td>
<td>225</td>
<td>294</td>
<td>363</td>
<td>432</td>
<td>500</td>
<td>569</td>
<td>635</td>
</tr>
<tr>
<td>12</td>
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<td>125</td>
<td>165</td>
<td>245</td>
<td>306</td>
<td>378</td>
<td>440</td>
<td>500</td>
<td>570</td>
<td>640</td>
</tr>
</tbody>
</table>

NOTES

1. If the work space extends across a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).
2. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection.
   However, when this results in the closure of a right lane having significant right turning movements, then the right lane may be restricted to right turn only, as shown. This procedure increases the through capacity by eliminating right turns from the open through lane.
3. Prohibit turns as necessary for traffic conditions.
4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.
5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
1. If the work space extends across a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).

2. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left lane having significant left-turning movements, then the left lane may be reopened as a turn bay for left turns only, as shown.

3. Prohibit turns as necessary for traffic conditions.

4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.

5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.

6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

NOTES

LEGEND

\[ \text{SIGN SPACING} = X \]

<table>
<thead>
<tr>
<th>RURAL ROADS</th>
<th>45 / 55 MPH</th>
<th>50' ±</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL ROADS &amp; URBAN ARTERIALS</td>
<td>35 / 40 MPH</td>
<td>300' ±</td>
</tr>
<tr>
<td>RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL &amp; BUSINESS DISTRICTS</td>
<td>25 / 30 MPH</td>
<td>200' ±</td>
</tr>
<tr>
<td>URBAN STREETS</td>
<td>25 MPH OR LESS</td>
<td>100' ±</td>
</tr>
</tbody>
</table>

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

MINIMUM TAPER LENGTH = L (FEET)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>105</td>
<td>150</td>
<td>205</td>
<td>270</td>
<td>450</td>
<td>500</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>115</td>
<td>155</td>
<td>220</td>
<td>294</td>
<td>495</td>
<td>555</td>
<td>605</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>125</td>
<td>180</td>
<td>245</td>
<td>320</td>
<td>540</td>
<td>600</td>
<td>660</td>
<td></td>
</tr>
</tbody>
</table>

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 70</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

INTERSECTION ~ LEFT LANE CLOSURE FAR SIDE
STANDARD PLAN K-32.40-00

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

NOTE:岁的去,所以下面的交点应该被封闭（see Standard Plan K-34.20）。

2. 正常的做法是在近侧关闭不通过该交点的车道。然而，当结果是关闭一个左转车道时，该左转车道可能被重新打开作为左转车道。

3. 禁止左转必要时，根据交通条件。

4. 闪光警告灯（类型A根据MUTCD）应使用，必要时，标记路障在夜间。

5. 稳定燃烧警告灯（类型C根据MUTCD）应使用标记渠化设备。

6. 对于长期工程，冲突的路面标记不再适用时应移除或标记。临时标记应使用。

7. 对于尺寸请参阅《统一交通控制设备手册》（MUTCD）和WSDOT标志制作手册M55-05。
SIGN SPACING = X

| RURAL ROADS                 | 45 / 50 MPH | 100’ ± |
| RURAL ROADS & URBAN ARTERIALS | 35 / 40 MPH | 135’ ± |
| RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS | 25 / 30 MPH | 200’ ± |
| URBAN STREETS               | 25 MPH OR LESS | 100’ ± |

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

SIGN LOCATION

CHANNELIZING DEVICES

TEMPORARY TRAFFIC ARROW – OPTIONAL

BARRICADE – TYPE 3 R

NOTES
1. Prohibit turns as necessary for traffic conditions.
2. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.
3. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
4. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-06.

MINIMUM TAPER LENGTH = L (FEET)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>105</td>
<td>150</td>
<td>205</td>
<td>270</td>
<td>345</td>
<td>405</td>
<td>500</td>
<td>550</td>
</tr>
<tr>
<td>11</td>
<td>115</td>
<td>165</td>
<td>225</td>
<td>294</td>
<td>369</td>
<td>449</td>
<td>550</td>
<td>605</td>
</tr>
<tr>
<td>12</td>
<td>125</td>
<td>180</td>
<td>245</td>
<td>320</td>
<td>405</td>
<td>510</td>
<td>600</td>
<td>660</td>
</tr>
</tbody>
</table>

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 70</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>
LONGITUDINAL BUFFER SPACE = B

POSTED SPEED (MPH) | 25 | 30 | 35 | 40 | 45
LENGTH B (FEET)     | 55 | 85 | 120| 170| 270

SIGN SPACING = X

RURAL ROADS                          45 / 55 MPH 50Y' X
RURAL ROADS & URBAN ARTERIALS        35 / 40 MPH 35Y' X
RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS 25 / 30 MPH 20Y' X
URBAN STREETS                        25 MPH OR LESS 10Y' X
ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (FEET) POSTED SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55
10 | 105 | 160 | 205 | 270 | 450 | 500 | 550
11 | 115 | 185 | 225 | 294 | 495 | 550 | 605
12 | 125 | 180 | 245 | 320 | 540 | 600 | 650

CHANNELEDIZING DEVICE SPACING

POSTED SPEED (MPH) IN TAPER (FEET) IN TANGENT (FEET)
50 / 70 40 80
35 / 45 30 60
25 / 30 20 40

LEGEND

\[\text{\textbullet} \]
SIGN LOCATION

\[\text{\textbullet\hspace{0.5em}} \]
CHANNELEDIZING DEVICES

\[\text{\textbullet\hspace{1.5em}} \]
ARROW PANEL

\[\text{\textbullet\hspace{2.5em}} \]
BARRICADE - TYPE 3 L

\[\text{\textbullet\hspace{3.5em}} \]
OBLITERATED MARKING

NOTES
1. NO LEFT TURN signs are to be used if traffic volumes are too high or there is an operating signal. Close the left turn pocket if there is one on the side street.
2. When turn prohibitions are implemented, two turn prohibition signs should be used, one on the near side and, space permitting, one on the far side of the intersection.
3. If the work space extends a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).
4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.
5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
6. For long term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used.
7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

FOR LOCAL AGENCY USE ONLY

NOT FOR USE ON STATE ROUTES

INTERSECTION ~ HALF ROAD CLOSURE WITH LANE SHIFT
STANDARD PLAN K-32.80-00

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

APPROVED FOR PUBLICATION
Ken L. Smith 02-15-07
STATE DESIGN ENGINEER
Washington State Department of Transportation

EXPRESS AUGUST 5, 2017
SHEET 1 OF 1 SHEET

STATE DESIGN ENGINEER
Washington State Department of Transportation 02-15-07

APPROVED FOR PUBLICATION
Ken L. Smith 02-15-07
STATE DESIGN ENGINEER
Washington State Department of Transportation

EXPRESS AUGUST 5, 2017
SHEET 1 OF 1 SHEET
NOTES

1. When crosswalks or other pedestrian facilities are closed or re-located, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

2. Controls shown are for pedestrian traffic only.

3. Use Warning Lights on barricades.

4. Maintain a minimum width of 3 feet for pedestrian path.

5. For sign size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
### BUFFER DATA

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>LOADED WEIGHT</th>
<th>MINIMUM WEIGHT 15,000 LBS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 YARD DUMP TRUCK,</td>
<td>SERVICE TRUCK, FLAT BED, ETC.</td>
<td>(MAXIMUM WEIGHT SHALL BE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)</td>
</tr>
</tbody>
</table>

### ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN.

(DRY PAVEMENT ASSUMED)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
<th>TAPER</th>
<th>TANGENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>105</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>30</td>
<td>150</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>35</td>
<td>205</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>40</td>
<td>250</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>45</td>
<td>300</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>50</td>
<td>350</td>
<td>40</td>
<td>80</td>
</tr>
</tbody>
</table>

### SIGN SPACING = X (1)

<table>
<thead>
<tr>
<th>RURAL ROADS</th>
<th>45 / 55 MPH</th>
<th>500' ±</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL ROADS &amp; URBAN ARTERIALS</td>
<td>35 / 40 MPH</td>
<td>350' ±</td>
</tr>
<tr>
<td>RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL &amp; BUSINESS DISTRICTS</td>
<td>25 / 30 MPH</td>
<td>200' ± (2)</td>
</tr>
<tr>
<td>URBAN STREETS</td>
<td>25 MPH OR LESS</td>
<td>100' ± (2)</td>
</tr>
</tbody>
</table>

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE AT-GRADE INTERSECTIONS AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

### LEGEND

- **□** SIGN LOCATION
- **●** CHANNELIZING DEVICES
- **▲** PROTECTIVE VEHICLE - RECOMMENDED

### NOTES

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. For long term projects conflicting pavement markings that are no longer applicable shall be removed. Temporary markings shall be used as necessary and signs shall be posted upon.

3. The sign MOTORCYCLES USE EXTREME CAUTION may be used.

4. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**FOR LOCAL AGENCY USE ONLY**

**NOT FOR USE ON STATE ROUTES**
LONGITUDINAL BUFFER SPACE = B

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH B (FEET)</td>
<td>360</td>
<td>425</td>
<td>495</td>
<td>570</td>
<td>645</td>
<td>730</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BUFFER DATA

TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)

VEHICLE TYPE

4 YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.

MINIMUM WEIGHT 15,000 LBS. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN. (DRY PAVEMENT ASSUMED)

MINIMUM TAPER LENGTH = L (FEET)

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOULDER WIDTH (FEET)</td>
<td>6</td>
<td>8</td>
<td>SEE STD. PLAN</td>
<td>270</td>
<td>300</td>
<td>330</td>
<td>360</td>
<td>390</td>
<td>420</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>K-40.40</td>
<td>360</td>
<td>400</td>
<td>440</td>
<td>480</td>
<td>520</td>
<td>560</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LESS THAN 6</td>
<td>3 DEVICES MINIMUM, SPACED 10' O.C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>50 / 70</th>
<th>45 / 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN TAPER (FEET)</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>IN TANGENT (FEET)</td>
<td>80</td>
<td>60</td>
</tr>
</tbody>
</table>

NOTES

1. A Protective Vehicle is recommended regardless if a TMA is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

3. No Encroachment on the traveled lane is permitted. If Encroachment is necessary, the lane shall be closed (see Standard Plan K-24.20).

4. Signs to be post mounted for long term projects.

5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

LEGEND

SIGN LOCATION

CHALLENGIZING DEVICES

PROTECTIVE VEHICLE - RECOMMENDED

SIGN SPACING = X

RURAL HIGHWAYS

60 / 65 MPH

800' ±

RURAL ROADS

45 / 55 MPH

500' ±

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.

SHOULDER CLOSURE

HIGH SPEED ROADWAY

(45 MPH OR HIGHER)

STANDARD PLAN K-40.20-00

FOR LOCAL AGENCY USE ONLY

NOT FOR USE ON STATE ROUTES

EXPRESS AUGUST 5, 2007

SHOULDER CLOSURE

HIGH SPEED ROADWAY

(45 MPH OR HIGHER)

STANDARD PLAN K-40.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Ken L. Smith 02-15-07

Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
NOTES

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

3. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

SIGN SPACING = X (1)

RURAL ROADS & URBAN ARTERIALS
35 / 40 MPH 300' ±

RURAL ROADS, URBAN ARTERIALS,
RESIDENTIAL & BUSINESS DISTRICTS
25 / 30 MPH 200' ± (2)

URBAN STREETS
25 MPH OR LESS 100' ± (2)

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Ken L. Smith 02-15-07

SHEET 1 OF 1 SHEET

EXPRES AUGUST 5, 2007

SHOULDER CLOSURE
~ LOW SPEED ROADWAY
(40 MPH OR LESS)

STANDARD PLAN K-40.40-00

G20-2A
OR
DOWNSTREAM TAPER TO
SHOW END OF WORK AREA
~ SEE NOTE 2

END ROAD WORK

W01-1 W01-5
WORK AREA

LEGEND

SIGN LOCATION

CHANNELIZING DEVICES

PROTECTIVE VEHICLE ~ RECOMMENDED

LONGITUDINAL BUFFER SPACE = B

POSTED SPEED (MPH) 25 30 35 40 45 50 55 60 65 70
LENGTH B (FEET) 156 200 250 305 SEE STD. PLAN K-40.20

BUDD DATA

TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)

VEHICLE TYPE LOADED WEIGHT 4 YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.

MINIMUM WEIGHT 15,000 LBS. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)

ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN.
(DRY PAVEMENT ASSUMED)

MINIMUM TAPER LENGTH = L (FEET)

SHOULDER WIDTH (FEET) 25 30 35 40 45 50 55 60 65 70
6 83 90 123 160
8 84 120 164 214 SEE STD. PLAN K-40.20
10 105 150 204 267

LESS THAN 6 3 DEVICES MINIMUM, SPACED 10' O.C.

CHANNELIZING DEVICE SPACING

POSTED SPEED (MPH) 35 / 40 25 / 30
IN TAPER (FEET) 30 20
IN TANGENT (FEET) 60 40

SHOULDER WORK
ROAD WORK AHEAD

SHEET 1 OF 1 SHEET
**NOTES**

1. In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning signs and the work area should not exceed 5 miles.

2. In those situations where the distance between the advance signs and the work area is 2 to 5 miles, a supplemental distance plaque should be used with the ROAD WORK AHEAD sign.

3. No encroachment into traffic lane is permitted with this plan.

4. Work vehicle and shadow vehicle shall use warning beacons.

5. Shadow vehicle shall maintain 500’ to 1000’ of sight distance to approaching traffic.

6. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M50-06.

---

**PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R**

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>LOADED WEIGHT</th>
<th>STATIONARY WEIGHT</th>
<th>STATIONARY OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.</td>
<td>MINIMUM WEIGHT 15,000 LBS. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)</td>
<td>30 FEET</td>
<td></td>
</tr>
</tbody>
</table>

Roll ahead distances vary and shall be determined in field based on work operation and site specific conditions.

---

**LEGEND**

- **\( \text{\#} \)**: SIGN LOCATION
- **\( \text{\#} \)**: PROTECTIVE VEHICLE MOUNTED
- **\( \text{\#} \)**: TRUCK MOUNTED ATTENUATOR – RECOMMENDED
- **\( \text{\#} \)**: SEQUENTIAL ARROW PANEL TYPE “B” – CAUTION MODE
- **\( \text{\#} \)**: WARNING BEACON – REQUIRED

**WORK VEHICLE**

**WORK AREA**

**SHADOW VEHICLE**

**ROAD WORK AHEAD**

**SHOULDER WORK**

**SEE NOTES 1 AND 2**
<table>
<thead>
<tr>
<th>Sign Location</th>
<th>ROAD WORK AHEAD</th>
<th>WORK AREA</th>
</tr>
</thead>
</table>

**RURAL ROADS**
45 / 55 MPH 
300' ±

**RURAL ROADS & URBAN ARTERIALS**
35 / 40 MPH 
300' ±

**SIGN SPACING = X (1)**

**RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS**
25 / 30 MPH 
200' ± (2)

**URBAN STREETS**
25 MPH OR LESS 
100' ± (2)

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE AT-GRADE INTERSECTIONS AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

**NOTES**

1. The sign shown is not required in the following cases: the work space is behind a barrier, or more than 2' behind the curb, or more than 15' from the edge of a roadway.

2. For sign size, refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

**LEGEND**

<table>
<thead>
<tr>
<th>SIGN LOCATION</th>
<th>X</th>
</tr>
</thead>
</table>
INSTALL THESE OR OTHER WARNING SIGNS AS NEEDED FOR THE SPECIFIC HAZARD

NOTES
1. Implement this plan when the initial roadway assessment is complete and determined to be passable with caution.
2. Portable Changeable Message Sign (PCMS) ~ recommended. For one-lane two-way traffic situations (see Standard Plan K-20.40) for additional details.
3. Spot hazards shall be marked with barricades or channelizing devices to alert motorists.
4. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
**NOTES**

1. Install additional Warning Signs based on site conditions and traffic characteristics. See an appropriate Standard Plan for guidance.

2. Regulatory Speed Limit signs are not a substitute for Work Zone Warning signs. Speed Limit signs shall remain in place as long as the reduced speed condition applies.

3. Motorcycle Warning Signs are required as per Washington Administrative Code (WAC) 468-95-305.

4. Closing a road and restricting traffic shall conform to Revised Code of Washington (RCW) 47.48.

5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**LEGAL TO RESUME SPEED**

**DO NOT PASS**

**INSTALL AS REQUIRED THROUGHOUT PROJECT LIMITS**

**CHIP SEAL AREA**

**CHIP SEAL PROJECT**

**NEXT X MILES**

**AUG XX TO AUG XX**

**FIELD LOCATE IN ADVANCE OF SIGNING**

**FOR LOCAL AGENCY USE ONLY**

**NOT FOR USE ON STATE ROUTES**
**NOTES**


2. **MOTORCYCLES USE EXTREME CAUTION** signs shall be installed when the following roadway conditions exist:
   - grooved pavement
   - abrupt lane edge
   - steel plates
   - loose gravel of earth

   Specific signs for each of the conditions noted shall be installed along with **MOTORCYCLES USE EXTREME CAUTION** signs.

3. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**LEGEND**

- **DI** SIGN LOCATION
- **• • •** CHANNELIZING DEVICES
- **>>>** ARROW PANEL

**SIGN SPACING = X (1)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL HIGHWAYS</td>
<td>90 / 85 MPH</td>
<td>800' z</td>
</tr>
<tr>
<td>RURAL ROADS</td>
<td>45 / 55 MPH</td>
<td>500' z</td>
</tr>
<tr>
<td>RURAL ROADS &amp; URBAN ARTERIALS</td>
<td>35 / 40 MPH</td>
<td>350' z</td>
</tr>
<tr>
<td>RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL &amp; BUSINESS DISTRICTS</td>
<td>25 / 30 MPH</td>
<td>200' ± (2)</td>
</tr>
<tr>
<td>URBAN STREETS</td>
<td>25 MPH OR LESS</td>
<td>100' ± (2)</td>
</tr>
</tbody>
</table>

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE.

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.
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.
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></th>
<th>To Bottom of Sign (No Supplemental Plaque)</th>
<th>To Bottom of Supplemental Plaque (When Required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>5' Minimum</td>
<td>4' Minimum</td>
</tr>
<tr>
<td>Urban</td>
<td>7' Minimum</td>
<td>6' Minimum</td>
</tr>
</tbody>
</table>

**NOTES**

**SIGN INSTALLATION**

- (Fill Section)
- (Curb Section)
- (Sidewalk and Curb Section)
- (Behind Traffic Barrier)
- With Supplemental Plaque Installation (Fill Section)
- (Ditch Section)

**SIGN INSTALLATION Standard Plan K-80.10-00**

**Sheet 1 of 1 Sheet**

**Approved for Publication**

Ken L. Smith 02-21-07

**State Design Engineer**

Washington State Department of Transportation

**Effective:** August 6, 2012 to August 4, 2013
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.

ASTM D4956 - TYPE 3 BARRICADE

NOTES

1. 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).

2. All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.

3. 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.

4. 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 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.

NOTE 2

- 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).

NOTE 3

- All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.
USEABLE TRAFFIC LANE

AREA CLOSED TO TRAFFIC

2' MIN

TRAFFIC LANE AREA CLOSED TO TRAFFIC TYPE 3L BARRICADE

STRIPES ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

AREA CLOSED TO TRAFFIC

USEABLE TRAFFIC LANE

TYPE 3R BARRICADE

TYPE 3L BARRICADE

ROAD CLOSURE AT INTERSECTION

WORK AREA

ROAD CLOSURE AT OTHER LOCATIONS

WORK AREA

TYPE 3L BARRICADE

TYPE 3R BARRICADE
NOTES

1. The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2' wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

2. The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.
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:

3/4" EXPANSION BOLT

SHIM - SEE NOTE 3

L 3 x 3 x 3/8 x 0.8

1/2 MIN. EMBEDMENT

3/4" EXPANSION BOLT W HARDENED WASHER (TYP.) - 4 1/2 MIN. EMBEDMENT

2' - 1" (TYP.)

1/2 SEGMENT LENGTH

2' - 1" (TYP.)
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).
**POST SPECIFICATIONS**

<table>
<thead>
<tr>
<th>POST</th>
<th>PIPE</th>
<th>ROLL FORMED</th>
<th>T-POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>END, CORNER, OR PULL POST</td>
<td>2&quot; DIA.</td>
<td>Y</td>
<td>5.10</td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIA.</td>
<td>Z</td>
<td>1.85</td>
</tr>
</tbody>
</table>

**STEEL POSTS AND BRACES**

**WIRE FENCE TYPE 1**

- Steel Posts Shown
- 1000' MAX TO PULL POST
- 14'-0" MAX.
- End, Corner, or Gate Post
- Wire Cinch Stay (Typ.)
- Wire Mesh 832-6-12-1/2
- Line Post w/ Anchor Plate (Typ.)
- 18" Square
- 60° Min.
- 65" Max.
- 12" Round (Typ.)

**WIRE FENCE TYPE 2**

- Steel Posts Shown
- 1000' MAX TO PULL POST
- 14'-0" MAX.
- End, Corner, or Gate Post
- Wire Cinch Stay (Typ.)
- 2 Strand Barbed Wire (Typ.) - Spaced @ 12"
- Line Post w/ Anchor Plate (Typ.)
- 18" Square
- 60° Min.
- 65" Max.
- 12" Round (Typ.)

**INTERMEDIATE BRACING/PULL POST**

- Steel Posts Shown

**GRADE DEPRESSION (SAG) DETAIL**

- Steel Posts Shown

**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 × 4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.
1. All concrete post bases shall be 10" minimum diameter.

2. Along the top and bottom, using Hog Rings, fasten the Chain Link Fence Fabric to the Tension Wire within the limits of the first full fabric weave.

3. Details are illustrative and shall not limit hardware design or post selection of any particular fence type.

**NOTES**

**POST AND RAIL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>POST</th>
<th>PIPE</th>
<th>ROLL FORMED</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOM. SIZE (SCH. 40)</td>
<td>L/D</td>
<td>SECTION</td>
</tr>
<tr>
<td>END, CORNER, OR PULL POST</td>
<td>2 1/2&quot; DIAM.</td>
<td>5.10</td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIAM.</td>
<td>1.85</td>
</tr>
</tbody>
</table>

**STANDARD PLAN L-20.10-02 SHEET 1 OF 2 SHEETS**

**CHAIN LINK FENCE TYPES 3 AND 4**

**METHOD OF FASTENING STRETCHER BAR TO POST**
1. All glare screen posts shall be 2 1/2" I.D. galvanized steel.

2. Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toe-nailed to post with 16d galvanized nails to prevent block rotation. See Standard Specification 9-18.3(2).

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

PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP
- 48" x 12" (TYP.)

SEE MOUNTING DETAIL

PADLOCK
- AGENCY PROVIDED

YELLOW REFLECTIVE
TAPE = 3" (TYP.)

ELEVATION

WOOD SPACER
- 3" x 2 1/2" x 13"

TIMBER POST
- 4 x 6 (NOM.)

PLASTIC PIPE = 12" (NOM.) x 2" - 7" LONG
COLOR SHALL BE HIGHLY VISIBLE
(SAFETY YELLOW IS ACCEPTABLE)

TOP VIEW
(CAP NOT SHOWN)

END POST

EYE SCREW = 5/8" DIA. x 6" WITH 2 FLAT WASHER

HEX LAG BOLT = 3/8-7UNC x 5"
(4 SETS TOTAL)

1 1/2" DIAM. HOLE (TYP.)

NOTE

Hardware shall be stainless steel or galvanized
in accordance with AASHTO M232.

SIGN PANEL MOUNTING DETAIL

5/8" S.S. EYE STRAP = FASTENED TO
THE SIGN PANEL WITH 2 3/8" DIAM.
SCREWS AND 2 HEX NUTS (TYP.)

SIDE OPPOSITE
STRIPES

ACCESS CONTROL GATE

STANDARD PLAN L-70.10-01

APPROVED FOR PUBLICATION

Pasco Bakotich III  05-21-08

STATE DESIGN ENGINEER

Washington State Department of Transportation
NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.
NOTES
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.
2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

SINGLE-LANE ON-CONNECTION

SINGLE-LANE OFF-CONNECTION

RAMP CHANNELIZATION
SINGLE LANE

STANDARD PLAN M-1.20-02
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Pasco Bakotich III 06-03-11
Washington State Department of Transportation
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

- **R** = RAMP LANE WIDTH
- **L** = LANE WIDTH

---

**NOTES**

- WHITE EDGE LINE
- YELLOW EDGE LINE
- LANE LINE
- WIDE LANE LINE
- MATCH LINE ‘X’
- DOTTED LANE LINE

---

**RAMP CHANNELIZATION**

**TWO LANE**

**STANDARD PLAN M-1.40-02**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

*Washington State Department of Transportation*

---

**PASCO BAKOTICH III**

**06-03-11**

**SPECIAL PROJECT ENGINEER**

**STATE DESIGN ENGINEER**

---

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

---

**VOICE OF REASON**

---

**NOTES**

- WHITE EDGE LINE
- YELLOW EDGE LINE
- LANE LINE
- WIDE LANE LINE
- MATCH LINE ‘X’
- DOTTED LANE LINE

---

**RAMP CHANNELIZATION**

**TWO LANE**

**STANDARD PLAN M-1.40-02**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

*Washington State Department of Transportation*

---

**PASCO BAKOTICH III**

**06-03-11**

**SPECIAL PROJECT ENGINEER**

**STATE DESIGN ENGINEER**

---

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

---

**VOICE OF REASON**

---

**NOTES**

- WHITE EDGE LINE
- YELLOW EDGE LINE
- LANE LINE
- WIDE LANE LINE
- MATCH LINE ‘X’
- DOTTED LANE LINE

---

**RAMP CHANNELIZATION**

**TWO LANE**

**STANDARD PLAN M-1.40-02**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

*Washington State Department of Transportation*

---

**PASCO BAKOTICH III**

**06-03-11**

**SPECIAL PROJECT ENGINEER**

**STATE DESIGN ENGINEER**

---

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**

---

**VOICE OF REASON**

---
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 herein. See the Standard Plans for RPM supplement and substitution patterns.
2. The channelization shown on this plan assumes optimal geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
C-D R = COLLECTOR DISTRIBUTOR RAMP LANE WIDTH
C-D L = COLLECTOR DISTRIBUTOR LANE WIDTH
R = RAMP LANE WIDTH
L = LANE WIDTH

COLLECTOR-DISTRIBUTOR ROAD ON-CONNECTION

300' MIN.

END OF TAPER (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. When weaving section is more than 3/4 of a mile in length, use lane line.

3. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND

L = LANE WIDTH
R = RAMP LANE WIDTH

TABLE

<table>
<thead>
<tr>
<th>SPEED</th>
<th>D (SEE TABLE)</th>
</tr>
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<tr>
<td>35 MPH</td>
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<td>40 MPH</td>
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<td>45 MPH</td>
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<td>60 MPH</td>
<td>1100'</td>
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<tr>
<td>65 MPH</td>
<td>1200'</td>
</tr>
<tr>
<td>70 MPH</td>
<td>1250'</td>
</tr>
</tbody>
</table>

RAMP CHANNELIZATION
PARALLEL ON & WEAVING SECTION
STANDARD PLAN M-1.80-03

WEAVING SECTION
NOTES

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' spacing is standard; however, for gore areas shorter than 150' use a 25' spacing, and for gore areas greater than 400' a spacing of 100' may be used.

2. The acute angle of the diagonals shall always point in the direction of main line traffic.
LEFT-TURN CHANNELIZATION
SYMMETRICAL WIDENING ABOUT CENTERLINE

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 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.

POSTED SPEED  APPROACH  APPROACH  APPROACH
SPEED   TAPER   TAPER   TAPER
60 MPH   360'  90'  720'
55 MPH   330'  90'  690'
50 MPH   300'  90'  660'
45 MPH   270'  90'  630'
40 MPH   240'  90'  600'
35 MPH   210'  90'  570'
30 MPH   180'  90'  540'
25 MPH   150'  90'  510'
20 MPH   120'  90'  480'

Washington State Department of Transportation
STANDARD PLAN M-3.10-03
Sheet 1 of 1 Sheet
Approved for Publication
Pasco Bakotich III 06-03-11

Effective: August 6, 2012 to August 4, 2013
**LEFT-TURN CHANNELIZATION**

**REDUCED TAPER LENGTHS – SYMMETRICAL WIDENING**

(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

**LEFT-TURN CHANNELIZATION**

**REDUCED TAPER LENGTHS – ASYMMETRICAL WIDENING RIGHT OF CENTER LINE**

(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

**LEFT-TURN CHANNELIZATION**

**REDUCED TAPER LENGTHS – ASYMMETRAL WIDENING LEFT OF CENTER LINE**

(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

---

**NOTES**

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

---

**LEGEND**

- **L** = 12' Typical Lane Width. See Contract for specified lane widths.
- **Type 2L (SL) Traffic Arrow**

---

**POSTED APPROACH DIMENSION**

**TAPER**

**APPROACH**

**CENTERLINE STRIPE**

SEE NOTES

160' 27' 320' 53'

**APPROACH TAPER**

**H**

**J**

**K**

40 MPH 160' 27' 320' 53'

35 MPH 150' 20' 245' 40'

30 MPH 100' 15' 180' 30'

25 MPH 60' 10' 125' 21'

20 MPH 40' 7' 80' 13'

---

**OPTIONAL MARKED DECELERATION TAPER**

(FOR LIMITED USE IN URBAN AREAS)

---

**STANDARD PLAN M-3.20-02**

---

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 06-03-11

Washington State Department of Transportation

---

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
LEFT-TURN CHANNELIZATION WITH ACCELERATION LANE

STATE DESIGN ENGINEER

LEGEND

L = 12" Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow
Type 6R (SR) Traffic Arrow

CENTERLINE STRIPE (SEE NOTES)

DOUBLE CENTERLINE (YELLOW)
(NARROW PATTERN)

STOPPING POINT FOR LEFT-TURN LANE

INSIDE RADIUS OF LEFT-TURNING VEHICLE

APPROACH TAPER A

VARIES = SEE CONTRACT PLANS

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.

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-03-11

Washington State Department of Transportation
LEFT-TURN CHANNELIZATION IN TWO-WAY LEFT-TURN LANE

NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 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.

POSTED DIMENSION APPROACH TAPER

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.

<â— Type 2L (SL) Traffic Arrow

Can be reduced to a minimum of 50' to increase storage capacity.

TWO-WAY LEFT-TURN AND MEDIAN CHANNELIZATION
STANDARD PLAN M-3.40-03
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION 06-03-11

Washington State Department of Transportation

 EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

Pasco Bakotich Iii
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two lane highway. The channelization plan may be used on four lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD Figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four lane undivided highways shall be double centerline.

6. All turn traffic arrows are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

**LEGEND**

- L = 12’ Typical Lane Width. See Contract for specified lane widths.
- Type 2L (SL) Traffic Arrow
- Type 2R (SR) Traffic Arrow

**POSTED SPEED** | **APPROACH TAPER** | **D**
---|---|---
60 MPH | 72’ | 420’
65 MPH | 66’ | 385’
60 MPH | 60’ | 350’
55 MPH | 54’ | 315’
50 MPH | 48’ | 280’
45 MPH | 42’ | 245’
40 MPH | 36’ | 210’
35 MPH | 30’ | 175’
30 MPH | 24’ | 140’
25 MPH | 20’ | 105’
20 MPH | 16’ | 75’

**DOUBLE LEFT-TURN CHANNELIZATION**

**STANDARD PLAN M-3.50-02**

**DOUBLE LEFT-TURN CHANNELIZATION WITH RIGHT TURN POCKET**

**SINGLE LEFT-TURN CHANNELIZATION**

Facing Opposing Double Left Turns

**PAINTED OR PLASTIC TRAFFIC DIVIDER**

**COMPOSED OF LONGITUDINAL MARKINGS**

**WHITE CROSSHATCH MARKINGS**

**OPTIONAL DOTTED EXTENSION LINE**

**APPROACH TAPER**

**WHITE EDGE LINE**

**WHITE DOTTED EXTENSION LINE**

**DOUBLE CENTERLINE (YELLOW)** (NARROW PATTERN)

**CENTERLINE STRIPE**

- SEE NOTES

**POSTED SPEED** | **APPROACH TAPER** | **D**
---|---|---
60 MPH | 72’ | 420’
65 MPH | 66’ | 385’
60 MPH | 60’ | 350’
55 MPH | 54’ | 315’
50 MPH | 48’ | 280’
45 MPH | 42’ | 245’
40 MPH | 36’ | 210’
35 MPH | 30’ | 175’
30 MPH | 24’ | 140’
25 MPH | 20’ | 105’
20 MPH | 16’ | 75’

**APPROVAL DATE**

**APPROVED FOR PUBLICATION**

**Pasco Bakitch III**

**06-03-11**

**WASHINGTON**

**State Design Engineer**

**Date**
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double center line.

6. All Traffic Arrows not required are optional, but recommended. Arrows may be added for longer storage lanes, or deleted for shorter storage lanes. See Contract Plans.

**LEGEND**

- L = 12' Typical Lane Width. See Contract for specified lane widths.
- Type 2R (SR) Traffic Arrow
- Type 3L (SL) Traffic Arrow

**RIGHT-TURN CHANNELIZATION**

**RIGHT-TURN CHANNELIZATION WITH DROP LANE**

**DOUBLE RIGHT-TURN CHANNELIZATION**
When Specified in the Contract Plans, the HOV Symbol Marking shall be installed with an offset of 1 foot max. from the lane centerline.
**BICYCLE LANE SYMBOL LAYOUT**

**KEY NOTES**

1. **Bid Item** "Bicycle Lane Symbol" includes Bike Lane Arrow and Bike Rider Symbol.
2. 2' x 6' White Bike Lane Arrow
3. Bike Rider Symbol

**GENERAL NOTE**

See contract for location and material requirements.

**STANDARD PLAN M-9.50-01**

**MARKING AREA**

- **BIKE RIDER SYMBOL DETAIL**
  - 6.02 SQ.FT.
- **BIKE LANE ARROW DETAIL**
  - 4.25 SQ.FT.

**GRID IS 1" SQUARE**

**TOTAL MARKING AREA**

- 10.27 SQ.FT.

**NOTE**

- EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

**Washington State Department of Transportation**

**APPROVED FOR PUBLICATION**

Ken L. Smith 01-30-07

**STATE DESIGN ENGINEER DATE**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE**

**EXPIRES AUGUST 6, 2013**
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.

In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle, (See Contract).

Provide Breakaway Bollards within the Roadway Design Clear Zone.

SHARED - USE PATH MARKINGS
STANDARD PLAN M-9.60-00
EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

Pasco Bakotich III 02-10-09
STATE DESIGN ENGINEER
Washington State Department of Transportation

APPROVED FOR PUBLICATION
**GENERAL NOTE**

See contract for location and material requirements.

**KEY NOTES**

1. **Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" white transverse lines.**
2. **24" white transverse line**
3. **W10-1 Advance Warning Sign (not included in RR Crossing Symbol Bid Item)**
4. **Place Stop Line 15' from the nearest rail or approximately 8 feet from RR gate, if present.**

**GRID IS 1" SQUARE**

**"R" DETAIL**

**SYMBOL DETAIL**

**RAILROAD CROSSING LAYOUT**

**STANDARD PLAN M-11.10-01**

**ALTERNATIVE SYMBOL**

**TOTAL MARKING AREA**

**PER 12' WIDE LANE**

= 111.59 SQ.FT.

---

**LAYOUT**

**TOTAL MARKING AREA**

**PER 12' WIDE LANE**

= 109.75 SQ.FT.
TYPICAL APPLICATIONS

INSTALL CROSSWALK LINES PARALLEL TO THE ROADWAY

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.

CROSSWALK LAYOUT
STANDARD PLAN M-15.10-01

DATE: 02-06-07
WASHER STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Ken L. Smith
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXP. AUGUST 5, 2007

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013

1. See the Contract Plans for locations of crosswalk centerlines.
2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.
3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
NOTES

1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.


LEGEND

- Reserved Parking Sign and post with R7-801A Plaque, if indicated
- Access Parking Space Symbol
- Manufactured wheel stop
- Detectable Warning Pattern
LONGITUDINAL MARKING PATTERNS
STANDARD PLAN M-20.10-02

NOTES

1. Dotted Extension Line shall be the same color as the line it is extending.

2. Edge Line shall be white on the right edge of traveled way, and yellow on the left edge of traveled way (on one-way roadways). Solid Lane Line shall be white.

3. The distance between the lines of the Double Centerline shall be 12" everywhere, except 4" for left-turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-state routes) may specify a 4" distance for all locations.

The distance between the lines of the Double Lane Line shall be 4".
GENERAL NOTE
See Standard Plan M-20.10 for pattern and color requirements.

PROFILED PLASTIC
(BROKEN LINE)
FOR:
CENTER LINE & LANE LINE - W = 6"-
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE - W = 4"-
REVERSIBLE LANE LINE - W = 4"-
WIDE BROKEN LANE LINE - W = 8"

EMBOSSED PLASTIC
(SOLID OR BROKEN LINE)
FOR:
CENTER LINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE
REVERSIBLE LANE LINE
DOUBLE CENTER LINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

PROFILED PLASTIC
(BROKEN LINE)
FOR:
NO-PASS LINE - W = 4"-
TWO-WAY LEFT-TURN CENTER LINE - W = 4"-
DOUBLE CENTER LINE & DOUBLE LANE LINE - W = 4"-
EDGE LINE & SOLID LANE LINE - W = 4"-
WIDE LANE LINE & WIDE LINE - W = 8"-
DOUBLE WIDE LANE LINE - W = 8"
BARRIER CENTER LINE - W = 20"

PROFILED EMBOSSED PLASTIC
(SOLID OR BROKEN LINE)
FOR:
CENTER LINE & LANE LINE
NO-PASS LINE
TWO-WAY LEFT-TURN CENTER LINE
REVERSIBLE LANE LINE
DOUBLE CENTER LINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

NOT TO SCALE
NOTES

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80' intervals on tangents and on horizontal curves with a radius of 5000' or more, and at 40' intervals on horizontal curves having radii of less than 5000'. Center the RPM's in the gaps between the pavement marking lines.

2. Type 2 RPM's, when specified, shall be placed outside the left edge line at 80' intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL".

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPM's on multilane one-way roadways, and Type 2YY RPM's on two lane two-way roadways.

4. The Type 2W RPM's placed on multilane one-way roadways and all RPM's set in recesses shall have an abrasion resistant coating.

TYPE 2 RPM RAISED FACE COLORS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2YY</td>
<td>YELLOW and YELLOW</td>
</tr>
<tr>
<td>2W</td>
<td>WHITE - ONE SIDE ONLY</td>
</tr>
<tr>
<td>2Y</td>
<td>YELLOW - ONE SIDE ONLY</td>
</tr>
</tbody>
</table>

LEFT EDGE OF LANE PLACEMENT DETAIL

SEE NOTE 2

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
1. Raised pavement markers shall be installed only when specified in the Contract Plans.

2. See the Standard Plans for marker designation.

3. The portion labeled "OPTIONAL" is only used when the Optional Marked Deceleration Taper (see Standard Plans M-3.10 and M-3.20) is specified in the Contract Plans.

Type 2L (SL) Traffic Arrow
NOTE

1. The NO PASS LINE (when required) is applied parallel to the CENTERLINE, 4" away, with the Type 2YY RPM's aligned (similar to TWO-WAY LEFT-TURN LINE).
**SYMBOL MARKINGS**

**TRAFFIC ARROWS FOR HIGH SPEED ROADWAYS**

**STANDARD PLAN M-24.20-01**

**NOTE**

Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher.

**MARKING AREA**

17.44 SQ. FT.

**GRID IS 4" SQUARE**

**TYPE 1 TRAFFIC ARROW**

**MARKING AREA**

17.93 SQ. FT.

**GRID IS 4" SQUARE**

**TYPE 2L (LEFT) TRAFFIC ARROW**

**ELLIPSE “A” AXIS**

1' - 4" - ELLIPSE “B” AXIS

**ELLIPSE “B”**

**CENTER POINT OF ELLIPSES**

**TYPE 2R (RIGHT) TRAFFIC ARROW**

**MIRROR IMAGE OF TYPE 2L TRAFFIC ARROW**

**MARKING AREA**

17.93 SQ. FT.

**GRID IS 4" SQUARE**

**NOTE**

Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher.
SYMBOL MARKINGS
TRAFFIC ARROWS FOR
HIGH SPEED ROADWAYS
STANDARD PLAN M-24.20-01

SYMMETRICAL ABOUT CENTERLINE
GRID IS 4" SQUARE
MARKING AREA 45.17 SQ.FT.

TYPE 7 TRAFFIC ARROW

2'-0" = ELLIPSE "A" AXIS
1'-7" = ELLIPSE "B" AXIS

CENTER POINT OF ELLIPSES

MARKING AREA 35.88 SQ.FT.

TYPE 6L (LEFT)
TRAFFIC ARROW

SYMBOL & LANE CENTERLINE

MARKING AREA 35.88 SQ.FT.

TYPE 6R (RIGHT)
TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6L
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

SYMMETRICAL ABOUT V CENTERLINE
GRID IS 4" SQUARE
MARKING AREA 45.17 SQ.FT.

TYPE 6L (LEFT)
TRAFFIC ARROW

SYMBOL & LANE CENTERLINE

MARKING AREA 35.88 SQ.FT.

TYPE 6R (RIGHT)
TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6L
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
SYMBOL & LANE CENTERLINE

MARKING AREA
15.94 SQ.FT.

TYPE 6SL (LEFT) TRAFFIC ARROW

MARKING AREA
19.58 SQ.FT.

TYPE 75 TRAFFIC ARROW

SYMMETRICAL ABOUT CENTERLINE

GRID IS 4" SQUARE

MARKING AREA
23.14 SQ.FT.

TYPE 5 TRAFFIC ARROW

MARKING AREA
23.14 SQ.FT.

TYPE 5 TRAFFIC ARROW

MARKING AREA
15.94 SQ.FT.

TYPE 6SR (RIGHT) TRAFFIC ARROW

MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)
REVERSE CURVE ELLIPSES ARE SYMMETRICAL ABOUT

ASSUME POINTS NOT DIMENSIONED TO BE COINCIDENT WITH GRID LINES

PVEMENT MARKING - ROUNDABOUT TRAFFIC ARROW

COMPONENT KEY

THE LABELED AREAS ABOVE CORRESPOND TO THE PORTIONS NECESSARY FOR EACH TYPE OF ROUNDABOUT TRAFFIC ARROW.


CENTER THE ARROW ON THE LANE CENTERLINE BETWEEN THE LATERAL EXTREMITIES OF THAT ARROW TYPE.

COMPONENT KEY

ROUNDABOUT TRAFFIC ARROW TYPE TRC

CENTER THE ARROW ON THE LANE CENTERLINE BETWEEN THE LATERAL EXTREMITIES OF THAT ARROW TYPE.
**NOTES**

1. If Rumble Strips are present, install marking outside of the Rumble Strip.

---

**CROSSHATCH MARKING**

- W = 8" for posted speed limit of 40 MPH or lower
- W = 12" for posted speed limit of 45 MPH or higher

**CHEVRON OR DIAGONAL**

**WHITE OR YELLOW — SEE CONTRACT PLANS**

**EDGES MARKING**

**LENGTH VARIES – SEE CONTRACT**

**MARKING AREA = 11.73 SQ.FT.**

**HALF-MILE MARKER**

**LENGTH VARIES – SEE CONTRACT**

**MARKING AREA = 6.00 SQ.FT.**

**FULL MILE MARKER**

**AERIAL SURVEILLANCE MARKERS**

**MARKING AREA = 0.96 SQ.FT.**

**JUNCTION BOX, PULL BOX, OR CABLE VAULT MARKINGS**

**MARKING AREA = 0.56 SQ.FT.**

**CROSS CULVERT**

**MARKING AREA = 0.56 SQ.FT.**

**ANGLE OF CROSS CULVERT**

**DRAINAGE STRUCTURE INLET**

**MARKING AREA = 1.06 SQ.FT.**

**DRAINAGE MARKING**

**CROSS CULVERT SYMBOL MARKINGS**

**MISCELLANEOUS**

**STANDARD PLAN M-24.60-03**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**Pasco Bakotich III 05-11-11**

**Washington State Department of Transportation**

**EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013**
**PUBLIC VEHICLES**

**ACCESS PARKING SPACE SYMBOL (MINIMUM)**

- GRID IS 4" SQUARE
- MARKING AREA = 1.41 SQ.FT.

**ACCESS PARKING SPACE SYMBOL (STANDARD)**

- GRID IS 4" SQUARE
- MARKING AREA = 3.09 SQ.FT.

**SPEED BUMP SYMBOL**

- MARKING AREA = 12.08 SQ.FT.

**YIELD AHEAD SYMBOL**

- MARKING AREA = 25.90 SQ.FT.

**YIELD LINE SYMBOL**

- MARKING AREA = 36.54 SQ.FT.

**YIELD LINE SYMBOL (MULTIPLE SYMBOLS REQUIRED FOR TRANSVERSE YIELD LINE - SEE CONTRACT)**

- MARKING AREA = 25.90 SQ.FT.

**SYMBOL MARKINGS MISCELLANEOUS**

- TOTAL MARKING AREA = 28.44 SQ.FT.
  - WHITE = 9.76 SQ.FT.
  - BLUE = 18.69 SQ.FT.

**ACCESS PARKING SPACE SYMBOL (STANDARD)**

- WITH BLUE BACKGROUND AND WHITE BORDER
- REQUIRED FOR CEMENT CONCRETE SURFACES

**ACCESS PARKING SPACE SYMBOL (MINIMUM)**

- WITH BLUE BACKGROUND AND WHITE BORDER
- REQUIRED FOR CEMENT CONCRETE SURFACES

**USE**

- LESS THAN 45 MPH
- 45 MPH OR GREATER

**MARKING AREA**

- 25.90 SQ.FT.
- 36.54 SQ.FT.
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 Reflectors: 9 square inches minimum surface area, acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Specific Intensity (cd/ft²-r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1°</td>
<td>0°</td>
<td>126</td>
</tr>
<tr>
<td>0.1°</td>
<td>20°</td>
<td>50</td>
</tr>
<tr>
<td>0.1°</td>
<td>30°</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTES

1. When the Contract Plans require a guidepost with concurrent guardrail runs, the Contractor shall:
   A. Drive the flexible guidepost in line with the guardrail posts, or
   B. Mount the shorter flexible guidepost onto the guardrail post.

2. Guideposts shall be fastened to the wooden guardrail post using two 2" x 3/8" lag screws with washers, along centerline of post. Also acceptable is any approved attachment method submitted by the guidepost manufacturer.

3. Guideposts shall be fastened to the steel guardrail posts using two galvanized 2" x 3/8" bolts with a washer on both sides, a lock washer, and nut. The nut shall be tightened to properly compress the lock washer. The drilled holes in the guardrail post web shall be painted with galvanizing repair paint as described in Standard Specification Section B-11.3(1C). Also acceptable is any approved attachment method submitted by the guidepost manufacturer.

4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delineators where guideposts are required.

GUIDEPOST TYPE DEFINITIONS – REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>Type W</th>
<th>Type WW</th>
<th>Type Y</th>
<th>Type YY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facing Traffic</td>
<td>Facing Traffic</td>
<td>Back Side</td>
<td>Facing Traffic</td>
</tr>
<tr>
<td>WHITE</td>
<td>WHITE</td>
<td>WHITE</td>
<td>YELLOW</td>
</tr>
<tr>
<td>3&quot;</td>
<td>3&quot;</td>
<td>5&quot;</td>
<td>3&quot;</td>
</tr>
</tbody>
</table>

GUIDEPOSTS AND BARRIER DELINEATORS

STANDARD PLAN M-40.10-02

BARRIER DELINEATORS

(CONCRETE BARRIER TYPES AND LOCATIONS VARY, SINGLE SLOPE IN MEDIAN SHOWN)
NOTES


2. Guide posts shall be placed at 100' spacing on ramp tangents and tapers.

3. "S" dimension shown on Standard Plan M-40.40 or 100', whichever is smaller.

4. One half of "S" dimension shown on Standard Plan M-40.40 or 50', whichever is smaller.

5. Two spaces at 100'.

6. Three equal spaces when R < 75', four equal spaces when R ≥ 75'.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet maximum.
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>115</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
<td>30</td>
</tr>
<tr>
<td>200</td>
<td>36</td>
</tr>
<tr>
<td>250</td>
<td>40</td>
</tr>
<tr>
<td>300</td>
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</tr>
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<td>400</td>
<td>56</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>
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<tr>
<td>1,700</td>
<td>120</td>
</tr>
<tr>
<td>2,300</td>
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<tr>
<td>2,800</td>
<td>160</td>
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<tr>
<td>3,700</td>
<td>180</td>
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<tr>
<td>4,500</td>
<td>200</td>
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<tr>
<td>5,500</td>
<td>220</td>
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<td>6,500</td>
<td>240</td>
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<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>
<tr>
<td>R=10,000</td>
<td>300</td>
</tr>
</tbody>
</table>

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

TWO-WAY UNDIVIDED HIGHWAYS
GUIDE POSTS ON OUTSIDE OF CURVE IN DIRECTION OF TRAVEL

MULTI-LANE DIVIDED HIGHWAYS
GUIDE POSTS ON INSIDE AND OUTSIDE OF CURVE FOR EACH DIRECTION OF TRAVEL
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.

CROSSOVER MEDIAN CROSSOVERS

NOTE

LEGEND

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

LANE REDUCTIONS
TYPICAL SHOULDER INSTALLATION

SECTION A

SECTION B

MEDIAN SHOULDER

OUTSIDE SHOULDER

SHOULDER RUMBLE STRIP

SHOULDER

EDGE LINE

12" R. MAX

7" ± 1/2"

1/2" MIN.

5/8" MAX}

SHOULDER RUMBLE STRIP TYPE 1 FOR DIVIDED HIGHWAYS STANDARD PLAN M-60.10-01 SHEET 1 OF 4 SHEETS

APPROVED FOR PUBLICATION Pasco Bakotich III 06-03-11 Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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.

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

Terminate the shoulder rumble strips at the beginning of the deceleration taper.

Radius point of right turn radius (typ.)

If a median acceleration taper is included, start the rumble strip at the end of the taper.
ISOMETRIC VIEW
TYPICAL SHOULDER INSTALLATION

UNIT SECTION A

UNIT SECTION B

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

Sheet 1 of 2 sheets

Approved for publication
Pasco Bakotich III 06-27-11
State design engineer
Washington State Department of Transportation

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4
FOR UNDIVIDED HIGHWAYS

STANDARD PLAN M-60.20-02

SHOULDER TAPER DETAIL

1. NOT LESS THAN 4' - PROVIDE 5' WHEN BARRIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

TYPE 2 - 12' GAP AND 12' WIDE STRIP

TYPE 3 - 16' GAP AND 16' WIDE STRIP

TYPE 4 - 12' WIDE STRIP

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

Pasco Bakotich III 06-27-11
STATE DESIGN ENGINEER

EFFECTIVE: AUGUST 6, 2012 TO August 4, 2013
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

RUMBLE (TYP.)

RAISED PAVEMENT MARKER WHEN SPECIFIED IN CONTRACT

REFER TO STANDARD PLAN M-30.30 FOR RECESSED PAVEMENT MARKER DETAIL

RECESSED PAVEMENT MARKER WHEN SPECIFIED IN CONTRACT

OMIT CENTERLINE RUMBLE STRIPS IN THIS AREA

\[ \text{RECESS LENGTH} \leq 1' - 0" \]

LONGITUDINAL MARKING (TYP.)

RUMBLE STRIP (TYP.)

BRIDGE APPROACH SLAB

BRIDGE

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP

STANDARD PLAN M-65.10-02

Sheet 2 of 2 Sheets

APPROVED FOR PUBLICATION

Pasco Bakotich 05-11-11

State Design Engineer

Washington State Department of Transportation

Effective: August 6, 2012 to August 4, 2013

NON-COMMERCIAL ROAD APPROACHES AND DRIVEWAYS

RUMBLE STRIP USAGE AS DIRECTED BY ENGINEER

TERMINATE RUMBLE STRIP AT BEGINNING AND END OF APPROACH OR INTERSECTION

RADIUS POINT (TYP.)

UNCHANNELIZED INTERSECTIONS AND COMMERCIAL ROAD APPROACHES

INSTALL RUMBLE STRIP

RUMBLE STRIP OPTIONAL - SEE NOTE 2

OMIT CENTERLINE RUMBLE STRIPS IN THIS AREA

25'
NOTE

1. Typically, four times the letter or numeral height = minimum, up to ten times = maximum, or according to Plans.
EIGHT FOOT HIGH LETTERS AND NUMERALS ARE SHOWN ON A FOUR-INCH SQUARE GRID FOR USE ON ROADWAYS WITH A POSTED SPEED OF 45 MPH OR MORE
SIX FOOT HIGH LETTERS AND NUMERALS SHOWN ON A THREE -INCH SQUARE GRID

TEN FOOT HIGH LETTERS SHOWN ON A FIVE- INCH SQUARE GRID

FOR USE ON ROADWAYS WITH A POSTED SPEED OF 40 MPH OR LESS