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

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

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

Contact the Design Standards Team at:

360-705-7256 (phone)
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For contact via conventional mail, the *Comment Request* Form on the reverse side of this page is provided to facilitate routing and prompt delivery. Making a copy will preserve the original form for future use. Attach a copy of the form as a cover sheet when sending comments or sketches made on other documents, such as marked copies of specific Standard Plans. Your questions, comments, and/or recommendations should be sent to:

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

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

Steve Roark
State Design Engineer
### Comments

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<td>Signal Bridge Standard Electrical Details</td>
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<td>Type 332 Signal Cabinet Detector Test Panel</td>
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<td>J-90.10-03</td>
<td>Pull Box</td>
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<td>Cable Vault</td>
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### Section K  Work Zone Traffic Control

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### Section L  Fence and Glare Screen

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<td>Wire Fence Types 1 &amp; 2 and Wire Gates</td>
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<td>Glare Screen Type 1 Design B</td>
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<td>Access Control Gate</td>
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<td>Access Control Double Gate</td>
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### Section M  Roadway Delineation

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<td>Ramp Channelization Single Lane</td>
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<td>M-1.40-02</td>
<td>Ramp Channelization Two Lane</td>
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<td>Ramp Channelization Parallel On &amp; Weaving</td>
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<td>Left Turn Channelization Reduced Tapers</td>
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<td>Left Turn Channelization Tee Intersection and Back-to-Back Turn Lanes</td>
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<td>Two-Way Left-Turn and Median Channelization</td>
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<td>Double Left-Turn Channelization</td>
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<td>M-5.10-02</td>
<td>Right-Turn Channelization</td>
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<td>1/30/07</td>
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<td>M-80.30-00</td>
<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
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</table>
FILL FROM CATCH POINT TO BEGINNING OF SECOND SLOPE (3.8 FEET)
SLOPE RATIO (2H:1V)
FILL TO SUB GRADE SHOULDER (2.25 FEET)
SLOPE RATIO (4H:1V)
DISTANCE FROM Q TO CATCH POINT (28.7 FEET)

COMPUND SLOPE LATH

FILL TO SUBGRADE (0.35 FEET)
FILL TO FINISH GRADE (CURB ELEVATION) (0.73 FEET)
DISTANCE FROM Q (14.3 FEET)
SLOPE RATIO (2H:1V)

SLOPE LATH FOR CURB SECTION

FILL FROM CATCH POINT TO TOP OF DITCH BASE (10 FEET)
FILL TO TOP OF CONCRETE BASE (0.6 FEET)
DISTANCE FROM CATCH POINT TO BOTTOM OF DITCH (2.4 FEET)
SIDE SLOPE RATIO (4H:1V)

STAKE FOR DITCH CONSTRUCTION

STAKE FOR DRAINAGE

DITCH CUT TO BOTTOM OF DITCH (0.60 FEET)
DITCH SECTION ALIGNMENT STATIONING

STAKE FOR FOUNDATION OF LUMINAIRES, SIGNALS OR SIGN STRUCTURES

OFFSET TO CENTER OF BASE (10 FEET)
PLAN SHEET NUMBER (4)
STRUCTURE NOTE NUMBER (10)
DITCH SECTION ALIGNMENT STATIONING

OFFSET (3 FEET)
PLAN SHEET NUMBER (6)
STRUCTURE NOTE NUMBER (3)
DRAINAGE ALIGNMENT STATIONING 25' INCREMENTS

OFFSET (3 FEET)
FILL TO TOP AND BACK EDGE OF CURB (0.90 FEET)
LINE DESIGNATION

LINE STATIONING HUNDRED FOOT INCREMENTS

LUMINAIRE NUMBER (23)
LINE DESIGNATION AND STATIONING HUNDRED FOOT INCREMENTS

STANDARD PLAN A-10.10-00

SURVEY STAKES

STAKE FOR CURB/GUTTER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
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).

SURVEY MONUMENT
TYPES 1 AND 2
STANDARD PLAN A-10.20-00
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
CONCRETE BASE

PLAN VIEW

SECTION A
INSTALLATION

SECTION RISER RING DIMENSIONS

A (SIZE) | 1 1/2 | 2" | 3"
---|---|---|---
10 1/2" DIA M. | 9 1/2" DIA M. | 8" DIA M. | 6" DIA M.

SECTION COVER

SECTION CASE

RISER RING

SOIL

GROUT

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

CONCRETE BASE

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

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<th>CASE</th>
<th>COVER</th>
<th>TOTAL</th>
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<tr>
<td></td>
<td>60 LBS</td>
<td>19 LBS</td>
<td>79 LBS</td>
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MONUMENT CASE AND COVER

STANDARD PLAN A-10.30-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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>
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<th>GROUND LINE (H : V)</th>
<th>CLASS A</th>
<th>CLASS B</th>
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<td>D</td>
<td>D</td>
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<tr>
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<td>0.5'</td>
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<tr>
<td>+6:1</td>
<td></td>
<td>1.2'</td>
<td>0.5'</td>
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<td>1.0'</td>
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<tr>
<td>-6:1</td>
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<tr>
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SLOPE TREATMENT NOT REQUIRED
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) at all ends of horizontal support ropes.

Distances X, Y, Z and torque to comply with manufacturer's specifications.
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.
TYPICAL ISOLATION JOINT GUIDELINES

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<th>FEATURE</th>
<th>EDGES, FLANGES OR LIPS IN THE Pavement Section</th>
<th>CONTINUOUS VERTICAL FACE THROUGH THE Pavement Section</th>
<th>DISTANCE FROM NEAREST TRANSVERSE JOINT</th>
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<td>USE</td>
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<td>&gt; 4 FT FROM JOINT</td>
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</table>

* WITH RECTANGULAR GRATE CAST INTO ADJUSTMENT SECTION
NOTES
1. Use the 1/2 inch joint details for bridges with expansion length less than 100 feet and for bridges with L type abutments. Use the 1 inch joint details for other applications. Use Detail 5 on steel trusses and timber bridges with concrete deck panels.

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

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

4. For Details 1, 2, 3, and 4, the item "HMA SAWCUT AND SEAL" shall be used for payment. For Details 5 and 6, the item "PAVED PANEL JOINT SEAL" shall be used for payment. For Detail 7, the item "SEALING EXISTING LONGITUDINAL AND TRANSVERSE JOINT" shall be used for payment.
1. All edges of the approach slab shall have 1/2" (in) radii except at longitudinal construction joints and adjacent to L-Type abutments.

2. Longitudinal joints shall be placed on lane lines and shall be constructed and sealed in accordance with Standard Specification Section 4-05.3(8). Joints may be either a sawcut crack control joint or a construction joint. Sawcut joints shall terminate 1'-0" before reaching edge of slab and shall be sawcut as soon as possible after placement of concrete.

   (A) Approach slabs less than 40'-0" wide — no joint is required.

   (B) Approach slabs wider than 40'-0" — one or more joints are required to divide the slab into approximately 24'-0" wide sections.

3. The minimum lap splice of #5 is 2'-0", #6 is 2'-6", #8 is 3'-0", and #10 is 3'-0". 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, #8, and #10 bars.
**Approach Expansion Anchor - Method A**

Longitudinal Section

- **Superstructure**
- **Abutment**

**Approach Expansion Anchor - Method B**

Longitudinal Section

- **Superstructure**
- **Abutment**

**Notes:**

The metal components of the approach expansion anchor shall either be painted with one coat of inorganic zinc paint conforming to Standard Specification Section I-58.1(2)(F) or be galvanized in accordance with AASHTO M 232.

**Approach Expansion Anchor - Method B**

- **Superstructure**
- **Abutment**

**Approach Expansion Anchor - Method A**

Longitudinal Section

- **Superstructure**
- **Abutment**

**Notes:**

The metal components of the approach expansion anchor shall either be painted with one coat of inorganic zinc paint conforming to Standard Specification Section I-58.1(2)(F) or be galvanized in accordance with AASHTO M 232.

**Approach Expansion Anchor - Method B**

Longitudinal Section

- **Superstructure**
- **Abutment**

**Notes:**

The metal components of the approach expansion anchor shall either be painted with one coat of inorganic zinc paint conforming to Standard Specification Section I-58.1(2)(F) or be galvanized in accordance with AASHTO M 232.
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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

NOTE:
OMIT BEVELED ENDS ON TOP OF BRIDGE TRAFFIC BARRIER WHEN CONNECTING TO CONCRETE BARRIERS.
EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER
NOTES

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

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

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

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

NEW TIE BAR ~ #5 x 30" (IN)
DRILL 7/8" (IN) MIN. TO 1 1/8" (IN) MAX. DIAM. X 15" (IN) LONG
HOLE IN EXISTING CEMENT CONCRETE FOR NEW TIE BAR

SAWED GROOVE
SEE STD. PLAN A-40.10
1/2 CONCRETE PAVEMENT DEPTH

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

SECTION A

SECTION B

SECTION C

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

EXISTING CEMENT CONCRETE PAVEMENT

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

SKewed TRANVERSE CONTRACTION JOINT
SEE STD. PLAN A-60.10

DOWEL BAR (TYP.) - SEE PLACEMENT DETAIL SHEET 2

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

DEC 23 2014 2:00 PM

PAGE 1 OF 2 SHEETS
NOTES

1. 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:40H or flatter) (0.2% maximum).

2. HMA removal depth and compacted depth shall be as shown in the plans.

3. When lowering bridge profile, removal of materials below guardrail must be to grade, and allow water to drain towards the ditch line. This work is incidental to other bid items for which payment is made.

4. Where an HMA profile transition ends at existing HMA, the Engineer may adjust the limits of the transition to improve ride.

Bijan Khaleghi

Bridge Deck Transition for HMA Overlay

Standard Plan A-60.30-01

Sheet 1 of 1 Sheet

Approved for Publication

Jan 31, 2018 1:18 PM

Washington State Department of Transportation
NOTES
1. If a zone has rebar section loss or full depth repairs, then the concrete deck repair in each zone shall achieve 3,000 PSI before progressing to the adjacent zone.
2. Remove all concrete 3/4" minimum clearance around all exposed reinforcement bars in accordance with Standard Specification 6-09.3(6).
3. For tension zones of continuous structures, when a longitudinal reinforcement bar has greater than 20% section loss (or damage), remove concrete a minimum of 3'- 6" on each side of section loss and place 2 supplemental reinforcement bars, adjacent and parallel to the deficient bar, extending 3'- 6" beyond each side having 20% section loss. Mechanical splices may be used to facilitate placement of #4 reinforcement bars.
4. For typical rebar repairs, when the reinforcement has greater than 20% section loss (or damage), remove concrete a minimum of 2'- 6" on each side of section loss, and replace with new supplemental reinforcement, same diameter as original, adjacent and parallel to the deficient bar, extending 2'- 3" beyond each end of section having 20% section loss.

LEGEND
- CONCRETE REMOVAL AREA

PLAN VIEW FOR DELAMINATION AND FULL DEPTH REPAIR

SECTION C
TRANSVERSE REBAR REPAIR

SECTION D
LONGITUDINAL REBAR REPAIR
(FOR CONTINUOUS STRUCTURES)
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" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) 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 Section 9-04.3.

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

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

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

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

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

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER (INCHES)</th>
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<tr>
<td>REINFORCED OR PLAN CONCRETE</td>
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<td>ALL METAL PIPE</td>
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<tr>
<td>PROFILE WALL PVC (STD. SPEC. SEC. 1.05.12(2))</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 shall not be greater than 20” (in), in any direction. Knockouts shall have a wall thickness of 2” (in) minimum to 2.5” (in) maximum. Provide a 1.5” (in) 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 Section 9-03.3.

3. The maximum depth from the finished grade to the lowest pipe invert shall be 5’ (ft).

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” (in). Knockouts shall have a wall thickness of 2” (in) minimum to 2.5” (in) maximum. Provide a 1.5” (in) 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 Section 9-04.3.

3. The maximum depth from the finished grade to the lowest pipe invert shall be 6’ (ft).

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

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

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

7. All pickup holes shall be grouted full after the basin has been placed.
NOTES
1. No steps are required when height is 4' or less.
2. The bottom of the precast catch basin may be sloped to facilitate cleaning.
3. The rectangular frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
4. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) 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 Section 9-04.3.

<table>
<thead>
<tr>
<th>CATCH BASIN DIMENSIONS</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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<th>PIPE ALLOWANCES</th>
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1 Corrugated Polyethylene Storm Sewer Pipe
(See Standard Specification Section 9-05.20)
2 (See Standard Specification Section 9-05.12(1))
3 (See Standard Specification Section 9-05.12(2))
4 Polypropylene Pipe (See Standard Specification Section 9-05.24)
NOTES

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

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" (in).

3. The flow restrictor shall be fabricated from one of the following materials:
   - 0.060" (in) Corrugated Aluminum Alloy Drain Pipe
   - 0.064" (in) Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.064" (in) Corrugated Aluminumized Steel Drain Pipe
   - 0.060" (in) 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 2023Al, or cast iron in accordance with ASTM A 48, Class 30B.

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

   A neoprene rubber gasket is required between the riser mounting flange and the gate flange. Install the gate so that the level-line mark is level when the gate is closed.

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

   All shear gate bolts shall be stainless steel.

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

9. Alternative shear gate designs are acceptable if material specifications are met.

CATCH BASIN TYPE 2
WITH FLOW RESTRICTOR
STANDARD PLAN B-10.40-01

NOTCH WEIR DETAIL

OVERFLOW ELEVATION
AS SPECIFIED IN CONTRACT

PLATE WITH ORIFICE

REMOVABLE WATERTIGHT COUPLING

ELBOW DETAIL

NOTCH WEIR DETAIL

FLOW RESTRICTOR

MORTAR (Typ.)

OUTLET

54" Diam. Min.

54" Diam. Min.

FLOW RESTRICTOR

RESTRICTOR PLATE
WITH ORIFICE

(SEE NOTE 6)

SECTION A

OVERFLOW ELEVATION
AS SPECIFIED IN CONTRACT

4" Min
6" Max.

SET OVERFLOW ELEVATION
TO PROVIDE DETENTION AS
SHOWN IN THE CONTRACT

PIECE SUPPORT
3" (in) x 0.075" (in) ALUMINUM,
OR 3" (in) x 0.079" (in)
STEEL (SEE NOTE 1)

LEVEL LINE
(SEE NOTE 7)

MAXIMUM OPENING

1/2" (in) HOLE ON 10 3/8" (in)
BOLT CIRCLE (Typ.)

MAXIMUM OPENING

LIFT HANDLE ATTACHMENT

ADJUSTABLE LOCK HOOK
WITH LOCK SCREW

1" (in) Diam. Rod or Tubing

MANHOLE RING AND COVER
WITH LOCKING BOLTS, MARKED "DRAIN"

ALTERNATIVE NOTCH WEIR
MAY BE SPECIFIED -
SEE DETAIL

STEP OR LADDER

LIFT HANDLE
NOTES

1. Drain basin to be custom manufactured according to plan details. Risers are needed for basins over 64" (in) due to shipping restrictions. The maximum depth from finished grade to the lowest invert shall be 8' (ft).

2. Drainage connections shall utilize flexible elastomeric seals conforming to ASTM F477 and shall meet the requirements of ASTM D3212.

3. Risers can be trimmed down to 3' (in) extension without interfering with the installation of the frame.

4. These structures can be used for Type 1, Type 1L, and Type 2 structures. Usage for the Type 2 structures shall be limited to pipe size use only.

5. Basins shall be manufactured from PVC pipe stock meeting the requirements of ASTM D1784, cell classification 12454.

6. Ductile iron castings for PVC catch basins shall conform to the requirements of ASTM A536, grade 70-50-06, and shall meet the proof load testing requirements of AASHTO M 306.

7. 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 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
GRAVEL BACKFILL FOR PIPE ZONE BEDDING

STEPS OR LADDER 24:1 SLOPE

REINFORCING STEEL (TYP.)

CHANNEL AND SHELF

PRECAST RISER SECTIONS

CIRCULAR ADJUSTMENT SECTION (TYP.)

ECCENTRIC CONE SECTION

MANHOLE RING AND COVER

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

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
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<th>MAXIMUM KNOCOUT SIZE</th>
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MANHOLE TYPE 1

STANDARD PLAN B-15.20-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

1-3-12
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

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

<table>
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<tr>
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MANHOLE TYPE 3

STANDARD PLAN B-15.60-02

Heilman, Julie
Jan 23 2017 2:58 PM

STATE DESIGN ENGINEER
Washington State Department of Transportation
NOTES

1. Precast concrete cone sections may be eccentric or concentric.

2. Seepage port orientation varies among manufacturers.

3. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.
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, knockout on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" (in) minimum and 2" (in) maximum.
CIRCULAR FRAME (RING) – SEE STANDARD PLAN B-30.70
CIRCULAR GRATE – SEE STANDARD PLAN B-30.80
FINISHED SURFACE
VARIES

ADJUSTMENT SECTION (TYP.)

CONE SECTION
4" CONCRETE SLAB – COMMERCIAL CONCRETE

CRUSHED SURFACING BASE COURSE

UNDERGROUND DRAINAGE GÉOTEXTILE, MODERATE SURVIVABILITY, CLASS A

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

FINISHED SURFACE
VARIES

ALTERNATIVE PRECAST FOOTING DETAIL

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

NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. See page 2 for orientation of manufacturers.
3. For depths over 16' - 2" use 72" x 8" Alternate 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 FOOTING
Precast

INTEGRAL BASE
Precast with Riser

CUTAWAY ELEVATION VIEW

INTEGRAL BASE DETAIL
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 centerline (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 method 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" (in) x 2" (in) 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, gratings, and covers, unless specified otherwise in the Contract. Provide two holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) x .111 NC x 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer. 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 Section 9-05.18(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 (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR</td>
<td>12&quot;</td>
</tr>
<tr>
<td>PLAIN CONCRETE</td>
<td></td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>16&quot;</td>
</tr>
<tr>
<td>CPSSP * (STD. SPEC. SECT. 9-66.20)</td>
<td>12&quot;</td>
</tr>
<tr>
<td>POLYPROPYLENE (STD. SPEC. SECT. 9-66.24)</td>
<td>12&quot;</td>
</tr>
<tr>
<td>SOLID WALL PVC (STD. SPEC. SECT. 9-66.13)</td>
<td>16&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC (STD. SPEC. SECT. 9-66.13)</td>
<td>16&quot;</td>
</tr>
</tbody>
</table>

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

### NOTES

1. As acceptable alternates 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" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) 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 Section 9-04.3.

3. The maximum depth from the finished grade to the lowest pipe invert shall be 8' (ft).

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

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

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

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

---

**CONCRETE INLET**

STANDARD PLAN B-25.60-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Holmam, Julie
Feb 20 2018 12:51 PM
NOTES

1. This frame is designed to accommodate 20" (in) x 24" (in) 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 3/4" Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

3. Refer to Standard Specification Section 9-06.18 and 9-06.18(2) for additional requirements.

DETAIL B

BOLT-DOWN HOLE (TYP.) - 5/8" (IN) - 11 NC (SEE DETAIL & NOTE 2)

RECEIVED ALLEN HEAD CAP SCREW 3/4" X 5/8" (IN) - 11 NC X 2" (IN)

GRATE

SLOT

FRAME CAST INTO PRECAST ADJUSTMENT SECTION - SEE STANDARD PLAN B-30.05 FOR ADJUSTMENT SECTION DETAILS

FRAME UPWARD

ISOMETRIC VIEW SHOWING THE VARIATIONS

TOP

SECTION A

RECTANGULAR FRAME (REVERSIBLE)

STANDARD PLAN B-30.10-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION 1/17/2013 3:11 AM

Washington State Department of Transportation
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 3.04 Stainless Steel (S.S.) 5/8" (In) - 11 NC x 2" (In) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. All grates shall be 20" (In) x 24" (In).

3. Grate alternative shown for informational purposes. Grate design varies by manufacturer and must meet ADA requirements.

4. Refer to Standard Specification Section 9-05.15 and 9-05.15 (2) for additional requirements.
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/16" (6.4 mm) - 11 NC x 2" (51 mm) Allen head cap screw by being tapped, or other approved mechanisms. 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 Section 5-B-06.16 and 5-B-06.16(2) for additional requirements.

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

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 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 Section 9-05.15 and 9-05.15(2) for additional requirements.

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

BOLT-DOWN DETAILS
SEE NOTE 1
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 3/4" Stainless Steel (S.S.) 5/8" (l) - 11 NC x 2" (l) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification Section 7-05.15, and 9-05.15(2) for additional requirements.

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

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (5.5) 5/8" (in) - 11 NC x 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification section 9-05.15, and 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" (in).

RECEIVED ALLEN HEAD CAP SCREW
304 Stainless Steel (5.5) 5/8" (in) - 11 NC x 2" (in)

ISOMETRIC

TOP

FRAME

HOLE

GRAITE

SLOT

RECEIVED ALLEN
HEAD CAP SCREW

This side toward curb

SLOT - SEE DETAIL AND NOTE 1

1" (IN) OPENING (TYP.)

1/2" (IN)

1 5/8" (IN)

FRONT

REAR

FOUNDRY NAME

NOTES

RECTANGULAR HERRINGBONE GRATE

STANDARD PLAN B-30.50-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Hoffman, Julie

Feb 20 2018 12:55 PM

Washington State Department of Transportation
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 304 Stainless Steel (SS) 5/8" x 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt down holes varies by manufacturer.

3. For bolt-down manhole rings and covers that are not designated "Water tight," 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 11/4" (in) 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. If 1"=3'0" the horizontal scale (1"=1'-0"),

CIRCULAR FRAME (RING) AND COVER

STANDARD PLAN B-30.70-04

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Feb 20 2018 12:55 PM
NOTES
1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywalls only. See Standard Plans B-20.20 and B-20.60.
3. See Standard Specification Section 5-05.15 for additional requirements.
1. Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 195.

**NOTE**

- **STEP**
  - 12' MIN.
  - 12' MAX.
  - 16' MAX.
  - 12' (TYP.)

- **PREFABRICATED LADDER**
  - 12' MIN.
  - 16' MAX.
  - 48' MIN.
  - 48' MAX.
  - 48' MIN.
  - 6' MAX.
  - 2', 4', 6', 12', OR 24' (IN)
  - ONE #3 BAR HOOP FOR 2', 4', OR 6' (IN)
  - TWO #3 BAR HOOPS FOR 12' (IN)
  - FOUR #3 BAR HOOPS FOR 24' (IN)

**RECTANGULAR ADJUSTMENT SECTION**

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

- As an acceptable alternative to conventional steel reinforcement, manufacturers shall use Synthetic Structural Fibers meeting the requirements of Standard Specification Section 9-05.50(10).

**CIRCULAR ADJUSTMENT SECTION**

For rectangular and circular adjustment sections, approved alternate material compositions are acceptable in lieu of precast concrete designs.
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.

Top View

Section A: Two Piece Base

Section B: Two Piece Base

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>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

Grate Inlet Type 2

Standard Plan B-35.40-00

Sheet 1 of 2 Sheets

Approved for Publication

Washington State Department of Transportation

Drawn by: Adam Cochrane

Date: 6/1/06

Expires July 1, 2007

State of Washington

Professional Engineer

SIGNED
NOTES
1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.
2. Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section.
3. All exposed concrete edges shall be finished with a 1/2" radius.
4. Pipes may enter through the knockouts on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.
5. The flow line of the outlet pipe shall be 18" minimum above the inside bottom of the inlet structure.
6. The grade line of the top inside of any inlet pipe shall enter no lower than the grade line of the top inside of the outlet pipe.
7. Unit "H" and optional extension units "J" and "K" shall be grouted in place to the satisfaction of the Engineer.
8. All pickup holes shall be grouted full after the basin has been placed.
ELEVEN EQUAL SPACES

TOP

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

SIDE

GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

SIDE

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)

3 1/2" X 3/4" STEEL PLATES

3 1/2" X 3/4" STEEL PLATES (BOTH SIDES)

WELDED GRATES
FOR GRATE INLET

STANDARD PLAN B-40.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. The Contract may specify a rotated inlet installation. Orient the grates in the frame so they intercept flow.

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 304 Stainless Steel (S.S.) 5/8" (m) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

3. Refer to Standard Specification Section 9-05-16(2) for additional requirements.

4. Frame and Grates shall be Ductile Iron.
NOTES
1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.
2. Bevel or round exposed concrete edges 1/2" (in).
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" (in) except in pipe knockout areas.
9. Precast insets 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" (in).

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" (in) except in pipe knockout areas.

9. Precast inlets shall be marked with the manufacturer's identification on the inside of the structure in some readily accessible location.

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

1/4" IN. x 3" (IN) x 1/2" (IN) x 35 1/4" (IN) STEEL ANGLE TO ANGLE

1/4" IN. x 3" (IN) x 3/8" (IN) STEEL PLATE - TACK WELD
**Type 1**

- Dimensions: 3 1/2" x 1/2" x 34 1/2" steel plate (typ.)
- Optional 1" max. vent holes on bottom for galvanizing
- Three spaces: 5 1/4" x 34 1/2"

**Type 2**

- Dimensions: 3 1/2" x 1/2" x 34 1/2" structural tubing (typ.)
- 2" (typ.)
- Grind top and bottom flush after welding

**Type 3**

- Dimensions: 3 1/2" x 1/2" x 34 1/2" steel plate (typ.)
- Optional 1" max. vent holes on bottom for galvanizing
- Five spaces: 3 1/2" x 3 1/2" x 33 1/4" structural tubing (typ.)
- Grind top and bottom flush after welding

**Isometrics**

- Section A: Three spaces: 5 1/4" x 34 1/2"
- Section B: 3 1/2" x 1/2" x 33 1/4" steel plate (typ.)
- Section C: Five spaces: 3 1/2" x 3 1/2" x 33 1/4" structural tubing (typ.)
CONCRETE AND DUCTILE IRON PIPE

THERMOPLASTIC PIPE

METAL AND STEEL RIB
REINFORCED POLYETHYLENE PIPE

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 bleded to spring line.

CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS

<table>
<thead>
<tr>
<th>PIPE TYPE</th>
<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCULAR PIPE (DIAMETER)</td>
<td>UP TO 48&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>METAL PIPE ARCH (SPAN)</td>
<td>48&quot; AND LARGER</td>
<td>DIAMETER/2 OR 36&quot; WHOEVER IS LESS</td>
</tr>
</tbody>
</table>
NOTES

1. The Concrete Collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum Concrete Collar width shall be 1 1/2" (1.5 in.). Concrete Collars may be used with all pipe materials and diameters. The Concrete Collar option shall only be used to extend existing pipes. Concrete shall be Commercial Concrete in accordance with Standard Specification Section 6-02.3(2).

2. Steel Welded Wire Fabric shall be in accordance with Standard Specification Section 9-07.7. Install two wraps for size 8 x 8 W1.4 x W1.4 (10 Gauge) Steel Welded Wire Fabric for each wrap for any of the following sizes:
   - 6 x 6 W2.1 x W2.1 (8 Gauge)
   - 6 x 6 W2.9 x W2.9 (6 Gauge)
   - 4 x 4 W2.3 x W2.3 (5 Gauge)
   - 4 x 4 W4.0 x W4.0 (4 Gauge)
   Provide 1 1/2" min. covering over wire fabric.

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" (12 in) wide rubber gaskets, thickness as required (Coupling Band only). The rubber gaskets shall be in accordance with Standard Specification Section 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" (36 in) or less.
NOTES

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

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

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

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

ALLOWABLE HEIGHTS OF COVER

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

END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))
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" (in) to 24" (in) inclusive and for pipe arches with a rise of 13" (in) to 20" (in) inclusive. Skirt sections for larger sizes of pipes may be multiple pieces in conformance with the tabulated values shown.
3. Design A and sections for 42" (in) thru 84" (in) diameter and 48" (in) to 33" (in) thru 83" (in) to 57" (in) 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" (in) lap seams tightly joined by 3/8" (in) stainless steel rivets or galvanized bolts on 6" (in) max. centers.
6. The reinforced edges of the following size End Sections shall be supplemented with galvanized steel stiffener angles:
60" (in) thru 72" (in) diameter pipe .......................... 2" (in) x 2" (in) x 1/4" (in) angle
76" (in) and 84" (in) diameter pipe, and
77" (in) x 52" (in) & 83" (in) x 57" (in) pipe arch .......... 2 1/2" (in) x 2 1/2" (in) x 1/4" (in) angle
7. The above galvanized angles shall be attached by 3/8" (in) galvanized nuts and bolts.
8. Galvanized steel angle reinforcement shall be placed under the center panel seams on the 72" (in) thru 84" (in) diam. pipe and 77" (in) thru 6/2" (in) & 83" (in) to 57" (in) pipe arch End Sections.
9. As an alternative to the connector lug and threaded rod used on 12" (in) thru 24" (in) culvert pipe, the attachment may be made with a 1" (in) wide strap, 12 gauge galvanized steel fastened with a 1/2" (in) diam., 6" (in) long galvanized bolt and one squarehead nut.
**Type 1**
Connection to Metal Pipe

- For 12" (in) thru 24" (in) pipe and 17" (in) x 13" (in) thru 20" (in) x 20" (in) pipe arch with annular end corrugations.

**Type 2**
Connection to Metal or Corrugated PE Pipe

- For 30" (in) thru 64" (in) pipe and 30" (in) x 24" (in) thru 83" (in) x 57" (in) pipe arch with annular end corrugations.

**Type 3**
Connection to Metal Pipe

- For 42" (in) thru 64" (in) pipe and 49" (in) x 33" (in) thru 83" (in) x 57" (in) pipe arch with annular end corrugations, and all helical end corrugated pipe and pipe arch.

---

**Design A**

- Concrete pipe
- Smooth Galvanized Steel, Aluminum, or Aluminized Steel Pipe
- Pivot Bolt
- Expander Lug
- 1" (R.S.) minimum lap after expansion
- Less than 38" diam. = 7"
- 38" diam. and over = 13"

**Alternate View for Female End**

- Pipe payment to this point
- Mastic where required
- Nominal diameter 3/4"

---

**Design B**

- Connection to Concrete or HDPE Pipe
- Inlet end only

- Pipe coupling band, shop bolted to flared end section with 3/8" (in) bolts at 6" (in) on center maximum or equivalent riveted or welded connection. For use with all sizes of pipe and pipe arch with annular ends.

**Design C**

- Connection to Metal or Concrete Pipe
- Outlet only

- Smooth tapered sleeve detail for use with Concrete or HDPE Pipe

---

**FLARED END SECTIONS**

STANDARD PLAN B-70.60-01

Sheet 2 of 2 sheets

Helman, Julie
Jan 25 2017 3:39 PM

Approved for publication:

Corporal, Jeff
Jan 30 2017 5:59 AM

State Design Engineer

Washington State Department of Transportation
NOTES
1. The variable dimension indicated for the height of step for step mitered pipes shall conform to the manufacturer's recommendations unless specified differently on the plans or in the Special Provisions.
2. Reinforcing steel shall have 1 1/2" (in) 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" (in).

STRUCTURAL PLATE PIPE ARCHES AND UNDERPASSES

STEP MITERED PIPE

PIPES AND STRUCTURAL PLATE PIPES

ANCHOR BOLT DETAIL
SEE STANDARD SPECIFICATION SECTION 9-06.5(1)
NOTES
1. Sockets shall be 3" extra strong steel pipe (3 1/2" O.D.). Sockets must be the proper angle and height so that safety bars are parallel with headwall and side slope, and are easily removable.
2. Safety Bars shall be 4" extra strong steel pipe (4 1/2" O.D.), or 4 1/2" O.D. (250" wall thickness) steel tubing. Length (20" maximum) shall be the minimum required to achieve Resin Bonded Anchor placement in full depth concrete. When multiple bars are required (see table) place bars at equal spacing (30" max.).
3. Bevel culvert pipe to match side slope.
4. Resin bonded anchors shall be 7" in length (5" embedment).
5. Centerline of headwall shall be normal to roadway centerline.
NOTES
1. D = Inside Diameter of Culvert Pipe, or Pipe Arch Span Width, 36" maximum.

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

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

 type 2 safety bars for culvert pipe or pipe arch (on cross road)
NOTES

1. All pipes or pipe arches shall be attached as shown in CONNECTOR DETAIL.
2. When a Toe Plate Extension is required, it shall be the same gage as the End Section. The dimensions shall be 8" high, and 6" less than the overall width. Install centered, and lapped 2", fasten with 3/8" x 3/4" galvanized bolts on 12" maximum centers.
3. Cross Drainage Bar and Safety Bars shall be 3" Schedule 40 galvanized steel pipe. Cross Drainage Bars shall be placed a maximum 30" apart.
4. Slot holes for safety bar attachment shall be provided on end sections.
5. Number of Safety Bars required will vary depending upon the length of the end section.

<table>
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<tr>
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<th>PIPE ARCH</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
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*SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"
**REINFORCED EDGE - FULL LENGTH OF END SECTION (SEE SECTION)**

**SAFETY BAR (TYP.) SEE NOTE 2**

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

**SIDE VIEW**

EDGE OF END SECTION SHEET ROLLED SNUGLY AGAINST STEEL ROD

1/8" DIAM MIN. GALVANIZED STEEL ROD OR NO. 4 GALVANIZED REINFORCING BAR

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

**SAFETY BAR END TREATMENT DETAIL**

1/4" x 3/4" SLOTS (TYP.)

**METAL END SECTIONS FOR CIRCULAR PIPES**

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**METAL END SECTIONS FOR ARCHED PIPES**

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**NOTES**

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

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

**SAFETY BAR END TREATMENT** SEE DETAIL

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

**SAFETY BAR END TREATMENT DETAIL**

1/4" x 3/4" SLOTS (TYP.)

**ISOMETRIC VIEW**

**REINFORCED EDGE (SEE SECTION)**

**TOE PLATE EXTENSION - WHEN REQUIRED; SAME GAGE AS END SECTION, 6" LESS THAN OVERALL WIDTH| CENTERED, 2" LAP, FASTEN W/ 3/8" x 3/4" GALV. BOLTS ON 12" MAX. CTRS.**

**SIDE VIEW**

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

**SAFETY BAR END TREATMENT DETAIL**

1/4" x 3/4" SLOTS (TYP.)

**ISOMETRIC VIEW**

**CROSS ROAD DRAINAGE STRUCTURE**

**NOTE**

EXPRESS JULY 1, 2007

TAPERED END SECTION WITH TYPE 4 SAFETY BARS (ON CROSS ROAD)

STANDARD PLAN B-80.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION:

DATE

6/1/06

STATE DESIGN ENGINEER:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE

6/1/06
VERTICAL CONNECTION

STANDARD PLAN B-85.10-01

FOR SANITARY SEWER USE

WASHINGTON, STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JULY 1, 2009

CITY OF WASHINGTON

WASHINGTON, STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JULY 1, 2009
1. Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gaskets for new sewer installations.

2. Mark location of sewer stub in accordance with Contracting Agency requirements.
45° BEND

4" OR 6" SEWER PIPE (SEE CONTRACT)

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

SEWER MAIN

TEES
PLAN

SECTION A

CAST IRON RING AND COVER

FOR SANITARY SEWER USE

STANDARD PLAN B-85.40-00

8 INCH SEWER CLEAN-OUT
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

Ductile iron drop connection

Elevation

Typical manhole foundation construction

Mortar dam or plug as required by engineer

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

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

1. Coat the pipe threads with asphalt after assembly.
2. All piping shall be galvanized steel.
3. Valve and piping to valve shall be 2" unless otherwise noted in the Contract.
4. Locate blowoff outlet near property corner if possible.
Notes
1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.
2. Locate at the high point of the main, tap top of main.
TWO TIE RODS WITH TURNBUCKLES

THREAD 6"

BLOCKING FOR 11.25° OR 22.5° VERTICAL BENDS

FOUR TIE RODS WITH TURNBUCKLES

THREAD 6"

BLOCKING FOR 45° VERTICAL BENDS

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

<table>
<thead>
<tr>
<th>PIPE DIAM.</th>
<th>TEST PRESSURE (PSI)</th>
<th>BEND ANGLE</th>
<th>CONCRETE VOLUME (FT³)</th>
<th>CUBE SIZE (IN)</th>
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NOTES

1. The Beam Guardrail Type 31, post type, or Beam Guardrail Type 31 Transition Section may vary from that shown on this plan.

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


BEAM GUARDRAIL BLOCKS AND RAIL ELEMENTS NOT SHOWN FOR CLARITY

PLAN

INLET PLACEMENT AT BRIDGE END

STANDARD PLAN B-95.40-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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

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

3. Timber blocks shall be toe-nailed to the post with a 16d galvanized nail to prevent block rotation.

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

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

6. Holes shall be located on approaching traffic side of web.
NOTES
1. Type 10 post shall be 6 x 8 timber, OR either W8 x 9, or W8 x 8.5 steel. Type 11 post shall be 10 x 10 timber or W8 x 15. For additional details see Standard Plan C-1b.
2. Type 10 guardrail post spacing shall be 6'-0" on center. Type 11 shall be a maximum of 3'-0" on center.
3. Spacing may vary depending on application. See Standard Specification Section 9-16.3(1) for rail element requirements.

TYPICAL RAIL ELEMENT

WOOD POST ASSEMBLY

TYPE 10

5/8" (IN) x 1 1/4" (IN) BUTTON HEAD BOLT WITH 7/8" (IN) OVAL GRIP AND RECESS HEX NUT

(SEE NOTE 1)

1 3/4" (IN) POST BOLT WAHER

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

SPUICE BOLT SLOT (TYP.) = 29/32" (IN) X 1 1/8" (IN)

FACE OF GUARDRAIL

RAIL ASSEMBLY

TYPE 11

5/8" (IN) x 1 1/4" (IN) BUTTON HEAD BOLT WITH 7/8" (IN) OVAL GRIP AND RECESS HEX NUT - TWELVE (12) REQUIRED PER SPUCES

(SEE NOTE 1)

NESTED THRE BEAM

5/8" (IN) x 35" (IN) BUTTON HEAD BOLT WITH 7/8" (IN) OVAL GRIP AND RECESS HEX NUT

(SEE NOTE 1)

1 3/4" (IN) POST BOLT WAHER

TIMBER BLOCK FOR STEEL POST

BEAM GUARDRAIL
(THRIE BEAM)

STANDARD PLAN C-1a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Coppinger, Jeff
Jul 14 2015 11:30 AM

Washington State Department of Transportation
NOTES

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

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

3. W6×8.5 or W6×9 steel posts and timber blocks are alternates for 6×6 timber posts and blocks. W6×15 steel posts and timber blocks are alternates for 10×10 timber posts and blocks.

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

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

6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.
INTERMEDIATE GUARDRAIL POST CONNECTION DETAILS
(Type A shown)

THREE BEAM GUARDRAIL REDUCER SECTION

THREE BEAM GUARDRAIL REDUCER SECTION

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

1. CASE 9C: Thirre 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.
BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 1

1. For W-Beam applications extend the rail from the bull nose 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-25.80.
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. 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. 8-65.5(b), with thin slab female inserts or resin bonded anchors. See the Contract Plans.
3. A single piece having similar dimensional shape to Design G and mating with the W-beam guardrail is an alternate.
4. In cases where Design F end section is lapped on the outside of the guardrail, a galvanized 1” ID, 2” OD, 0.134” thick, narrow Type A Plain Washer or an anchor rail washer shall be placed under the splice bolt heads.

BEAM GUARDRAIL END SECTIONS
STANDARD PLAN C-7

[Diagram with dimensions and notes]
NOTES

1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. 9-06.04(4), with thin slab female inserts or resin bonded anchors. See the Contract Plans.

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

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

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

3. Timber blocks shall be toe-nailed to the post with a 16d galvanized nail to prevent block rotation.

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

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

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

7. Holes shall be located on approaching traffic side of web.
NOTES
1. Where a crashworthy terminal is not required, use Beam Guardrail Type 10; see Standard Plan C-23.60.
2. Where a crashworthy terminal is required, use a Beam Guardrail Type 31 Non-Flared Terminal see Standard Plan C-22.40 or C-22.45.
3. For terminal type and details, see Contract Plans and applicable drawings.
4. For additional details not shown on this plan, refer to Standard Plan C-20.10.
5. Timber or steel post, Steel post shown.
BEAM GUARDRAIL TRANSITION SECTION

TYPE 31 – PAY LIMIT (SEE NOTE 3)

SEE FLARE RATE TABLE

EDGE OF SHOULDER

ONE-OR TWO-WAY TRAFFIC

CASE 4 - 31

NOTES

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

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

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

4. Timber or steel post. Steel post shown.

BEAM GUARDRAIL TYPE 31

PAY LIMIT

CASE 5 - 31

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE (F/T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>15 : 1</td>
</tr>
<tr>
<td>60</td>
<td>14 : 1</td>
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<tr>
<td>55</td>
<td>12 : 1</td>
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<tr>
<td>50</td>
<td>11 : 1</td>
</tr>
<tr>
<td>45</td>
<td>10 : 1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>9 : 1</td>
</tr>
</tbody>
</table>
BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL - PAY LIMIT
(SEE NOTE 3)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL - PAY LIMIT
(SEE NOTE 3)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL TYPE 31
PAY LIMIT (SEE NOTE 1)

BEAM GUARDRAIL ANCHOR TYPE 10 - PAY LIMIT
(SEE NOTE 2)

BEAM GUARDRAIL EXTENSION
LENGTH VARIES - SEE CONTRACT
(SEE NOTE 4)

NOTES
1. For details see Standard Plan C-20.10.
2. For details, see Standard Plan C-23.60.
3. For details, see Standard Plan C-22.40 or C-22.45.
4. Timber or steel post. Steel post shown.
NOTES

1. For details, see Standard Plan C-20.10.

2. For details, see Standard Plan C-1a.

3. Attach a standard 12" (305 mm) or 8" (203 mm) wood blockout to the rail using two 5/8" (16 mm) lag bolts.

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

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

6. For details, see Standard Plan C-22.40 or C-22.45.

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

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

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

4. For fill depths greater than 40 inches, drive standard guardrail posts and install guardrail per Standard Plan C-20.10.
NOTES

1. See Contract for transition and connection type.

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

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

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

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

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

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

2. Use a single or combination of blockouts to achieve the actual 12" (in) offset. See Standard Specification, Section 8-16.3(2). Wood blockouts 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 blockouts shown. Blocks of alternate material may be used. See Standard Specification, Section 8-16.3(2).
1. The implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan. Non-Flared terminals shall be selected from the WSDOT Qualifying Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

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

3. An MSKT-SP-MGS (TL-2) as manufactured by Road Systems, Inc., SOFTSTOP (TL-2) as manufactured by Trinity Highway Products, LLC, or MAX-TENSION (TL-2) as manufactured by Lindsay Transportation Solutions, shall be installed according to manufacturer's recommendations.

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

5. Snow load rail washers shall not be installed within the terminal limits.

6. Provide an offset between 0 to 1 foot so that the impact head does not encroach onto the paved shoulder. The offset is provided over the length of the terminal system from the center of the last post splice to either: (1) The face of the impact head at its leading edge (MSKT-SP-MGS), or (2) The center of anchor Post 6 (Softstop or Max-Tension). Provide the maximum offset where practicable.

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

8. These terminals are supplied with steel posts only. They can be used with beam guardrail Type 31 runs, composed of steel or wood guardrail posts.
1. For use on the end of guardrail run when a crashworthy terminal is not required.
2. For additional details not shown, see Sheet 2 of this Plan.
3. For end section details, see Standard Plan C-7 and C-7a.
4. Use details for Wood Breakaway post shown on this plan and components shown on Standard Plan C-10.
5. Fasten the Anchor Cable using two 1" (in) nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification, Section 5-16.3(2).
7. Posts shall match those of the connecting run: timber or steel.
8. Anchor plate may be constructed from 1/4" (in) plates welded to equal strength and dimensions as shown.
9. Eight 5/8" (in) x 1 1/2" (in) machine bolts with hex nut and washer. Place washer on face side of rail.

ELEVATION VIEW
W-BEAM

ISOMETRIC VIEW

WOOD BREAKAWAY
POST DETAIL

ELEVATION VIEW
THREE BEAM

ISOMETRIC VIEW

ANCHOR RAIL WASHER - ON TRAFFIC SIDE
(SEE NOTE 2)

END SECTION DESIGN C
(SEE NOTE 3)

WOOD BREAKAWAY POST

BEARING PLATE
(SEE NOTE 2)

GROUND LINE

ANCHOR PLATE
(SEE NOTE 2)

ANCHOR CABLE

STANDARD 2" (IN) I.D.
PIPE SLEEVE -
2 3/8" (IN) O.D.

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)

ANCHOR POST ASSEMBLY
(SEE NOTE 4)
NOTES

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

2. If the last guardrail post is 3' (in) or less from the end of the bridge barrier, this attachment and blockout is not necessary.

3. See Bridge Plans for additional connection details.

4. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification, Section 9-15.3 (2).

5. Steel posts shown. Timber posts may be used.
NOTES
1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety-
shape barrier. The toe of the single slope and the safety-shape barrier shall be tapered or the
barrier blocked out so that the toe of the barrier does not project past the face of the
approach guardrail.
2. See Standard Plan C-24.10 for details regarding connection to bridge rail or traffic barrier.
3. For details of typical components, see Standard Plans C-10 and C-20.10.

BEAM GUARDRAIL TRANSITION SECTION TYPE 21 - PAY LIMIT

NOTE: TRANSITION PAY LIMIT SHALL INCLUDE END SECTION FOR CONNECTION TO BARRIER OR FIXED OBJECT

BEAM GUARDRAIL TYPE 31

SEE CONTRACT PLANS
FOR SPECIFIED
CONNECTION

12-6" NESTED THREE BEAM GUARDRAIL
12-GAGE

6'-3" SHORT THREE BEAM ELEMENT
12-GAGE

REDUCER ELEMENT
10-GAGE

W/BEAM GUARDRAIL
12-GAGE

12 SPACES @ 3'-1 1/2"

GROUND LINE

W6 x 12 - 7'-6" LONG STEEL POST
WITH 6 x 12 BLOCK

W6 x 12 x 16" (IN) LONG BLOCK -
SEE DETAIL STD. PLAN C-26.32

W6 x 15 - 7'-6" LONG
STEEL POST
WITH 6 x 8 BLOCK

W6 x 8.5 OR W6 x 9 - 6'-0" LONG STEEL
POST WITH 6 x 12 BLOCK

BEAM GUARDRAIL (TYPE 31)
TRANSITION SECTION
TYPE 21

STANDARD PLAN C-25.20-06

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Carver, Jeff

Jul 14 2013 11:20 AM
1. See Standard Plans C-1b, C-1d, C-20.10, and C-25.20 for rail elements and thrie beam block details.

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


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

3. For additional alternatives not shown, see Contract Plans.
1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety-shape barrier. The toe of the single slope and the safety-shape barrier shall be tapered or the barrier blocked out so that the toe of the barrier does not project beyond the face of the approach guardrail.

2. See Standard Plan C-1b for three beam wood block detail.

3. See Standard Plan C-20.10 for typical components (nuts, washers and bolts) at splice.


5. All rail sections shall be lapped in the direction of traffic.

6. See Standard Plan C-24.10 for details regarding connection to bridge rail or traffic barrier.
NOTES

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

2. Accommodating the wider blockout (12” (in) width) used with Type 31 guardrail will require widening the embankment.

3. Wood blockouts shown. Blockouts of alternate material may be used. See Standard Specification, Section 8-16.3(2).

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

5. Post 1 is an existing Type 1 post. Post 2 through 5 are new posts with 12” (in) or 8” (in) blockouts. All blockouts shall be uniform in size. The blockout size shall match the size used on the Type 31 Guardrail run or non-flared terminal.
NOTES

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

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

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

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

CONCRETE BARRIER
TYPE 2
STANDARD PLAN C-8
SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WIRE ROPE LOOP DETAIL

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

1 3/4" L.D. LOOP

5/8" WIRE ROPE

SEE NOTE 1

PLATE WASHER
1/8" THICK

2" MIN.
2 1/2" MAX.

2 3/8" FOR CONNECTING PIN
3/8" FOR DRIFT PIN

1" DIAM. PIN WITH ROUNDED BOTTOM EDGES

SEE NOTE 3

CONNECTING PINS AND DRIFT PINS

TOP VIEW

WIRE ROPE LOOPS - SEE NOTE 1

HOLE FOR DRIFT PIN

PIN

SEE NOTE 4

BARRIER TERMINAL

SIDE VIEW

WIRE ROPE LOOPS - SEE NOTE 1

3/4" CHAMFER

PIN

BARRIER CONNECTION DETAIL

CONCRETE BARRIER TYPE 2
STANDARD PLAN C-8
SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation
NOTES
1. This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 16' (ft) max. length double mast arms.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3'-0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. See the Contract Plans for conduit size and placement.
5. Concrete shall be Class 4000.
6. Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If PVC conduits are specified, the conduit stub and end bell bushing shall not be glued to the coupling.

GROUNDING CONDUCTOR - ROUTE TO GROUNDING STUD (SEE NOTE 3)

SECTION A

CONCRETE BARRIER LIGHT STANDARD SECTION
STANDARD PLAN C-8b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Carpenter, Jeff
Feb 29 2016 12:30 PM
Washington State Department of Transportation
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

TOP VIEW

TOP VIEW

TRANSITION SECTION

TRANSITION SECTION

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" - 6" apart. See Standard Plan C-6, BARRIER CONNECTION DETAIL.
NOTES
1. Concrete for Type F Barrier shall be Class 5000.
2. The reinforcing steel details for the NARROW BASE barrier are
   the same as those shown for the 24" (IN) wide barrier except that
   the bars along the vertical face run vertically with a 1 1/2" (IN)
   clearance.
1. The intended use of this plan is for the anchoring of Precast Concrete Barrier Type F on hot mix asphalt (HMA) or cement concrete pavement in permanent or temporary installations. See Standard Plan K-60.37 for anchoring Narrow Base Barrier in Temporary Installations Only.

2. After removing the anchoring pins, clean the pin holes and fill them with sealant according to Standard Specification Section 9-04.2.

3. Remove slack between barrier segments after inserting the connecting pin.
SECTION A
4'-0" BARRIER SHOWN LEVEL.

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

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

HIGH-PERFORMANCE BARRIER
NOTES

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

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

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

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

5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3" - 6" and a minimum embedment of 3" (in).
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) Premolded Joint Filler between segments; fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.

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

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

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

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

DIRECTION OF TRAVEL

PLAN

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

ELEVATION

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

REBAR GRID (SEE NOTE 3)

TOP OF ROADWAY

2 3/8" (IN) PREMOLDED JOINT FILLER — FOR PERMANENT INSTALLATION

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPIEL, #57.10) FOR BENDING DIAMETERS

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

2 1/2" HT.

DIRECTION OF TRAVEL

NOTE:

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

DIMENSION TABLE (SEE NOTE 3)

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD. 3'-6&quot;</td>
<td>8&quot;</td>
<td>2'-0&quot;</td>
<td>3'-2&quot;</td>
<td>3'-9&quot;</td>
<td>1'-7&quot;</td>
<td>8</td>
<td></td>
<td></td>
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<tr>
<td>H/PS</td>
<td>4'-0&quot;</td>
<td>9 1/2&quot;</td>
<td>2'-2 1/4&quot;</td>
<td>3'-2&quot;</td>
<td>3'-3&quot;</td>
<td>1'-9&quot;</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

NOTES

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

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

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

4. 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/PS row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 5" and a minimum embedment of 3" (in).
NOTES

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

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

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

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

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 907.1.5 FOR BENDING DIAMETERS

EXPANSION JOINT DETAIL

ISOMETRIC VIEW

SECTION B

PREPARED GRADED BASE
HYPOTHETICAL GRADE SEPARATION

BARRIER TRANSITION DETAIL

NOTE: STEEL WELDED WIRE REINFORCEMENT DEFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 91.3

TYPICAL SECTION
DUMMY JOINT DETAIL

EXPANSION JOINT DETAIL

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

STEEL REINFORCEMENT SYMMETRICAL ABOUT PREMOLDED JOINT FILLER

EXPANSION JOINT DETAIL

CONNECTION BLOCKOUT (SEE NOTE 2)

ISOMETRIC VIEW

SECTION B
HIGH-PERFORMANCE BARRIER

SECTION A

4'-0" BARRIER SHOWN LEVEL

SECTION A

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

SECTION A

4'-0" BARRIER FOR USE WITH A GREATER THAN 3" (IN) TO 8" (IN) MAX. GRADE SEPARATION (SEE NOTE 3)
NOTES

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

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

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 9-97-1.12 FOR BENDING DIAMETERS

DIMENSION TABLE

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

SECTION A

SECTION B

SECTION C

ELEVATION

PLAN

SINGLE-SLOPE CONCRETE BARRIER (BID ITEM)

10'-0" MIN. TO 12'-0" MAX. SEE STANDARD PLAN C-80.10

VARIES = 1'-6" MAX.

VARYES = 1'-6" MAX.

FIELD BEND 

#5 BARS

"2 SQ. SPACES

DUMMY JOINT

NOTES:

- The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
- See Standard Plan C-80.10, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details.
- When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3" (in).

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

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 9-97-1.12 FOR BENDING DIAMETERS

DIMENSION TABLE

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

SECTION A

SECTION B

SECTION C

ELEVATION

PLAN

SINGLE-SLOPE CONCRETE BARRIER (BID ITEM)

10'-0" MIN. TO 12'-0" MAX. SEE STANDARD PLAN C-80.10

VARIES = 1'-6" MAX.

VARYES = 1'-6" MAX.

FIELD BEND 

#5 BARS

"2 SQ. SPACES

DUMMY JOINT

NOTES:

- The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
- See Standard Plan C-80.10, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details.
- When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3" (in).

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

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 9-97-1.12 FOR BENDING DIAMETERS

DIMENSION TABLE

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

SECTION A

SECTION B

SECTION C

ELEVATION

PLAN

SINGLE-SLOPE CONCRETE BARRIER (BID ITEM)

10'-0" MIN. TO 12'-0" MAX. SEE STANDARD PLAN C-80.10

VARIES = 1'-6" MAX.

VARYES = 1'-6" MAX.

FIELD BEND 

#5 BARS

"2 SQ. SPACES

DUMMY JOINT

NOTES:

- The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
- See Standard Plan C-80.10, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details.
- When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3" (in).

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

REINFORCING STEEL BENDING DIAGRAM

SEE STD. SPEC. 9-97-1.12 FOR BENDING DIAMETERS

DIMENSION TABLE

<table>
<thead>
<tr>
<th>BARRIER</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>HORIZONTAL BARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEIGHT (FT.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(QTY.)</td>
</tr>
<tr>
<td>STD.</td>
<td>2'-6&quot;</td>
<td>8&quot;</td>
<td>2'-0&quot;</td>
<td>3</td>
<td>2'-0&quot;</td>
<td>1'-6&quot;</td>
<td>8</td>
</tr>
<tr>
<td>HP</td>
<td>6'-0&quot;</td>
<td>9'8&quot;</td>
<td>2'-2'1/8&quot;</td>
<td>4</td>
<td>3'-0&quot;</td>
<td>1'-10&quot;</td>
<td>10</td>
</tr>
</tbody>
</table>
1. The Transition Section is used in the configurations shown in Standard Plans C-85.10 and C-85.11.

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

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

4. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 6" and a minimum embedment of 3' (in).
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-85.16, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details. Modify rebar as shown in EXPANSION JOINT MODIFICATION.

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

4. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 6" and a minimum embedment of 3" (in).
This plan is for transitions to Precast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.
NOTES
1. Use the barrier type, precast or cast-in-place, as specified in the Contract.
2. Single-Slope Concrete Barrier details, see Standard Plan series C-79'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).
1. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-70.10.

2. See the Contract Plans for conduit placement.

3. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3" to 5" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.

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

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

6. Concrete shall be Class 4000.

7. This spread footing is designed for an allowable soil bearing pressure of 2500 psf or better.
1. This Barrier/Foundation combination has been designed in accordance with AASHTO LRFD Test Level 4 requirements. The horizontal vehicle impact force at the top of the barrier is taken at 54 kips for Strength and Extreme Limit States, and 10 kips for foot traffic (turning and sliding) in the Service Limit State.

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

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

4. See the Contract Plans for conduct placement.

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

6. This plan shall be used for 40' (t) and 50' (t) Light Standards with 16' (t) max. length, double mast arms.

7. Concrete shall be Class 4000.

8. The factored soil bearing resistance shall exceed the following:
   i) Service limit state = 6 ksf
   ii) Strength limit state = 24 ksf
   iii) Extreme limit state = 48 ksf
NOTES
1. When connecting between Cast-In-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.
2. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3'-0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
3. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.
4. Concrete shall be Class 4000, unless otherwise noted.

DIMENSIONS "W" AND "Z"

<table>
<thead>
<tr>
<th>SIGN BRIDGE SPAN LENGTH</th>
<th>W</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' OR LESS</td>
<td>4'-0&quot;</td>
<td>11'-6&quot;</td>
</tr>
<tr>
<td>6'-1&quot; TO 9'-0&quot;</td>
<td>5'-0&quot;</td>
<td>13'-6&quot;</td>
</tr>
<tr>
<td>9'-1&quot; TO 12'-0&quot;</td>
<td>6'-0&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>12'-1&quot; TO 15'-0&quot;</td>
<td>7'-0&quot;</td>
<td>16'-6&quot;</td>
</tr>
</tbody>
</table>

SHAFT DEPTH "Z" IS BASED ON ALLOWABLE LATERAL BEARING PRESSURE IN EXCESS OF 1000 PSI WITH Ø = 28 DEGREES OR GREATER
### Table

<table>
<thead>
<tr>
<th>Grade Separation</th>
<th>Barrier Height</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0' TO 2'</td>
<td>3'-0&quot;</td>
<td>8'</td>
<td>2'-0&quot;</td>
<td>1'-0&quot;</td>
<td>6'-8&quot;</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>UP TO 7&quot;</td>
<td>4'-0&quot;</td>
<td>9'-8&quot;</td>
<td>2'-2&quot;</td>
<td>4'-8&quot;</td>
<td>8'-4&quot;</td>
<td>3'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>UP TO 10&quot;</td>
<td>6'-0&quot;</td>
<td>10'-8&quot;</td>
<td>2'-8&quot;</td>
<td>6'-8&quot;</td>
<td>10'-4&quot;</td>
<td>5'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
</tbody>
</table>

*ADD TWO (2) #5 BARS, EQUALLY SPACED, AT THE TOP OF THE FOUNDATION BARRIER*

### Steel Plate Detail
- Notch plate as required to clear the shaft reinforcement when \( W = 4' - 0" \)
- 1 1/16" (IN) Diam. Hole (Typ.)
- 1'-3" Diam. Hole
- 5/8" Bolt Circle
- ASTM A36 Steel Plate, 5/8" (IN) x 21" (IN) x 21" (IN)

### Bar List

<table>
<thead>
<tr>
<th>Mark No.</th>
<th>Location</th>
<th>Span Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6&quot; OR LESS</td>
</tr>
<tr>
<td>1</td>
<td>Barrier - Top Vertical</td>
<td>#4</td>
</tr>
<tr>
<td>2</td>
<td>Barrier - Bottom Vertical</td>
<td>#8</td>
</tr>
<tr>
<td>3</td>
<td>Barrier - Horizontal</td>
<td>#8</td>
</tr>
<tr>
<td>4</td>
<td>Barrier - Horizontal</td>
<td>#5</td>
</tr>
<tr>
<td>5</td>
<td>Barrier - Horizontal</td>
<td>#8</td>
</tr>
<tr>
<td>6</td>
<td>CAP - Vertical</td>
<td>#4</td>
</tr>
<tr>
<td>7</td>
<td>CAP - Vertical</td>
<td>#4</td>
</tr>
<tr>
<td>8</td>
<td>CAP - Horizontal</td>
<td>#5</td>
</tr>
<tr>
<td>9</td>
<td>SHAFT - Vertical</td>
<td>#4</td>
</tr>
</tbody>
</table>

*See Table, this Sheet, Column "Q"*

*If joining two splices, see Lap Splice Detail*

### Single-Slope Concrete Barrier

**Sign Bridge Foundation**

**Standard Plan C-85.16-01**

---

**Abbreviations:**
--anchor (A)
- bolt (B)
- concrete (C)
- dim (D)
- grade (G)
- lap (L)
- reinforcement (R)
- standard plan (S)
- splice (S)
- steel plate (SP)
- vertical (V)
- width (W)

---

**References:**

- Zeldenrust, Richard
- Jan 10, 2014 10:21 AM
- State Design Office
- Washington State Department of Transportation

---

**Approval:**

- APPROVED FOR PUBLICATION
- Dec 5, 2014 3:45:25 AM
- State Design Office
- Washington State Department of Transportation
NOTES
1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.

2. All concrete shall be class 4000.

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

TABLE

<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 6'</td>
<td>3' - 6'</td>
<td>8'</td>
<td>2' - 0'</td>
<td>4' - 10'</td>
<td>3' MIN.</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>6' TO 7'</td>
<td>6' - 0'</td>
<td>6'</td>
<td>2' - 1'</td>
<td>4' - 14'</td>
<td>3' MIN.</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>7' TO 10'</td>
<td>6' - 0'</td>
<td>6'</td>
<td>2' - 1'</td>
<td>4' - 3'</td>
<td>3' MIN.</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

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)

BAR LIST

<table>
<thead>
<tr>
<th>MARK NO.</th>
<th>LOCATION</th>
<th>SIZE</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BARRIER - TOP VERTICAL</td>
<td># 4</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>BARRIER - BOTTOM VERTICAL</td>
<td># 4</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>BARRIER - HORIZONTAL</td>
<td># 5</td>
<td></td>
</tr>
</tbody>
</table>
NOTE
1. For W-Beam Type 31 shoulder application, see Standard Plan C-20.10.
2. See Contract Plans for Barrier location.

TRAFFIC BARRIER
SHOULDER WIDENING
STANDARD PLAN C-16a

Beam Guardrail Type 1
(See Note 1)

Beam Guardrail Type 1 on Steep Slopes
(See Note 1)
1. From the End of Landform, use the Design Layout Line to determine the location of the downstream (with traffic) Cable Barrier Terminal.

2. Provide the Lateral Deflection Distance and show in the Contract Plans to accommodate potential opposing traffic encroachments.

NOTES

LEGEND

- Design Layout Line

DIRECTION OF TRAFFIC

NOTE 1

LATERAL DEFLECTION DISTANCE (TYP.) - SEE CONTRACT PLANS

HIGH TENSION CABLE BARRIER

EDGE OF TRAVELED WAY

EDGE OF PAVED SHOULDER

CABLE BARRIER TERMINAL

SEE NOTE 1

BEGIN LENGTH OF NEED POINT

25°

1'-0" MIN.

EDGE OF TRAVELED WAY

HIGH TENSION CABLE BARRIER

EDGE OF PAVED SHOULDER

CABLE BARRIER TERMINAL

NOTE 2

LATERAL DEFLECTION DISTANCE (TYP.) - SEE CONTRACT PLANS

BEGIN LENGTH OF NEED POINT

25°

1'-0" MIN.

EDGE OF TRAVELED WAY

HIGH TENSION CABLE BARRIER

EDGE OF PAVED SHOULDER

CABLE BARRIER TERMINAL

NOTE 2

PLAN VIEW

LATERAL DEFLECTION DISTANCE (TYP.) - SEE CONTRACT PLANS

HIGH TENSION CABLE BARRIER

EXISTING BRIDGE PIER

EXISTING REDIRECTION LANDFORM

EDGE OF TRAVELED WAY

SECTION A

BARRIER PLACEMENT ~ CABLE BARRIER SHIELDING FOR REDIRECTIONAL LANDFORM

STANDARD PLAN C-40.18-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation
FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

TRANSVERSE BARS NOT SHOWN

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

NOISE BARRIER WALL TYPE 2

STANDARD PLAN D-2.04-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: ADAM COCHRAN

EXPRES AUGUST 23, 2016

STANDARD PLAN D-2.04-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. Wall to be designated Noise Barrier Wall Type 3A, 3B, 3C or 3D. The Contract specifies actual wall designations.

2. For intermediate wall heights not listed, use the next higher H.

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

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

---

**CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING**

**NOISE BARRIER WALL TYPE 3**

**STANDARD PLAN D-2.06-01**

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

---

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 3A, 3B, 3C or 3D. The Contract specifies actual wall designations.

2. For intermediate wall heights not listed, use the next higher H.

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

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

---

**WIND EXPOSURE & VELOCITY**

<table>
<thead>
<tr>
<th>NOISE BARRIER TYPE</th>
<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>B1</td>
<td>80</td>
</tr>
<tr>
<td>3B</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>3C</td>
<td>B2</td>
<td>80</td>
</tr>
<tr>
<td>3D</td>
<td>B2</td>
<td>90</td>
</tr>
</tbody>
</table>

---

**CHART**

- Bar "B" (Typ.)
- Bar "C" (Typ.)
- 2-0" Min. Lap (Typ.)
- 1'-0" Min. Level (Typ.)
- 3" (Typ.)
- 1/2" Premolded joint filler in expansion joints (Typ.) at 24'-0" Centers

---

**CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING**

**NOISE BARRIER WALL TYPE 3**

**STANDARD PLAN D-2.06-01**

---

**DRAWN BY:**

**ADAM COCHRAN**

---

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

---

**Scale:**

1/12 = 1'-0"
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
SHEET 2 OF 2 SHEETS
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. Wall to be designated Noise Barrier Wall Type 4A, 4B, 4C or 4D. The Contract specifies actual wall designations.
2. For intermediate wall heights, see next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the shaft cap shall be spaced at 120 feet maximum.
5. The Contract specifies actual foundation requirements D1 or D2.

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

EXPIRES AUGUST 23, 2006

NOISE BARRIER WALL

TYPE 4

STANDARD PLAN D-2.08-00

SHEET 1 OF 2 SHEETS

APPROVED FOR CONSTRUCTION

Design Engineer

Washington State Department of Transportation

11/10/05
CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

DETAIL "B"

PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

3/4" CHAMFER (TYP.)

1/2" NOISE SEALER (TYP.)

2" (TYP.)

1.0

REINFORCED PER LISTED WALL HEIGHT REINFORCEMENT TABLE

3/8" SPIRAL @ 6" PITCH

SHAFT REINFORCEMENT

SHAFT

PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

ANGLE POINT

3/8" SPIRAL

SHAFT FOUNDATION

CONCRETE SHAFT

SHAFT REINFORCEMENT

SPACING @ 12"

THREE SPACES @ 6"

#4 STIRRUP

CONCRETE SHAFT

SHAFT REINFORCEMENT

W 3.5 SPIRAL @ 6" PITCH

DEPTHER LENGTH FOR PAVING

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

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

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

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

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

### Precast Concrete Wall on Spread Footing

**Type 9 Classifications:**

- **9A:** 5'- 0" Height,
- **9B:** 6'- 0" Height,
- **9C:** 7'- 0" Height,
- **9D:** 8'- 0" Height

**Designation:**

1. 5'- 0" Minimum Panel Width at Wall Footing
2. **2'- 0" Wall Height**
3. 1.5'- 0" Minimum Panel Height
4. **2'- 0" Space Extending Through Construction Joint**

**Contact and Ground Line:**

- Minimum 3'- 0" Width
- Minimum 3'- 0" Height
- Minimum 2'- 0" Space
- Minimum 2'- 0" Contact
- Minimum 3'- 0" Ground Line

**Wind Exposure & Velocity:**

- **Type 9A:** 90 MPH
- **Type 9B:** 90 MPH
- **Type 9C:** 90 MPH
- **Type 9D:** 90 MPH

**Wind Velocity Limitations:**

- **Type 9A:** 80 MPH
- **Type 9B:** 80 MPH
- **Type 9C:** 80 MPH
- **Type 9D:** 80 MPH

**Specifications:**

- Minimum Panel Width 12'- 0" Max.
- Panel Height 1'- 0" Max.
- Panel Thickness 5'- 0" Max.
- Panel Height 1'- 0" Max.
- Panel Width 12'- 0" Max.

**Examples:**

- Using Type 9A for 5'- 0" Height
- Using Type 9B for 6'- 0" Height
- Using Type 9C for 7'- 0" Height
- Using Type 9D for 8'- 0" Height

**References:**

- **See Contract**
- **See Detail A**
- **See Detail B**
- **See Detail C**
- **See Detail D**

**Construction Joints:**

- Construction Joints in Foundation Footing
- Construction Joints in Foundation Footing
- Construction Joints in Foundation Footing
- Construction Joints in Foundation Footing

**风速及风力限值:**

- **Type 9A:** 80 MPH
- **Type 9B:** 80 MPH
- **Type 9C:** 80 MPH
- **Type 9D:** 80 MPH

**规范:**

- 最小面板宽度12'-0" max.
- 面板高度1'-0" max.
- 面板厚度5'-0" max.
- 面板高度1'-0" max.
- 面板宽度12'-0" max.

**实例:**

- 使用Type 9A 5'-0"高度
- 使用Type 9B 6'-0"高度
- 使用Type 9C 7'-0"高度
- 使用Type 9D 8'-0"高度

**参考:**

- **See Contract**
- **See Detail A**
- **See Detail B**
- **See Detail C**
- **See Detail D**

**构造接缝:**

- 基础脚手架构造接缝
- 基础脚手架构造接缝
- 基础脚手架构造接缝
- 基础脚手架构造接缝

**风速及风力限制:**

- **Type 9A:** 80 MPH
- **Type 9B:** 80 MPH
- **Type 9C:** 80 MPH
- **Type 9D:** 80 MPH

**规范:**

- 最小面板宽度12'-0" max.
- 面板高度1'-0" max.
- 面板厚度5'-0" max.
- 面板高度1'-0" max.
- 面板宽度12'-0" max.

**实例:**

- 使用Type 9A 5'-0"高度
- 使用Type 9B 6'-0"高度
- 使用Type 9C 7'-0"高度
- 使用Type 9D 8'-0"高度

**参考:**

- **See Contract**
- **See Detail A**
- **See Detail B**
- **See Detail C**
- **See Detail D**

**构造接缝:**

- 基础脚手架构造接缝
- 基础脚手架构造接缝
- 基础脚手架构造接缝
- 基础脚手架构造接缝
ANGL POINT
BAR "D"
CORNER PANEL
REINFORCED PIER
LISTED WALL HEIGHT
REINFORCEMENT TABLE

JOINT AND CORNER DETAIL

WALL
BAR "D"
BAR "D" SPIRAL
FILL VOID WITH GROUT
BAR "H"

GROUT DUCT
GROUT PAD
FOOTING

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

3/4" CHAMFER (TYP.)
1/2" NOISE SEALER (TYP.)
TRAFFIC SIDE

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

PRECAST CONCRETE WALL
ON SPREAD FOOTING

NOISE BARRIER WALL
TYPE 9
STANDARD PLAN D-2.32-00
EXPIRES AUGUST 23, 2006
APPROVED FOR PUBLICATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
J O I N T  A N D  C O R N E R  D E T A I L

12" NOISE SEALER (TYP.)
3/4" CHAMFER (TYP.)

CORNER PANEL

305 x 291
FILL VOID WITH GROUT

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

BAR "D"
BAR "G"
CORNER PANEL

GROUT DUCTS

305 x 240
FOOTING

1/2"
NOISE SEALER (TYP.)

BAR "A" (TYP.)

W
1" CLR. (TYP.)

T - 0' MIN. (TYP.)

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

2" (TYP.)

TRAFFIC SIDE

PRECAST CONCRETE WALL ON OFFSET SPREAD FOOTING

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DATE
12/31/08

APPROVED FOR SPECIFICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 2 SHEETS

DRAWN BY: ADAM COCHRAN

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

DETAIL A

FOOTING

GROUT PAD

GROUT DUCTS

WALL

BAR "O"

BAR "G" SPIRAL

REINFORCED PER LISTED WALL HEIGHT REINFORCEMENT TABLE

2' - 0"
2' - 0"
2' - 0"
**SHAFT TO PANEL CONNECTION DETAIL**

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

**Rod “A”**
- Anchor Bolt Option
- ASTM A563 or 105 for all heights “H”

**Rod “A” Wedge Head Option**
- ASTM A570 or 80 as allowed per Table for heights “H” ≤ 18 in Western Washington and height “H” ≤ 20 in Eastern Washington

**BENDING DIAGRAM**
- Varies with angle
- Varies to match angle
- Panel length
- Anchor rod blockout

**SECTION (F)**
- Shaft and pilaster
- Edge of panel - surface treatment not shown
- Tapered hole for wedge head option shown - no taper for anchor bolt option with hole diameter = rod “A” diameter + 1/16” (typ.)

**SECTION (E)**
- Base plate detail
- Shaft and pilaster
- Foundation design
- Soil type: Angle of internal friction, $\phi$ (degrees)
- D1: 32
- D2: 36

**WIND AND SEISMIC LIMITATIONS**

<table>
<thead>
<tr>
<th>Location</th>
<th>Wind Exposure</th>
<th>Wind Velocity (MPH)</th>
<th>Peak Seismic Ground Acceleration Coefficient on Rock, Site Class B (g)</th>
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<tbody>
<tr>
<td>Western Washington</td>
<td>Sparse Suburban</td>
<td>100</td>
<td>0.46</td>
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<td>Eastern Washington</td>
<td>Sparse Suburban</td>
<td>80</td>
<td>0.19</td>
</tr>
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**FOOTPRINTS**
- Bending diagram
- Rod “A” anchor bolt option
- Rod “A” wedge head option

**ANALYST**
- Bijan Khaleschi

**STANDARD PLAN D-2.36-03**
- Sheet 2 of 3 sheets

**APPROVED FOR PUBLICATION**
- Revised 11/14/14 2:21 PM
- Engineer

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
- Engineer
- Construction Bounding

**SHAFT AND PLATE CONNECTION DETAIL**
- Either option acceptable to grout blockouts, anchor bolts and base plate to the limits shown.

**SECTION (F)**
- Shaft and pilaster
- Edge of panel - surface treatment not shown
- Tapered hole for wedge head option shown - no taper for anchor bolt option with hole diameter = rod “A” diameter + 1/16” (typ.)

**SECTION (E)**
- Base plate detail
- Shaft and pilaster
- Foundation design
- Soil type: Angle of internal friction, $\phi$ (degrees)
- D1: 32
- D2: 36

**WIND AND SEISMIC LIMITATIONS**

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**FOOTPRINTS**
- Bending diagram
- Rod “A” anchor bolt option
- Rod “A” wedge head option

**STANDARD PLAN D-2.36-03**
- Sheet 2 of 3 sheets

**APPROVED FOR PUBLICATION**
- Revised 11/14/14 2:21 PM
- Engineer

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
- Engineer
- Construction Bounding
### 1. SEALER OF CONSTRUCTION JOINTS

- Seal all construction joints in the footing.

### 2. SEPARATION OF DUCTS

- Seal the joint with grout using ducts. Ducts shall be located on the panel face opposite the traffic.

### 3. REINFORCED CONCRETE WALL

- The wall shall be reinforced with the specified bars and tensioned ducts.

### 4. NOISE SEALER

- Use noise sealers as specified in the standard plan.

### 5. LEVELING COURSE

- The leveling course shall be placed immediately after placing grout.

### 6. TYPICAL SECTION

- The typical section shows the detailed placement of bars and reinforcement.

### 7. WALL HT

- The wall height shall be as specified in the standard plan.

### NOTES

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

BENDING DIAGRAM

PRECAST CONCRETE WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SPREAD FOOTING

NOISE BARRIER WALL
TYPE 13SS

STANDARD PLAN D-2.44-00

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION
Washington State Department of Transportation
NOTES

1. Wall to be designated Noise Barrier Wall Type 14SSA, 14SSB, 14SSC or 14SSD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet level ground on each side.
4. All joints shall be in full contact and sealed.
5. Anchor Bolts, Nuts, Washers, Base Plate, and Bar B shall have a Protective Coating of one of the following: Hot Dipped Galvanizing AASHTO M 232 for Hardware; AASHTO M 111 for Washers and Plates; Mechanical Galvanizing AASHTO M 298 CL 55., or Zinc Rich Paint. Paint threads and nuts after installation.
6. The bottom 9" of Bar "B" shall be painted with one coat of Formula A-6-86 Zinc Dust Oxide Primer OR, one coat of Formula A-11-99 Primer.
7. The Contract specifies actual foundation requirements D1 or D2.
NOISE BARRIER WALL
TYPE 16
STANDARD PLAN D-2.60-00

MASONRY WALL ON TRENCH FOOTING

NOTES
1. Wall 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.

See contract for peace.
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT
EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW
TYPICAL EXPANSION JOINT

#5 (TYP.)

SEE DETAIL A

#5 (TYP.)

PLAN VIEW
EXPANSION JOINT AT WIDTH STEP

8" CMU

10" CMU

THE TRAFFIC SIDE

BOND BEAM DETAIL

SASH BLOCK RECESSES

BOND BEAM GROUTING LIMIT

8" OR 10" CMU

BACKER ROD

POLYURETHANE SEALANT

DETAIL A

TYPICAL BOTH SIDES OF WALL

PLAN VIEW
TYPICAL EXPANSION JOINT

MASONRY WALL ON TRENCH FOOTING

NOISE BARRIER WALL
TYPE 16

STANDARD PLAN D-2.60-00

SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

TYPICAL EXPANSION JOINT

BOND BEAM DETAIL

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

NOTE: TRANSVERSE BARS NOT SHOWN

NOISE BARRIER WALL
TYPE 17

STANDARD PLAN D-2.62-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

6" OR 10" CMU

PLAN VIEW
TYPICAL EXPANSION JOINT

8" CMU

PLAN VIEW
EXPANSION JOINT AT WIDTH STEP

BOND BEAM DETAIL

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

#5 (TYP.)

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

BOND BEAM DETAIL

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

PLAN VIEW
TYPICAL EXPANSION JOINT

8" OR 10" CMU

PLAN VIEW
EXPANSION JOINT AT WIDTH STEP

DETAIL A

TYPICAL BOTH SIDES OF WALL

MASONRY WALL ON OFFSET SPREAD FOOTING

FOOTING WIDTH TRANSITION DETAIL
(for locations without footing step)

NOTE: TRANSVERSE BARS NOT SHOWN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
### NOISE BARRIER WALL

**TYPE 19**

#### SHEET 1 OF 2 SHEETS

**APPROVED FOR PUBLICATION**

Washington State Department of Transportation

**SHEET 1**

**NOISE BARRIER WALL**

**TYPE 19**

**STANDARD PLAN D-2.66-00**

---

### WALL HT

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<th>CMU WIDTH</th>
<th>X BAR &quot;D&quot;</th>
<th>X BAR &quot;C&quot;</th>
<th>DIAM.</th>
<th>BAR &quot;P&quot;</th>
<th>DEPTH D1</th>
<th>DEPTH D2</th>
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### WALL HT

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</tbody>
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### NOTES

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

---

**MASONRY WALL ON SHAFT W/ GRADE BEAM FOUNDATION**

**DRAWN BY ADAM DODGE**

**APPROVED AUGUST 23, 2006**

---

**EXPANSION JOINTS**

@ 24'- 0" MAX. CENTERS.

SEE CONTRACT FOR LOCATIONS

---

**NOISE BARRIER WALL TYPE 19**

**STANDARD PLAN D-2.66-00**

---

**SHEET 1**

---

**DESIGNATION**

- **D1**: 32
- **D2**: 38

**SOIL TYPE**

- **C**: Normal
- **B2**: Loose
- **B1**: Interim
- **B0**: Sharp

---

**WIND EXPOSURE & VELOCITY**

- **CN**: Normal
- **B**: Moderate
- **C**: Strong
- **D**: Very Strong

**WIND VELOCITY (MPH)**

- **D1**: 80
- **D2**: 100

---

**CONSTRUCTION JOINT**

See "Details" sheet for masonry wall finishes, special shapes, sizes and layouts.
BOND BEAM DETAIL

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

6" OR 10" CMU

TRAFFIC SIDE

PLAN VIEW

TYPICAL EXPANSION JOINT

BOND BEAM DETAIL

BACKER ROD

POLYURETHANE SEALANT

1/2" JOINT

DETAIL B

TYPICAL BOTH SIDES OF WALL

EXPANSION JOINT AT WIDTH STEP

PLAN VIEW

1/2" JOINT

#5 @ 6'-0" MAX. (TYP.)

#5 (TYP.)

SEE DETAIL B

TRAFFIC SIDE

6" CMU

8" CMU

#5 (TYP.)

SEE DETAIL B

TRAFFIC SIDE

STEP DETAIL

CONCRETE SHAFT

W 3 & SPIRAL @ 6" PITCH

CONCRETE SHAFT

DETAIL A

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

#4 STIRRUP SPACING @ 12"

#4 STIRRUP SPACING @ 6"

#4 @ 1'-0"

3'-0"

1'-0" MIN. LAP

2" CLR

135° HOOK (TYP.)

NOTE: BAR "1" AT EQUAL SPACING (FOR TOTAL NUMBER SEE REINFORCEMENT SCHEDULE)

1/2" JOINT

SECTION A

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 11.10.05

Washington State Department of Transportation

DRAWN BY: ADAM DOCHRAN

WASHINGT0N CONSTRUCTION CO., INC.
NOTES
1. All rebar shall have a minimum 1 1/2' cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

EXPANSION JOINT
BAR "A"
#5 x 4' - 0" (TYP.)
85 x 8' - 0" (TYP.)
DOOR - SEE NOTE 2
BAR "A" (7 BARS PER SIDE)
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)
48" DOOR OPENING
#6 x 11' - 0" (TYP.)
2 PER SIDE OF DOOR
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)
GROUND LINE
CONCRETE SLAB
CONCRETE SLAB
WALL
CONCRETE SLAB DETAIL
FOR CAST-IN-PLACE WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
ACCESS DOOR TYPE 1
STANDARD PLAN D-2.80-00
HEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Washington State Department of Transportation

DATE
EXPANSION JOINT

ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

46" DOOR OPENING

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

#5 x 6 - 3" (TYP.)

#5 x 6 - 8" (TYP.)

3" (TYP.)

DOOR DETAIL (SEE NOTE 2)

ANCHOR PIN (TYP.)

#6 x 11 - 2" (TYP.)

BAR "A" (TYP.)

BAR "A" (TYP.)

BAR "A" (TYP.)

BAR "A" (TYP.)

SECTION C

FINISHED GRADE

TOP OF ROADWAY

CONCRETE SLAB DETAIL

FOR CAST-IN-PLACE WALL W/ TRAFFIC BARRIER

NOISE BARRIER WALL
ACCESS DOOR TYPE 2
STANDARD PLAN D-2.82-00
SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

EXPIRES AUGUST 23, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

HaraM 11.10.05

11.10.05

11.10.05
CONCRETE SLAB

SECTION 0

2'-0" 4'-6"

EXPANSION JOINT

BAR "A"

DOOR FRAME (SEE NOTE 2)

CONCRETE SLAB

FINISHED GRADE

48' DOOR OPENING

2'-0" 12'

4'-0" 5'-0"

BENDING DIAGRAM

#4 BAR

BAR "A"

BAR "E"

5' 0"

4" CONCRETE SLAB

4" CONCRETE SLAB

SEE NOTE 3

48' DOOR OPENING

WALL

SECTION B

FOR PRECAST WALL ON SHAFT FOUNDATION

NOTES

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

4" CONCRETE SLAB

CONCRETE SLAB

CONCRETE SLAB

FINISHED GRADE

CONCRETE SLAB

ISOMETRIC CUTAWAY VIEW

NOISE BARRIER WALL
ACCESS DOOR TYPE 3

STANDARD PLAN D-2.84-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. All rebar shall have a minimum 1 1/2" cover.

CONCRETE SLAB
4' x 6' (TYP.)

BAR 'A' (TYP.)

48" DOOR OPENING
2'-0" 4'-0" 5'-0" 12'-0"

TOP VIEW

DOOR - SEE DETAIL

TOP OF TRAFFIC BARRIER

FINISHED GRADE LINE

FRONT VIEW

BAR 'A'

DOOR FRAME (SEE NOTE 2)

CONCRETE SLAB

TOP OF ROADWAY

FINISHED GRADE

TOP OF ROADWAY

ISOMETRIC CUTAWAY VIEW

CONCRETE SLAB

2'-0"

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL ACCESS DOOR TYPE 4

STANDARD PLAN D-2.86-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EXPRES AUGUST 23, 2006
CONCRETE SLAB DETAIL

CONCRETE SLAB

GROUND LINE

WALL

CONCRETE SLAB

#4 BAR

BAR "A"

VARES

VARES

BAR "F"

BAR "E"

BAR "D"

#4 BAR

2'-0" 12"

10" 4'-0"

104°

BENDING DIAGRAM

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL ACCESS DOOR TYPE 4

STANDARD PLAN D-2.86-00

HEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EXPIRES AUGUST 23, 2006

STATE OF WASHINGTON

PROFESSIONAL ENGINEER

DATE
BENDING DIAGRAM

FRONT VIEW

BAR "A"

CONCRETE SLAB DETAIL

SOLID GROUT CAP

FOR MASONRY WALL
(SHAFT FOUNDATION SHOWN)

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

SOLID GROUT CAP

DOOR OPENING

GROUND LINE

NOISE BARRIER WALL
ACCESS DOOR TYPE 5

STANDARD PLAN D-2.88-00

SHEET 1 OF 1 SHEET

WASHINGTON
DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 23, 2006
ANCHOR PIN = 1/2" x 5" STEEL, WELDED TO REINFORCEMENT PLATE

REINFORCEMENT PLATE = 5" x CHANNEL WIDTH x 1/8" W/ 1/2" x 9" ANCHOR PIN

5" x 10" S.S. PLATE W/ 1/2" x 1" DAM. S.S. HANDLE

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

ANCHOR REINFORCEMENT PLATE (TYP.) = (CHANNEL WIDTH) x 2" x 1/8", WELDED TO FRAME

GROUND LINE

NOTE
All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.
1. For the values of "L," see sheet 3, and for the values of "Sv" see sheet 2.
2. For Geosynthetic Wall Construction Sequence, see sheet 4.
3. "As" is the peak seismic ground acceleration as defined and applied in the AASHTO LRFD Bridge Design Specifications, Articles 3.10.4.1 and 11.6.5.
4. The long-term geosynthetic design strength "Tal" shall be determined in accordance with WSDOT Standard Practice T925. See Qualified Products List (QPL), Appendix "D," for products in which "Tal" has been determined. "H" and "Z" are graphically defined. "Z" is the distance from the top of the wall to a geosynthetic layer, and is used to determine "Tal" for that layer.
5. "L," the geosynthetic reinforcement length behind the wall face, is graphically defined. The maximum factored bearing stress acts in the vertical direction at the base of the wall. The load factors used are as specified in the AASHTO LRFD Bridge Design Specifications for each specified limit state.
6. Fascia or facing type shall be selected from Standard Plans D-3.10 or D-3.11 and called out in the Contract Plans. Region is to coordinate with the Geotechnical Services and Bridge & Structures offices.
<table>
<thead>
<tr>
<th>TOTAL WALL</th>
<th>DEPTH BELOW WALL TOP AT FACE, z (ft)</th>
<th>GEOSYNTHETIC WALL</th>
<th>GEOSYNTHETIC WALL TYPE 1</th>
<th>GEOSYNTHETIC WALL</th>
<th>GEOSYNTHETIC WALL TYPE 3</th>
<th>GEOSYNTHETIC WALL</th>
<th>GEOSYNTHETIC WALL TYPE 5</th>
<th>GEOSYNTHETIC WALL</th>
<th>GEOSYNTHETIC WALL TYPE 7</th>
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<td>UP TO 5</td>
<td>0 &lt; H ≤ 10</td>
<td>1.5 tf</td>
<td>508</td>
<td>240</td>
<td>220</td>
<td>505</td>
<td>240</td>
<td>50</td>
<td>220</td>
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<tr>
<td>5 &lt; H ≤ 10</td>
<td>0 &lt; H ≤ 10</td>
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<td>530</td>
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<td>470</td>
<td>528</td>
<td>497</td>
<td>510</td>
<td>460</td>
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<tr>
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<td>570</td>
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<td>750</td>
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<td>764</td>
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<td>832</td>
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<td></td>
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NOTE: See Note 4, sheet 1.
### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

(Includes Design Seismic Force for Large Earthquake: A = 0.25g)

<table>
<thead>
<tr>
<th>TOTAL WALL HEIGHT, H (ft)</th>
<th>GEOSYNTHETIC WALL TYPE 1</th>
<th>GEOSYNTHETIC WALL TYPE 2</th>
<th>GEOSYNTHETIC WALL TYPE 3</th>
<th>GEOSYNTHETIC WALL TYPE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L(FT)</td>
<td>SERVICE</td>
<td>MAX. FACTORED STRENGTH</td>
<td>L(FT)</td>
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<tr>
<td>0</td>
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<td>114</td>
<td>118</td>
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**NOTE:** See General Note 5, sheet 1.

### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

(Includes Design Seismic Force for Large Earthquake: A = 0.25g)

<table>
<thead>
<tr>
<th>TOTAL WALL HEIGHT, H (ft)</th>
<th>GEOSYNTHETIC WALL TYPE 5</th>
<th>GEOSYNTHETIC WALL TYPE 6</th>
<th>GEOSYNTHETIC WALL TYPE 7</th>
<th>GEOSYNTHETIC WALL TYPE 8</th>
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</thead>
<tbody>
<tr>
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<td>8</td>
<td>112120</td>
<td>112120</td>
<td>112124</td>
<td>112120</td>
</tr>
</tbody>
</table>
1. SET FORM ON COMPLETED LIFT.

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

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

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

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

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

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

NOTES (SHEET)

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

2. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.
NOTES
1. All bars shown on this plan shall be ASTM A706 unless otherwise specified in the Contract.
2. Safety cable or fence required when "H" ≥ 10'-0".
3. All cast-in-place concrete shall be class 4000.

CAST-IN-PLACE PERMANENT GEOSYNTHETIC WALL FASCIA AND FACING

STANDARD PLAN D-3.10-01

SHEET 1 OF 1 SHEET
additional text
CAST-IN-PLACE CONCRETE BARRIER
PRECAST CONCRETE BARRIER

EXPANSION JOINT
1 1/4" (IN) PVC CONDUIT (TYP.) TO BE INSTALLED PARALLEL TO GRADE AND PARALLEL TO FACE OF BARRIER
1/2" (IN) PREMOLDED JOINT FILLER IN EXPANSION JOINT

CONNECTION BLOCKOUT IN PRECAST BARRIER SEE STANDARD PLAN C-70.10

EXPANSION JOINT DETAIL
FOR CAST-IN-PLACE TO PRECAST BARRIER CONNECTION

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

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

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

PVC CONDUIT
CURB LINE

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

PVC CONDUIT
CURB LINE

REINFORCING STEEL BENDING DIAGRAM
ALL REINFORCING BARS SHOWN ON THIS PLAN SHALL BE AASHTO M 31 UNLESS OTHERWISE NOTED.
\( \psi \) = EPOXY COATED

ALL DIMENSIONS ARE OUT TO OUT

\( \begin{align*}
&\#4 \text{ L = 7"} \\
&\#4 \text{ L = 8 3/8"} \\
&\#4 \text{ L = 10 3/4"}
\end{align*} \)

EXPANSION JOINT DETAIL
1 1/4" (IN) PVC CONDUIT (TYP.) TO BE INSTALLED PARALLEL TO GRADE AND PARALLEL TO FACE OF BARRIER
1/2" (IN) PREMOLDED JOINT FILLER IN EXPANSION JOINT

1/2" MIN. EXPANSION GAP BETWEEN BAR AND CAP
CONDITION A OR CONDITION B WITH GEOTEXTILE

CONDITION A

CONDITION B

ALTERNATE DETAIL
TYPICAL FOR CONSTRUCTION WITH SHORING

NOTES
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.

BACKFILL AND DRAINAGE FOR RETAINING WALLS
STANDARD PLAN D-4
TYPICAL GABION

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

FASTENING ADJACENT BASKETS

CROSS CONNECTING WIRE PLACEMENT, END CELLS

CROSS CONNECTING WIRE PLACEMENT, INTERIOR CELLS OF FRONT GABIONS

TWISTED FABRIC

WELDED FABRIC

LACING DETAIL

Six independent wires encompassed

Three vertical and two horizontal wires encompassed

Gabions

Standard Plan D-6

Washington State Department of Transportation
Olympia, Washington
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 \((0.003 \times H) \text{ CY/LF}\).

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

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


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

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

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

DRAWN BY: BILL RISBERG

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

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

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

REINFORCED CONCRETE RETAINING WALL TYPE 2 AND 2SW STANDARD PLAN D-10.15-01 SHEET 1 OF 2 SHEETS

BAR Q #4

LOCATION WALL HEIGHT (Ft) QTY.
TOP OF FOOTING
≤ 12 5
12 ≤ 16 6
16 ≤ 22 7
22 ≤ 28 9
28 ≤ 35 11
BOTTOM OF FOOTING
≤ 12 5
12 ≤ 16 6
16 ≤ 22 7
22 ≤ 28 9
28 ≤ 30 11

OFFSET - SET TOP OF WALL BACK:
H ≥ 20' OFFSET = 1/2 H
H < 20' OFFSET (inches) = H ≤ 28'

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

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)
### Reinforcement Notes

1. If traffic barrier is used, add 0.110 CY of concrete class 4000 for barrier alternate 1.
2. Add 0.182 CY of concrete class 4000 for barrier alternate 2. See standard plan 0-15-10

### Sloping Face Wall Design with a 250 PSF Surfchage

**Reinforced Concrete Retaining Wall Type 2 and 2S**

**Standard Plan D-10.15-01**

**Sheet 2 of 2 Sheets**

**Approved for Submission**

---

**Table:**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Foaming Reinforcement</th>
<th>Stem Reinforcement</th>
<th>Material Quantity</th>
<th>Maximum Soil Pressure (PSF)</th>
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<td>10'</td>
<td>3'</td>
<td>1'</td>
<td>2'-14</td>
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**Diagram:**

- **Bar E (1'-6' Centers):**
  - **Radius (See Table):**
    - **Bar E:**
      - **Bar Radius:**
        - #1: 2'-0'
        - #2: 2'-0'
        - #3: 3'-0'
        - #4: 3'-0'
        - #5: 3'-0'
        - #6: 6'-0'

---

**Design by Bill Denns**

**Washington State Department of Transportation**
NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 3SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 3SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/lf.
5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Informations through 2008. The seismic design of these walls has been completed using an effective PGA of 0.32 g.
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 4SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 4SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by (0.003 x H) CY/LF.
5. Concrete in the 48" foot wall sections shall be placed separately between expansion joints with a minimum 24-hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.32 g.

SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 4 AND 4SW

STANDARD PLAN D-10.25-01

APPROVED FOR PUBLICATION
May 15, 2013

Washington State Department of Transportation

### Vertical Face Wall Design

#### Standard Plan D-10.30-00

**REDUCED SCALE CONCRETE RETAINING WALL**

**MAXIMUM SOIL PRESSURE (PSF)**

<table>
<thead>
<tr>
<th>WALL H'</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>BARS</th>
<th>FOOTING REINFORCEMENT</th>
<th>STEM REINFORCEMENT</th>
<th>MATERIAL QUANTITY</th>
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<tr>
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<td>3'</td>
<td>4'</td>
<td>5'</td>
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<td>17%</td>
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<td>17% 19% 19% 21% 21%</td>
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<tr>
<td>1.5</td>
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<td>3'</td>
<td>4'</td>
<td>5'</td>
<td>6'</td>
<td>17%</td>
<td>17% 19% 19% 21% 21%</td>
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<tr>
<td>2.0</td>
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<td>3'</td>
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<td>5'</td>
<td>6'</td>
<td>17%</td>
<td>17% 19% 19% 21% 21%</td>
<td>17% 19% 19% 21% 21%</td>
<td></td>
</tr>
</tbody>
</table>

**Diagram**

**BAR @ 1" CENTERS**

**Bar Radius**

- **Bar #4**: 1 1/2" M
- **Bar #5**: 1 1/2" M
- **Bar #6**: 1 1/2" M
- **Bar #7**: 1 1/2" M
- **Bar #8**: 1 1/2" M
- **Bar #9**: 1 1/2" M
- **Bar #10**: 1 1/2" M
- **Bar #11**: 1 1/2" M

**Sheet 2**

**Reinforced Concrete Retaining Wall**

**Type 5**

**Standard Plan D-10.30-00**

**Approved for Fabrication**

**Washington State Department of Transportation**
1. All concrete shall be Class 4000, except as noted.

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

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

4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

## Typical Section

### Wall Top Detail

- **3/4" Chamfer (Typ.)**
- **SPECIAL WALL TREATMENT WHEN SPECIFIED IN CONTRACT**
- **3/4" CLR.**
- **TOP OF WALL**
- **CEMENT CONC. GUTTER** (CL 3000, 4" THICK)

### Drain

- **3" CLR.**
- **3" Diam. Drains at about 12' Centers and 6" above final ground line at front face of wall**

### Construction Joint with Roughened Surface

- **1/2" CLR.**
- **ONLY FOR H ≥ 26'**

### Expansion Joint - 48 Centers, W/ 1/2" Premolded Joint Filler

### Notes

#### Wall Top Detail

- **3/4" CHAMFER (Typ.)**
- **24" MIN. VERTICAL CURVE AT ALL ANGLE OR BREAK POINTS IN TOP OF WALL PROFILE**
- **3" CLR.**
- **TOP OF WALL**

#### Surface Treatment

- **3/4" @ 1'-6" Centers (Max.) 100' IN FACE**
- **1/2" CLR.**
- **TOP OF WALL**

#### Construction Joint with Roughened Surface

- **1/2" CLR.**
- **ONLY FOR H ≥ 26'**

#### Footing

- **2'-0" MIN. - BELOW FINAL GROUND LINE**
- **2'-0" MIN. BELOW SHOULDER**

### TYPICAL SECTION

#### Location

<table>
<thead>
<tr>
<th>Bar</th>
<th>QTY</th>
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<tbody>
<tr>
<td>#4</td>
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<td>#4</td>
<td>8</td>
</tr>
<tr>
<td>#4</td>
<td>10</td>
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</table>

#### Wall Height

- **6"**
- **12"**
- **18"**
- **24"**
- **30"**

#### Footing

- **10'**
- **15'**
- **20'**
- **25'**
- **30'**

### Key Detail

- **REQUIRED ON WALLS WHERE H ≥ 26'**
NOTES

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

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

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

Washington State Department of Transportation
### Footing Reinforcement

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### Stem Reinforcement

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### Maximum Soil Pressure (PSF)

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<td>36&quot; - 42&quot;</td>
<td>42&quot; - 48&quot;</td>
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### REINFORCEMENT NOTES

1. If traffic barrier is used, add 0.100 CYLV of concrete class 4000 for barrier alternate 1. Add 0.123 CYLV of concrete class 4000 for barrier alternate 2. See standard plan D-15.10
2. Add 28 LBF of reinforcing steel for barrier alternate 1 or 19 LBF of reinforcing steel for barrier alternate 2. See standard plan D-15.10

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

**REINFORCED CONCRETE RETAINING WALL
**
**TYPE 7
**
**STANDARD PLAN D-10.45.01
**
**SHEET 3 OF 3 SHEETS
**

**APPROVED FOR PUBLICATION
**

**Washigton State Department of Transportation**

1/25/08
250 PSF EQUIVALENT LIVE LOAD SURCHARGE WHEN SPECIFIED IN CONTRACT

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

CONSTRUCTION JOINT WITH ROUNDED SURFACE

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

SURFACE TREATMENT

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

REINFORCED CONCRETE RETAINING WALL TYPES

STANDARD PLAN D-10.45-01

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

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

TYPICAL SECTION

SPLIT ELEVATION VIEW
(SHOWING SEPARATE REBAR LAYERS)

BAR #4

<table>
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<tr>
<th>LOCATION</th>
<th>WALL HEIGHT (Ft)</th>
<th>QTY.</th>
</tr>
</thead>
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<tr>
<td>TOP OF FOOTING</td>
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<td>5</td>
</tr>
<tr>
<td></td>
<td>13 ≤ 16</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>17 ≤ 22</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>23 ≤ 28</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>29 ≤ 35</td>
<td>11</td>
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<tr>
<td>BOTTOM OF FOOTING</td>
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<tr>
<td></td>
<td>29 ≤ 35</td>
<td>11</td>
</tr>
</tbody>
</table>

OFFSET - SET 1/2" OF WALL BACK;
H ≤ 20" - OFFSET = 1/2";
H > 20" - OFFSET (INCHES) = H/12 - 2

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

1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.

2. Spacing between the numeral "1" and any other numeral is 1" Spacing between all other numerals is 3/4".

3. Traffic Barrier Connections between the bridge and the approaching roadway vary and may consist of concrete barrier extensions. Install the Date Numerals on the traffic barrier of the bridge itself.
When the height exceeds 20', but less than 25', longitudinal bracing shall be placed on outside piles or both sides of pile in every third pile, as required by local conditions. When the height exceeds 20', two-story bracing shall be used. Longitudinal struts and cross braces shall be fastened at each end with 3/4" DIA bolts and machine washers.

On frame trestles, longitudinal bracing shall be placed on outside posts on both sides of trestle in alternate spans or as required by local conditions. When it exceeds 20', two-story bracing shall be placed. Longitudinal struts and cross braces shall be fastened at each end with 3/4" DIA bolts and machine washers.
NOTES
1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
3. All piling shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, ungalvanized.
6. Each deck plank shall be nailed to each stringer with two 7" spikes, number 1 or larger.
7. On 17' spans, stringers shall be 6x6 S!E. On 15' spans, stringers shall be 5x6 S!E.
   Two-lane bridges shall use thirteen lines of stringers, one-lane bridges shall use seven lines of stringers.
8. Overlay thickness must be sufficient to cover bolts.
<table>
<thead>
<tr>
<th>PILE TYPE</th>
<th>D (in.)</th>
<th>PERIMETER (in.)</th>
<th>UNIT WEIGHT (lbs./ft)</th>
<th>AREA (in²)</th>
<th>MOMENT OF INERTIA (in⁴)</th>
<th>RADIUS OF GYRATION (in.)</th>
<th>NUMBER OF STRANDS</th>
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<td>SQUARE</td>
<td>12</td>
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<td></td>
<td>14</td>
<td>56.0</td>
<td>215</td>
<td>196</td>
<td>3201</td>
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<td>16</td>
<td>64.0</td>
<td>281</td>
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<td>5481</td>
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<tr>
<td>OCTAGONAL</td>
<td>14</td>
<td>40.4</td>
<td>178</td>
<td>182</td>
<td>2163</td>
<td>3.6</td>
<td>5</td>
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<td></td>
<td>16 1/2</td>
<td>54.7</td>
<td>247</td>
<td>226</td>
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<td>24</td>
<td>79.5</td>
<td>524</td>
<td>477</td>
<td>18151</td>
<td>6.2</td>
<td>13</td>
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</table>

**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 (d₀). Grade 270, uncoated strands, AASHTO M203, jack to 0.75 Fp maximum.
4. Strength of concrete shall be 5.0 ksi at release and 7.0 ksi at final.
5. 2 1/2" cover if pile is exposed to salt water.
PRECAST PILES, HANDLING NOTES

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

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

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

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

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

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

7. For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E-4.

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

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

DEPRESSED CURB SECTION

NOTE
NOTES

1. The intent of this design is to facilitate the compaction of Hot Mix Asphalt pavement adjacent to a drainage structure.

2. The centerline of the drainage structure may differ from the centerline of the frame and grate.
NOTES
1. Construct curb joints at cement concrete pavement transverse joint locations. If all adjacent pavement is HMA, see Standard Plan F-30.10 for Curb Expansion and Contraction Joint Spacing.
2. A 2 inch vertical curb may be used where low clearance vehicles or trucks are present.

LEGEND
- Width varies ~ See Contract Plans.
- Match adjacent pavement thickness but not less than 6 inches.
NOTES
1. The installation of curb in areas with existing guardrail could require the removal and resetting of the guardrail or its components.
2. Extend shoulder pavement to provide a base for the extruded curb.
3. See Contract for exception to distances shown.
4. Type 3 and 6 curbs are not used on roadways with a posted speed greater than 40 mph.
5. Type 3 and 6 are not used under beam guardrail on roadways with a posted speed greater than 50 mph.
6. For extruded curb placement at Beam Guardrail Type 31, See Standard Plan C-20.10.
7. For extruded curb details, See Standard Plan F-10.42.
**EXTRUDED CURB**

**STANDARD PLAN F-10.42-00**

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

**NOTE**

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

<table>
<thead>
<tr>
<th>CURB RADIUS</th>
<th>DIMENSION A</th>
<th>DIMENSION B</th>
<th>DIMENSION C</th>
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<tr>
<td>3'</td>
<td>12''</td>
<td>2''</td>
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<td>4' TO 5'</td>
<td>12''</td>
<td>1 1/2''</td>
<td>9''</td>
</tr>
<tr>
<td>6'</td>
<td>12''</td>
<td>1''</td>
<td>10''</td>
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<tr>
<td>7'</td>
<td>12''</td>
<td>7 1/8''</td>
<td>10 1/4''</td>
</tr>
<tr>
<td>8'</td>
<td>18''</td>
<td>1 1/8''</td>
<td>15 3/4''</td>
</tr>
<tr>
<td>9'</td>
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<td>1''</td>
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<td>14' TO 15'</td>
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<td>16' TO 17'</td>
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<td>18' TO 22'</td>
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<td>23' TO 29'</td>
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<td>23''</td>
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<tr>
<td>30' TO 34'</td>
<td>30''</td>
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<td>35' TO 48'</td>
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<td>49' TO 60'</td>
<td>30''</td>
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<tr>
<td>OVER 60'</td>
<td>USE TANGENT BLOCK, SEE SHEET 1</td>
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</table>

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

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

NOTES
1. At marked crosswalks, the connection between the landing and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in the Depressed Curb and Gutter where the Landing connects to the roadway.
6. The Bid Item "Cement Concrete Curb Ramp Type __" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalk.
7. The Curb Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length, the running slope of the curb ramp is allowed to exceed 6.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet. Do not include abutting landing(s) in the 15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the walkway.
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will be no material to retain.

CONTRACTION JOINT (Typ.) — See STANDARD PLAN F-30.1 FOR CURB RAMP LENGTH GREATER THAN 8' - PROVIDE CONTRACTION JOINT EQUALLY SPACED 4'-0" MIN. OC.
CEMENT CONCRETE PEDESTRIAN CURB — See NOTE 5

SECTION A

PLAN VIEW
TYPE PARALLEL A

SECTION B

(ALONG INSIDE RADIUS AT BACK OF WALKWAY)
"CEMENT CONCRETE Curb RAMP TYPE PARALLEL A" PAY LIMIT — SEE NOTE 6

ISOMETRIC VIEW
TYPE PARALLEL A PAY LIMIT

SECTION C

(ALONG INSIDE RADIUS AT BACK OF WALKWAY)
"CEMENT CONCRETE Curb RAMP TYPE PARALLEL B" PAY LIMIT — SEE NOTE 6

ISOMETRIC VIEW
TYPE PARALLEL B PAY LIMIT
1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.

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

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


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

7. The Curb Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length, the running slope of the curb ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet. Do not include the abutting landing in the 15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the wayway.


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

**LEGEND**
- Slope in Either Direction
- 1.5% or Flatter Recommended for Design/Formwork (2% Max.)
- 7.5% or Flatter Recommended for Design/Formwork (8.3% Max.)

**COMBINATION CURB RAMP STANDARD PLAN F-40.14-03**
NOTES
1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in front of the Curb Ramp where it connects to the roadway.
6. The Bid Item "Cement Concrete Curb Ramp Type " does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length, the running slope of the Curb Ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the landing over a horizontal distance of 15 feet. Do not include the abutting landing in the 15-foot max. measurement.
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

PLAN VIEW
TYPE PERPENDICULAR A

PLAN VIEW
TYPE PERPENDICULAR B

SECTION A

ISOMETRIC VIEW
TYPE PERPENDICULAR A PAY LIMIT

ISOMETRIC VIEW
TYPE PERPENDICULAR B PAY LIMIT
NOTES

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


3. Curb and Gutter shown; see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for Curb Details.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.

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

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

7. Beyond limits shown. Pay item does not include driveway. See Contract Plans.
Cement Concrete Driveway Entrance Types 1, 2, 3, & 4

Standard Plan F-80.10-04

Sheet 2 of 2 Sheets

Approved for Publication

Carpenter, Jeff

July 18, 2016 12:23 PM

Washington State Department of Transportation
TYPICAL INSTALLATION FOR SINGLE-FACED SIGNS

TYPICAL INSTALLATION FOR DOUBLE-FACED SIGNS

NOTES


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

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

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

5. Install at the locations shown in the Contract. Installation may be moved 50 feet or less (longitudinally) before or after the contract location if obstructions are encountered, or to utilize the post of another sign. Mileposts that cannot be placed within this degree of accuracy shall be omitted entirely.
NOTES
1. Refer to the Sign Specification Sheet of the Contract for the 'V' and 'W' distances.

2. The minimum vertical distance from the bottom of the sign to the ground shall not be less than 7' (ft) for signs located within the Design Clear Zone.

GROUND-MOUNTED SIGN PLACEMENT
STANDARD PLAN G-20.10-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

1. Notch is only required with multiple post installations.

2. 6x10, 8x10, and 6x12 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 barriers.


4. For 8x6 posts and larger, 7" (ft) minimum spacing is required between posts.

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

---

**POST INSTALLATION TABLE**

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<th>POST SIZE (NOM)</th>
<th>DEPTH</th>
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<td>6x12</td>
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**TIMBER SIGN SUPPORT**

**STANDARD PLAN G-22.10-04**

Sheets 1 of 3
EXPLODED VIEW
BREAKAWAY SIGN BRACKET 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. 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.
ASSEMBLY NOTES

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

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pretightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.

3. Slip Base assembly and all other materials shall meet the requirements of Standard Specification Sections 9-06 and 9-28.
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 NC/IRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pretightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10-15 ft-lbs increments, alternately, to a final torque of 40 ft-lbs on each.

NOTES
1. For "W", horizontal distance from edge of traveled way to center of nearest post, and "V", vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20.10.
3. Top of concrete foundation shall be smooth, dense, and uniform to finished ground line.
4. Field drill posts to accept angle and cold galvanized holes.

STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3
INSTALLATION DETAILS
STANDARD PLAN G-24.40-07

WINLOAD FOR SQUARE TUBE POSTS AT 90 MPH

<table>
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<th>POSTS</th>
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<td>2 POST</td>
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<tr>
<td>7-GAGE</td>
<td>471</td>
</tr>
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(DRAWN BY FERN LINDSLEY)

Nisbet, John
Digitally signed by Nisbet, John
Date: 2018.06.27 11:38:14 -07'00'
ASSEMBLY NOTES

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

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pretightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lb on each.

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

STEEL SIGN SUPPORT TYPES SB-1A & SB-3A ~ 10" (IN)
ASSEMBLY NOTES

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

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pretightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lbs increments, alternately to a final torque of 40 ft-lbs on each.

3. Use only Slip Base manufacturer supplied hardware that meets the requirements of Standard Specification Sections 9-06 and 9-28.
NOTES
1. All material and workmanship shall be in accordance with the current requirements of the Washington State Department of Transportation Standard Specifications for Road, Bridge, Municipal Construction and Amendments.
2. Sign support components have been designed to meet the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals dated 2015 and interim, using basic wind speed of 115 mph, and 50 year design life.
3. All non-steel parts shall be galvanized in accordance with AASHTO M111 after fabrication. Bolts and hardware shall be galvanized in accordance with AASHTO M232.
4. Size of fillet weld shall be 1/4" (in) minimum except where noted.
5. For sign bracing details, see Standard Plan G-30.10 or G-50.10.
6. Rotate sign on post to be normal to traffic.
7. No resin bonded anchors shall be nearer than 1’ - 6” from a vertical expansion joint and all resin bonded anchors shall clear any embedded electrical conduit.
8. Sign support shall be installed on cast-in-place concrete barriers rigidly connected to bridge or retaining wall.
9. Anchors shall be bolted into reinforced concrete only with a nominal thickness no less than 9” (in). Base plate shall be installed such that full bearing contact is achieved.
10. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the hole abandoned. Fill hole with grout conforming to Standard Specification, Section 6.02.30(20).

**TABLE OF MATERIALS**

<table>
<thead>
<tr>
<th>PART</th>
<th>MATERIAL SPECIFICATION</th>
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<tr>
<td>PLATES AND BARS</td>
<td>ASTM A36 OR ASTM 972</td>
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<tr>
<td>PIPES</td>
<td>ASTM A53 GRADE B TYPE E OR S, OR EQUIVALENT HBS ASTM A500 ROUND GRADE B</td>
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<tr>
<td>RESIN BONDED ANCHORS</td>
<td>ASTM F1564 GRADE 56 GALV.</td>
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<td>ASTM A563 GRADE A</td>
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**BARREL MOUNTED ELBOW SIGN SUPPORT**

**STANDARD PLAN G-26.10-00**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

Washington State Department of Transportation

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**PIECE SIZE**

<table>
<thead>
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<tr>
<td>4” X-S</td>
<td>&lt; 220 FT</td>
<td>&lt; 2’ - 6”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6” STD.</td>
<td>&lt; 260 FT</td>
<td>&lt; 3’ - 6”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**AREA CALCULATIONS**

\[
X_1 \times Y_1 = 4’ \times 4’ = 16 \text{ FT}^2
\]

\[
X_2 \times Y_2 = 2.5’ \times 2.5’ = 6.25 \text{ FT}^2
\]

TOTAL AREA = 16’ + 6.25’ = 22.3’ ^2

**X Y Z CALCULATIONS**

\[
X_1 \times Y_1 \times Z_1 = 4’ \times 4’ \times 12.6’ = 203.2 \text{ FT}^3
\]

\[
X_2 \times Y_2 \times Z_2 = 2.5’ \times 2.5’ \times 8.25’ = 51.6 \text{ FT}^3
\]

\[
\Sigma (XYZ) = 203.2 + 51.6 = 254.8 \text{ FT}^3
\]

\[
254.8 \text{ FT}^3 < 260 \text{ FT Therefore use 5’ STD. PIPE}
\]
RESIN BONDED ANCHOR DETAIL
INSTALL ANCHOR BOLT NORMAL TO CONCRETE SURFACE

SECTION B

3/4" (IN) DIAMETER
RESIN BONDED ANCHOR

PIPE WALL

3/16" E

3/4" E

2 THREAD MIN.

3/4" (IN) DIAMETER
HEX NUT WITH HARDENED WASHER

BARRIER MOUNTED
ELBOW SIGN SUPPORT
STANDARD PLAN G-26.10-00

Zelenaux, Richard
Jul 19 2019 7:37 AM

APPROVED FOR PUBLICATION
Washington State Department of Transportation
1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/4" (in) wide and 0.030" (in) thick.

2. All signs installed on mast arms or standards (poles) require windbeams. All signs shall be installed with horizontal edges level. A skewed windbeam is required only when the sign is mounted within 12" (in) of the mast arm base (see Detail "A").

3. The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3' (ft); signs larger than 36 square feet require a special design mast arm and signal pole.
SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

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

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

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

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

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

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

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

Field Drill 5/16" (in) Diameter Hole in Sign Panel (typ.)

For Sign Attachment, See Detail - Standard Plan G-22.10

1/4" (in) Diameter x 1" (in) Long Hex Head Bolt, Nut, and Washers (typ.) (See Note 4)

Sign Panel

3/8" (in) Diameter x 1 1/2" (in) Long Lag Bolt and Washers

Timber Sign Post

1/4" (in) Diameter x 1" (in) Long Hex Head Bolt, Nut, and Washers (typ.) (See Note 4)

Sign Panel

Steel Tube Sign Post

NOTE

Field Drill 6/16" (in) Diameter Hole in Sign Panel (typ.)

For Sign Attachment, See Detail - Standard Plan G-24.30

Sign Panel

1/4" (in) Diameter x 1" (in) Long Hex Head Bolt, Nut, and Washers (typ.) (See Note 4)

Sign Brace

Steel Tube Sign Post

PLAN

SIGN BRACE ON TIMBER POST

SIGN PANEL

WINOBEAM

SIGN BRACE

TIMBER SIGN POST

MOUNTING BRACKET AND STEEL STRAP WITH WINOBEAM PER: STANDARD PLAN G-30.10,
SHEET 2 OF 2 (TYP.)

PLAN

SIGN BRACE ON STEEL TUBE

SIGN PANEL

SIGN BRACE

STEEL TUBE SIGN POST

SIGN PANEL

SIGN BRACE ON STEEL PIPE

FIELD DRILL 5/16" (in) DIAMETER HOLE IN SIGN PANEL (TYP.)

FOR SIGN ATTACHMENT, SEE DETAIL, STANDARD PLAN G-22.10

1/4" (IN) DIAMETER X 1" (IN) LONG HEX HEAD BOLT, NUT, AND WASHERS (TYP.) (SEE NOTE 4)

SIGN PANEL

3/8" (IN) DIAMETER X 1 1/2" (IN) LONG LAG BOLT AND WASHERS

TIMBER SIGN POST
**SIGN BRACE DIMENSIONS**

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

**SIGN POST TYPE**

<table>
<thead>
<tr>
<th>4x6 OR 6x6</th>
<th>6x8</th>
<th>3&quot; DIAM. STEEL PIPE</th>
<th>2 1/2&quot; SQUARE TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>4 2 3/4&quot;</td>
<td>2 1/2&quot;</td>
</tr>
</tbody>
</table>

**NOTE**

1. For sign installations on round steel posts, see Standard Plan G-30.10, sheet 2 of 2.

---

**SIGN BRACE DETAIL**

- **YIELD SIGN**
- **SMALL RECTANGULAR SIGN**
- **LARGE RECTANGULAR SIGN**
- **DIAMOND-SHAPED SIGN**
- **RAILROAD WARNING SIGN**
- **STOP SIGN**

**NO PASSING ZONE SIGN BRACE DETAIL**

- **SCHOOL ZONE SIGN**

---

**SIGN BRACING**

**STANDARD PLAN G-50.10-03**

**SIGN BRACE PLACEMENT**

Digital signature by John Nisbet on 2018.06.27 11:42:51 -07'00'.
NOTES

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

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

3. For VMS mounting, the Contractor may substitute W6 × 12 steel or W6 × 13 steel sections for the Vertical Brace W4 × 13 steel.

ASSEMBLY NOTES

All parts shall be plumb and square.

Bring all parts into full contact with each other.

Fasteners and associated hardware shall be in a snug tight condition when assembled.

Bolted parts shall fit solidly together.

RICHARD P. ZELDENEBLUST
State Engineer
Washington State Department of Transportation
1. Install Sign Lighting Luminaires (and Brackets) only when required in the Contract.
2. All nuts, bolts, washers, and other hardware shall be stainless steel per Standard Specification Section 9-28.11, except as noted. Galvanize all non-stainless steel parts.
3. See Standard Plan G-90.20 (Monotube), or G-90.30 (Truss) for additional Overhead Sign Lighting details.

**NOTES**

**VERTICAL BRACE SPACING WITH SIGN LIGHTING**

<table>
<thead>
<tr>
<th>SIGN WIDTH</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE SIGN LIGHTING LUMINAIRE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8&quot; - 0'</td>
<td>6&quot;</td>
<td>3' - 6&quot;</td>
</tr>
<tr>
<td>10&quot; - 0'</td>
<td>6&quot;</td>
<td>4' - 6&quot;</td>
</tr>
<tr>
<td>12&quot; - 0'</td>
<td>6&quot;</td>
<td>5' - 6&quot;</td>
</tr>
<tr>
<td>14&quot; - 0'</td>
<td>6&quot;</td>
<td>6' - 0&quot;</td>
</tr>
<tr>
<td>16&quot; - 0'</td>
<td>6&quot;</td>
<td>6' - 0&quot;</td>
</tr>
<tr>
<td>TWO SIGN LIGHTING LUMINAires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18&quot; - 0'</td>
<td>6&quot;</td>
<td>4' - 3&quot;</td>
</tr>
<tr>
<td>20&quot; - 0'</td>
<td>6&quot;</td>
<td>4' - 9&quot;</td>
</tr>
<tr>
<td>22&quot; - 0'</td>
<td>6&quot;</td>
<td>5' - 3&quot;</td>
</tr>
<tr>
<td>24&quot; - 0'</td>
<td>6&quot;</td>
<td>5' - 9&quot;</td>
</tr>
<tr>
<td>26&quot; - 0'</td>
<td>6&quot;</td>
<td>6' - 3&quot;</td>
</tr>
<tr>
<td>28&quot; - 0'</td>
<td>6&quot;</td>
<td>6' - 9&quot;</td>
</tr>
<tr>
<td>30&quot; - 0'</td>
<td>6&quot;</td>
<td>7' - 0&quot;</td>
</tr>
<tr>
<td>32&quot; - 0'</td>
<td>6&quot;</td>
<td>7' - 0&quot;</td>
</tr>
<tr>
<td>THREE SIGN LIGHTING LUMINAires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34&quot; - 0'</td>
<td>6&quot;</td>
<td>6' - 1 1/2&quot;</td>
</tr>
<tr>
<td>36&quot; - 0'</td>
<td>6&quot;</td>
<td>6' - 4 1/2&quot;</td>
</tr>
</tbody>
</table>

★ IF "B" EXCEEDS THE SPACING LISTED ON THE VERTICAL BRACE SPACING TABLE, ADD AN ADDITIONAL VERTICAL BRACE
NOTES

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

OVERHEAD SIGN MOUNTING (TRUSS STRUCTURE)

STANDARD PLAN G-90.30-04
1. Sign Lighting Luminaire shall include a 3/4" (in) threaded side entry, a gasketed front entry, a door prop, and 4 mounting holes. Refer to Standard Spec. 8-20.3(13) for additional requirements.

2. See Standard Plan J-75.40 and J-75.45 for Sign Light Luminaire Electrical Details.

3. For all sign lighting bracing details not shown, see Standard Plan G-90.11.
NOTES
2. For mounting the maintenance walkway to a monorail 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".

MAINTENANCE WALKWAY

WALKWAY ENTRANCE
(INSIDE OPENING SWING GATE)

STAEL

GRAATING

SEE DETAIL

W4 x 13 (TYP.)

4'-0" MAX. (TYP.)

W4 x 13 AND POST

WI4 x 13 AND RAILING POST

PLAN

MAINTENANCE WALKWAY

END VIEW

MODIFY DIMENSION AS REQUIRED FOR PROPER FIT-UP WITH THE VMS DOOR OPENING.

MATERIAL SPECIFICATIONS

| PIPE | ASTM A 36 OR ASTM A 53 GRADE B, "TYPE E" OR "R", OR ASTM A 500 GRADE B |
| PLATES AND SHAPES | ASTM A 36 |
| STRUCTURAL TUBING | ASTM A 500 GRADE B |
| GALVANIZING FOR PIPE PLATES, SHAPES, AND STEEL GRATING | AASHTO M 111 |
| HIGH STRENGTH BOLTS, NUTS & WASHERS, INCL. MOUNTING BEAM BOLTS | STD SPEC, Sect. 8-B(9.3) |
| ALL OTHER BOLTS | STD SPEC, Sect. 8-B(5.9.1) |
| FASTENER GALVANIZING | ASTM F2329 |
| STEEL GRATING | ASTM A 36 |

ELEVATION

MAINTENANCE WALKWAY

W4 x 13

2'-6" SEE DETAIL "A"

W4 x 13 AND RAILING POST

MAINTENANCE WALKWAY GATE

STANDARD PLAN G-95.10-02

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

WASHINTON STATE DEPARTMENT OF TRANSPORTATION

Richard Zeldenrust

Jun 19 2018 2:30 PM
**MONOTUBE SIGN BRIDGE**

**PLAN**
- SAFETY CABLE AND INTERMEDIATE SUPPORT ARE OPTIONAL IN THIS ZONE
- INTERMEDIATE SUPPORT FOR VARIOUS ROPE (TYP.) (SEE NOTE 3)
- 3/8" (IN.) DAM, WIRE ROPE (SEE NOTE 4)

**ELEVATION**
- MAINTENANCE WALKWAY LAYOUT
- FALL RESTRAINT BRACKET (TYP.) (SEE DETAIL)

**NOTES**
2. For maintenance walkway, railing, grating, and toe plate details, see Standard Plan G-96.10.
3. Use two lanyards through intermediate wire rope support.
4. 3/8" (in) diameter wire rope with 14 kips min breaking strength. The wire rope shall be installed with 450 lbs of tension, and with 6" (in) of take up adjustment available in the turnbuckles.
5. Handrail tie-up with VMS door opening is the responsibility of the contractor.

**MATERIAL SPECIFICATIONS**
- PIPE: ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR ASTM A 500 GRADE B
- PLATES AND SHAPE: ASTM A 36
- STRUCTURAL TUBING: ASTM A 500 GRADE B
- GALVANIZING FOR PIPE, PLATES, SHAPE AND STEEL GRATING: AASHTO M 111
- HIGH STRENGTH BOLTS, NUTS & WASHERS: INCL. MOUNTING BEAM BOLTS
- FASTENER GALVANIZING: ASTM F 2352
- STEEL GRATING: ASTM A 36
- WIRE ROPE: ASTM A 620 W CLASS A, WEIGHT ZINC COATED WIRES THROUGHOUT

**MAINTENANCE WALKWAY INSTALLED ON MONOTUBE SIGN BRIDGE**
(WALKWAYS MAY BE USED WITH OTHER LAYOUTS THAN THAT SHOWN ABOVE)

**DETAILS**
- SEE DETAIL A
- SEE DETAIL B
- SEE DETAIL 4
- SEE DETAIL 3

**FURTHER DETAILS**
- SEE SHEET 2 FOR BRACKET DETAILS

**DRAWN BY:**
Bill Berens

**APPROVED FOR PUBLICATION:**
Ottawa, WA
Jan 29, 2018 10:33 AM

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE SIGN BRIDGE**

**STANDARD PLAN G-95.20-03**

**SHEET 1 OF 3 SHEETS**
MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE</td>
<td>ASTM A 36 OR ASTM A 53 GRADING B, TYPE E OR C, OR ASTM A 500 GRADING B</td>
</tr>
<tr>
<td>PLATES AND SHAPES</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 690 GRADING B</td>
</tr>
<tr>
<td>GALVANIZING FOR PIPE PLATES, SHAPES AND STEEL GRATING</td>
<td>AASHO M 111</td>
</tr>
<tr>
<td>HIGH STRENGTH BOLTS, NUTS, &amp; WASHERS: INCL MOUNTING BEAM BOLTS</td>
<td>STD SPEC 0-065(3)</td>
</tr>
<tr>
<td>ALL OTHER BOLTS</td>
<td>STD SPEC 0-065(1)</td>
</tr>
<tr>
<td>FASTENER GALVANIZING</td>
<td>ASTM F 2320</td>
</tr>
<tr>
<td>STEEL GRATING</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>WIRE ROPE</td>
<td>ASTM A 620 W CLASS A WEIGHT ZINC COATED WIRES THROUGHOUT</td>
</tr>
</tbody>
</table>

ALLOWABLE ALTERNATE MATERIAL: FEDERAL STANDARD RS-544-4147 TYPE B CLASS 3 GALVANIZED.

NOTES

1. Not intended for use in static signs.
2. For maintenance walkway, railing, grating and toe plate details, see Standard Plan G-95.19.
3. Use two lanyards through intermediate wire rope support.
4. 3/8" (in) diameter wire rope with 14 kips min. breaking strength. The wire rope shall be installed with 450 lbs. of tension, and with 6" (in) of take up adjustment available in the turnbuckle.
5. Handrail fit-up with VMS door openings is the responsibility of the contractor.

MAINTENANCE WALKWAY INSTALLED ON TRUSS-TYPE SIGN BRIDGE

(WALKWAYS MAY BE USED WITH OTHER LAYOUTS THAN THAT SHOWN ABOVE)

ELEVATION

MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE SIGN BRIDGE

STANDARD PLAN G-95.30-03

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

January 2019
**SHRUB, TREE AND GROUND COVER PLANTING DETAIL**

- Mulch & compost to specified depth - feather to base of plant
- Uppermost root shall be no more than 1" below soil surface
- Mound soil to form watering well at outer edge of planting hole
- See note
- Existing soil
- Break up rootball of container plants, prune circling roots
- Existing soil
- Three times the root spread
- Lower wrapped (B&B) rootball into hole. Cut away all wrapping materials from rootball and remove from hole, roughen soil at edges of rootball to stimulate roots
- Existing soil
- Mound soil to form watering well at outer edge of planting hole
- See note

**SECTION**

- Bulb planting detail
- Uppermost root shall be no more than 1" below soil surface
- Mound soil to form watering well at outer edge of planting hole
- Existing soil
- See note
- Existing soil
- Using 36" x 2" x 2" stakes, stake through edge of rootball into edge of undisturbed soil. Stakes shall be flush with ground surface or just below

**TUBER OR RHIZOME PLANTING DETAIL**

- Uppermost root shall be no more than 1" below soil surface
- Mound soil to form watering well at dripline of each plant
- See note
- Existing soil
- Spread roots out
- Planting hole 3 times the root spread
- Existing soil
- Break up rootball of container plants, including plugs, prune circling roots
- See note

**SLOPE PLANTING DETAIL**

- (Includes all plants on slopes)
- Plant rhizome with crown / growth points at finished grade
- Finished grade
- See note
- Existing soil

**EMERGENT PLANTING DETAIL**

- Uppermost root shall be no more than 1" below soil surface
- Mound soil to form watering well at dripline of each plant
- See note
- Existing soil
- Install plant vertically

**NOTE**

Backfill with soil removed from hole. See planting area soil preparation detail or Special Provisions.
Notes:
1. See Plant Material List for size and type of live stake.
2. Do not use axe or sledge for driving stakes.
3. In hard ground use an iron bar or star drill to prepare the holes for the stake.
4. Avoid stripping bark or bruising stakes during installation.
5. Fill void around cutting with soil.

Live Stake Installation in Riprap
- Cut damaged end to leave two buds exposed
- Fill voids with native soil
- Existing soil

Typical Live Stake Installation
- Cut damaged end to leave two buds exposed
- See notes
- Existing soil

Live Stake Installation in Quarry Spalls
- Cut damaged end to leave two buds exposed
- See notes
- Existing soil

Live Stake Installation on Slopes
- Cut damaged end to leave two buds exposed
- See notes
- Existing soil

NOTES
**NOTES**

1. All Angle Irons and Steel Straps shall be galvanized in accordance with AASHTO M 232.

2. Pipe, Caps, and T-Adapter shall be 1" I.D. white PVC or Primed Steel, except the water intake pipe shall be white PVC. Pipe shall be Sch. 40. All pipe joints shall be threaded.

3. Gage assembly pipe, fiberglass rod, and angle iron can be extended as needed to fit site requirements. Extra Pipe Clamps shall be added for security.

4. Score the water intake pipe 1/4" deep, 1/32" wide (width of saw blade), every 1/2", alternating cuts on top and bottom for drainage. Place at lowest water level.

5. Water level may vary, depending on season.

6. Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
FINISHED GRADE

CONCRETE FOOTING - COMMERCIAL CONCRETE
6" x 1/4" Diam. Steel Bar

SECTION A

POST

FINISHED GRADE

CONCRETE FOOTING - COMMERCIAL CONCRETE
6" x 1/4" Diam. Steel Bar

NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

1/2" REFLECTIVE TAPE (TYP.)
STEEL PIPE - ASTM A 53, NPS 3 (2" NOM.), SCHEDULE 80

1/2" REFLECTIVE TAPE (TYP.)

5/16" DRILLED HOLE

PAINT ASSEMBLY WITH A "HIGHLY VISIBLE" COLOR
(SAFETY YELLOW IS ACCEPTABLE)

NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

1/2" REFLECTIVE TAPE (TYP.)
STEEL PIPE - ASTM A 53, NPS 3 (2" NOM.), SCHEDULE 80

1/2" REFLECTIVE TAPE (TYP.)

5/16" DRILLED HOLE

PAINT ASSEMBLY WITH A "HIGHLY VISIBLE" COLOR
(SAFETY YELLOW IS ACCEPTABLE)

NOTE
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.

1/2" REFLECTIVE TAPE (TYP.)
STEEL PIPE - ASTM A 53, NPS 3 (2" NOM.), SCHEDULE 80

1/2" REFLECTIVE TAPE (TYP.)

5/16" DRILLED HOLE

PAINT ASSEMBLY WITH A "HIGHLY VISIBLE" COLOR
(SAFETY YELLOW IS ACCEPTABLE)
WOOD POST FASTENERS

<table>
<thead>
<tr>
<th>SIZE/TYP</th>
<th>QUANTITY</th>
<th>WASHERS</th>
<th>LOCKNUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; DIA. x 3/4&quot; BOLT</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; DIA. x 1/2&quot; SCREW</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

STEEL POST FASTENERS

<table>
<thead>
<tr>
<th>SIZE/TYP</th>
<th>QUANTITY</th>
<th>WASHERS</th>
<th>LOCKNUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; DIA. x 2-1/4&quot; BOLT</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; DIA. x 3/4&quot; BOLT</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>3/16&quot; DIA. x 1/4&quot; SCREW</td>
<td>8</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>1 7/8&quot; M-CLAMP</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

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 - SIZE 1, 1A, OR 2 (SIZE 1A SHOWN) - SEE TABLE, STANDARD PLAN H-70.18, SHEET 2, FOR DIMENSIONS

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

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

NOTES

1. The anchoring system shall meet NCHRP 350 crash test criteria. Use a socket and wedge system or the anchoring system supplied by or recommended by the Type 2 Support manufacturer.

2. A maximum of five mailboxes may be installed on a Type 2 Support.

3. The Platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.10, Sheet 2. The design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this platform design. Adjustable platforms must fit the 1 7/8" M-Clamp.

4. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners (see ALIGNMENT DETAIL). Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

5. Attach a newspaper box to a Type 2 Support with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.
MAILBOX SUPPORT
TYPE 2
STANDARD PLAN H-70.20-01
SHEET 2 OF 2 SHEETS

ANCHORING SYSTEM
- SOCKET AND WEDGE SHOWN
(SEE NOTE 1)

MAILBOX SUPPORT TYPE 1
(WOOD POST SHOWN)
FOR DETAILS,
SEE STANDARD PLAN H-70.10

MAILBOX SUPPORT TYPE 2

SPACING DETAIL

NEWSPAPER BOX
- SEE NOTE 2

MAILBOX SUPPORTS TYPE 2

SNOW GUARD - WHEN REQUIRED,
PLACE ON LEADING END OF
SUPPORT (SEE DETAIL)

BEHIND CURB
# UNLESS OTHERWISE SHOWN IN THE PLANS
MAILBOX PLACEMENT SECTIONS

BEHIND SIDEWALK

MUFFLER CLAMP

SECTION A

SNOW GUARD DETAIL

AT EDGE OF SHOULDER

FACE OF CURB

VARIABLE 6" TO 12"

VARIABLE 9" TO 12"

VARIABLE 9" TO 12"

BACK OF SIDEWALK

EDGE OF SHOULDER OR TURNOUT

ANGLE IRON

1/2" RAISED EXPANDED METAL

SECTION 0

4'-3" MIN.

5'-3" MIN.

3'-0" MAX.

3'-0" MAX.

2'-9" MAX.

1'-11" MAX.

MUFFLER CLAMP

1'-6"

FRONT VIEW

BOTTOM VIEW

SNOW GUARD

CURB TYPE VARIES

1/2" RAISED EXPANDED METAL

18" x 1-4

5'-0" MAX.

3'-0" MAX.

1/4" x 1/2"

7/16" DIAL (TYP.)

1'-6"

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: MARK BULLA

SHEET 2 OF 2 SHEETS

APPROVED FOR USE: 3/10/01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
MAILBOX - SIZE 1 OR 1A (SIZE 1A SHOWN)
- SEE TABLE, STANDARD PLAN H-70.10, SHEET 1, FOR DIMENSIONS

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

1 1/4" PIPE x 8" LONG (THREAD ONE END)
1 1/4" PIPE x 2 3/4" LONG (THREAD ONE END)
45° ELBOW - SEE NOTE 3

ASSEMBLY DETAIL
ISOMETRIC VIEW

VERTICAL SUPPORT -
1 1/4" PIPE, LENGTH AS REQUIRED (THREAD BOTH ENDS)

HORIZONTAL MOUNT -
1 1/4" PIPE, LENGTH AS REQUIRED (THREAD ONE END)

INSTALL PLASTIC CAP OR PLUG

NOTES
1. The insert pipe is 1" nominal diameter, Schedule 40 steel pipe, as indicated; all other pipe shown on this plan is 1 1/4" nominal diameter, Schedule 40 steel pipe. All pipe, couplings, and elbows shall be galvanized in accordance with ASTM A 153.

2. The vertical support may be cast in a concrete foundation, or bolted to a U-channel post, (see PLACEMENT DETAIL, Sheet 2). Avoid placing the vertical support in the flow line of a ditch.

3. The pipe angles required in this design may be achieved by using pipe fittings or by bending the pipes. See DETAIL "A," Sheet 2.

4. Coat the 1" diam. pipe with grease (petroleum) before sliding the 1 1/4" diam. pipe (cantilever arm) onto it, to aid rotation and to guard against corrosion.

5. The Platform design shown in this plan is detailed in the PLATFORM DETAIL, Standard Plan H-70.10, Sheet 2. The design features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required.

6. Match the edge of the mailbox platform to the end of the horizontal pipe mount. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners. Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform, (see ALIGNMENT DETAIL).

7. Attach a newspaper box to the pipe with two 1 3/4" muffler clamps spaced 4" apart. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.
1. Post shall have sufficient strength and durability to support the fence through the life of the project.
1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

2. Perform maintenance in accordance with Standard Specifications 8·01.3(9)A and 8·01.3(15).

3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.

4. Install silt fencing parallel to mapped contour lines.

**NOTES**

**TYPICAL INSTALLATION DETAIL**

(Steel posts shown)

**GEOTEXTILE FOR SILT FENCE** - See Standard Specification Section 9-33.2(1), Table 6

**POST** - Wood or Steel (Typical)

**BACKUP SUPPORT** (Typical)

**FABRIC** (Geotextile) (Typical)

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

**SPlice DETAIL**

(Steel posts shown)

**STATE OF WASHINGTON**

**REGISTERED LANDSCAPE ARCHITECT**

**SANDRA L. SALSBURY**

**CERTIFICATE NO. 000585**

**MARCH 11, 2013**

**WASHINGTON**

**Dept. of Transportation**

**DESIGN BY: BILL MURDOCH**

**POST - SEE STD. SPEC. 8·01.3(9)A**

**ATTACH IN A MANNER THAT ASSURES FABRIC IS FIRMLY HELD BY THE BACKUP SUPPORT IN A WAY THAT REDUCES THE POTENTIAL FOR FABRIC TEARING**

**BURY GEOTEXTILE IN TRENCH**

**NOTE**

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE. AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

**TYPICAL INSTALLATION DETAIL**

(Steel posts shown)

**NOTE**

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE. AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

**TYPICAL INSTALLATION DETAIL**

(Steel posts shown)
BACKFILLED & COMPACTED NATIVE SOIL

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

NOTE
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

SILT FENCE
STANDARD PLAN 1·30.15-02
SHEET 1 OF 1 SHEET

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

SPLICE DETAIL
(WOOD POSTS SHOWN)

NOTES
1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(16)
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.
NOTES
1. Angle high visibility silt fence terminal end uphill 24° (in) to 48° (in) to prevent sediment from flowing around the end of the fence.
2. Perform maintenance in accordance with Standard Specification, Sections 8-01.4.5 and 8-1.0.5.2.
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

TYPICAL INSTALLATION DETAIL
(Steel posts shown)

NOTE
During excavation, minimize disturbing the ground around trench as much as is feasible, and smooth surface following excavation to avoid concentrating flows. Compaction must be adequate to prevent undercutting flows.

HIGH VISIBILITY SILT FENCE
WITH BACKUP SUPPORT
STANDARD PLAN I-30.16-01

TYPICAL HIGH VISIBILITY SILT FENCE
WITH BACKUP SUPPORT
ISOMETRIC
(Steel posts shown)

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

SPICE DETAIL
(Steel posts shown)
NOTES
1. Angle Terminal end uphill 24" (H) to 48" (H) to prevent flow around fence (Typical).
2. Perform maintenance in accordance with Standard Specification, Sections 8-01.3.9/A and 8-01.3.15.
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstated unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

TYPICAL INSTALLATION DETAIL
(Steel Posts Shown)

DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE. AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS. COMPACTATION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

TYPICAL HIGH VISIBILITY SILT FENCE
WITHOUT BACKUP SUPPORT
ISOEMETRIC
(Steel Posts Shown)

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

SPICE DETAIL
(Wood Posts Shown)
PLACE SAND BAGS AS REQUIRED AROUND CULVERT TO PROVIDE SUPPORT FOR SILT FENCE.

SILT FENCE DESIGN

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

COMPOST BERM - SEE STD. PLAN I-80.15

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

COMPOST BERM DESIGN

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

Erosion Control At Culvert Ends
Standard Plan I-30.20-00

Washington State Department of Transportation

2. Securely knot each end of Wattle. Overtape adjacent Wattle ends, 1/2" (13) behind one another and secure tie together.

3. Compact excavated soil and trenches to prevent undercutting. Additional staking may be necessary to prevent undercutting.

4. Install Wattle perpendicular to flow along contours.

5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.

6. Perform maintenance in accordance with Standard Specification, Section 8.01.3(15).

7. Refer to Standard Specification, Section 8.01.3(16) for removal.

**WATTLE SPACING TABLE**

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>TEMPORARY MAX. SPACING</th>
<th>PERMANENT MAX. SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H: 1V</td>
<td>9&quot; - 9&quot;</td>
<td>5&quot; - 0&quot;</td>
</tr>
<tr>
<td>2H: 1V</td>
<td>10&quot; - 0&quot;</td>
<td>2H: 1V 8&quot; - 0&quot;</td>
</tr>
<tr>
<td>3H: 1V</td>
<td>15&quot; - 0&quot;</td>
<td>3H: 1V 10&quot; - 0&quot;</td>
</tr>
<tr>
<td>4H: 1V</td>
<td>20&quot; - 0&quot;</td>
<td>4H: 1V 15&quot; - 0&quot;</td>
</tr>
</tbody>
</table>
NOTES

1. Compost Sock shall be in accordance with Standard Specification, Section 9-14.5(6).

2. Securely knot each end of Compost Sock. Overlap adjacent Compost Sock ends 12" (in) behind one another and securely tie together.

3. Compost to be dispersed on site as determined by the Engineer, when vegetation covers the surface.

4. If Erosion Control Blanket is specified, place Compost Sock on top of blanket. See Standard Plan I-60.10.

5. Install Compost Sock perpendicular to flow along contours.

6. Remove sediment from the upslope side of the Compost Sock when accumulation has reached 1/2 of the effective height of the Compost Sock without compromising the intended function of the Compost Sock per Standard Specification, section 8-01.3(12) as determined by the Engineer.

7. Perform maintenance in accordance with Standard Specification, Section 8-01.3(15).

8. Refer to Standard Specification, Section 8-01.3(16) for removal,

### Standard Plan I-30.40-02

**Compost Sock Detail**

<table>
<thead>
<tr>
<th>Slope</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H : 1V</td>
<td>5' - 0&quot;</td>
</tr>
<tr>
<td>2H : 1V</td>
<td>10' - 0&quot;</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>15' - 0&quot;</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>20' - 0&quot;</td>
</tr>
</tbody>
</table>

**Catch Basin Installation**

(Diagram showing the layout and details of the compost sock, erosion control blanket, and drainage grate.)
NOTES

1. Coir logs shall be installed starting at the bottom of the slope and working uphill.
2. Excavated material shall be spread evenly along the uphill slope and compacted by hand tampering or other methods approved by the Engineer.
3. Overlap Coir log ends by 12" (in) to prevent water from moving between logs.
4. Always install Coir log perpendicular to slope along contour lines. Ends shall angle uphill to prevent flow around the Coir log.
5. Use an adequate number of stakes to ensure logs are secure.
6. Coir logs shall be in accordance with Standard Specification, Section 9-14.5(7), and be installed in accordance with Standard Specification, Section 8-01.3(6)(a).
7. Perform maintenance in accordance with Standard Specification, Section 8-01.3(15).

### 12" DIAMETER MINIMUM COIR LOG SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H : 1V</td>
<td>5' - 6&quot;</td>
</tr>
<tr>
<td>2H : 1V</td>
<td>10' - 0&quot;</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>15' - 0&quot;</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>20' - 0&quot;</td>
</tr>
</tbody>
</table>
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).

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PREPARED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE OF WASHINGTON

REGISTERED LANDSCAPE ARCHITECT

MARK W. MILLER

CERTIFICATE NO. 0096

9/20/03

TEMPORARY SILT FENCE FOR INLET PROTECTION IN UNPAVED AREAS

STANDARD PLAN 1-40.10-00

SHEET 1 OF 1 SHEET
NOTES

1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
CHECK DAMS ON CHANNELS

GENERAL NOTES
1. Check Dams shall meet the requirements of Standard Specifications 8-01.3(6) and 9-14.5(4).
2. In channels, install the sloped ends of the Check Dam a minimum of 8" higher than the spillway to ensure water flows over the dam and not around it.
3. Perform maintenance in accordance with Standard Specification 8-01.3(15).
4. Remove Check Dams in accordance with Standard Specification 8-01.3(16).

BIODEGRADABLE CHECK DAM

1. Biodegradable Check Dams may need additional or modified staking to prevent undercutting or scouring.

NON-BIODEGRADABLE CHECK DAM

1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer's recommendations and shall perform in accordance with Standard Specification 8-01.3(6).
2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.
3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.
INSTALLATION STEPS:

1. Prepare smooth slope.
2. Amend soil and seed, as specified.
3. Dig anchor trench. Set aside native soil removed from trench.
4. Secure blanket in anchor trench, staking or stapling blanket as shown.
5. Replace native soil previously removed from trench.
6. Roll blanket down the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.
7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.

NOTES

1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and slope steepness.
2. See Standard Specification 8-01.3(3) and 9-14.5(2).
3. Use manufacturer's requirements. When manufacturer's requirements are not provided, use installation requirements shown on Standard Plans.
4. Additional staples may be required on slopes greater than 3H : 1V.

STATE OF WASHINGTON
LICENSE NO. 860
DATE: 6 June 2013

BIODEGRADABLE EROSION CONTROL BLANKET
PLACEMENT FOR SLOPES
STANDARD PLAN 1-60.10-01

Washington State Department of Transportation
Tamped native soil from pile anticipated water line

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

Channel installation - section A

Erosion control blanket

Staple - 18" O.C. max.

Tamped native soil

Longitudinal anchor detail

Initial anchor - section B

Tamped native soil from pile

Tamped native soil

Staple - 6" max.

Check slot - section C

Staple - 36" max.

Shingle splice at end of roll

Section D

Channel termination - double row of staples staggered 6" apart

Isometric view

NOTES

1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.

2. Install Check Slots per manufacturer's recommendations.

3. See Standard Specification 6-01.2(3) and 5-14.6(2)

4. Use manufacturer's requirements. When manufacturer's requirements are not provided, use installation requirements shown on Standard Plan.

5. Additional staples may be required for high flow exposure.

INSTALLATION STEPS:

1. Prepare smooth slope.

2. Amend soil and seed, as specified.

3. Dig anchor trench. Set aside native soil removed from trench.

4. Secure blanket in anchor trench, staking or stapling blanket as shown.

5. Replace native soil previously removed from trench.

6. Roll blanket parallel to the slope in a controlled manner, taking care to remove excess slack, and taking care not to stretch blanket.

7. Stake or staple blanket as shown so there are no gaps between the blanket and the soil. Staple while unrolling blanket to minimize walking on blanket.
OUTFLOW CHANNEL IS CONSTRUCTED BY EXCAVATION

1'-0" DEPTH OVerFLOW

SEDEMENT TRAP BOTTOM

1'-0" DEPTH OF 3/4" - 1 1/2"
COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE
SEE STANDARD SPECIFICATION SECTION 8.03.14)

COMPACTED NATIVE MATERIAL
CONSTRUCTED BY EXCAVATION
OR EMBANKMENT

QUARRY SPALLS - 1' (FT) DEPTH
SEE STANDARD SPECIFICATION
SECTION 8.13.16)

PROVIDE GEOTEXTILE FOR SEPARATION
SEE STANDARD SPECIFICATION
SECTION 8.03.14)

SECTION A

AS REQUIRED - 100' (FT) MIN. EXCEPT
MAY BE REDUCED TO 50' (FT) MIN. FOR
SITES WITH LESS THAN ONE ACRE
OF EXPOSED SOIL

PLACE CONSTRUCTION GEOTEXTILE FOR SOIL
STABILIZATION FROM THE EDGE OF THE EXISTING
ROADWAY TO THE CONSTRUCTION ENTRANCE,
OR AS DIRECTED BY THE ENGINEER

PERMEABLE BALLAST (TYP.) - SEE
STANDARD SPECIFICATION
SECTION 8.03.20)

PROVIDE FULL WIDTH OF INGRESS / EGRESS AREA
15' (FT) MINIMUM

ISOMETRIC VIEW

STABILIZED CONSTRUCTION ENTRANCE
STABILIZED CONSTRUCTION ENTRANCE SHALL MEET THE REQUIREMENTS
OF STANDARD SPECIFICATION SECTION 8.01.37).

COARSE COMPOST

X = 1'-0" FOR SLOPES 4H:1V OR FLATTER
X = 1'-6" FOR SLOPES STEEPER THAN 4H:1V

TYPICAL SECTION
COMPOST BERM DETAIL

LONGITUDINAL SECTION

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

TEMPORARY SEDIMENT TRAP

GROUND LINE

2'-0" SETTLING DEPTH

1'-0" SETTLING STORAGE

4'-0" MIN.

0' - 0" MAX. HT = BERM OR PARTIAL OR
COMPLETE EXCAVATION

TEMPORARY SILT FENCE
OR COMPOST Sock

VOL. 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Corban, Jeff
July 13, 2016 2:21 PM
Washington State Department of Transportation
SECTION A-A

Conduit reserve area

Face of guardrail

Back of curb

Edge of shoulder

Conduit reserve area

Conduit

PLAN

1'

2'

Conduit reserve area

SECTION A-A

Not Steeper than 2:1
CONSTRUCTION NOTES

1. Drive ground rods before placing concrete. Move rod(s) and cover(s) as required to achieve full ground penetration. Maintain a 6” (ft) minimum clearance between ground rods and 6” (ft) from foundation edge as detailed on Standard Plan J-60.05.

2. All PVC conduits penetrating the foundation shall be terminated with end bushing, threaded with special coupling, and substituted with a 1/2”(in) dia. bushing, if no transformer or service cabinet is to be installed. See Standard Plan J-60.05 for details.

3. Deflects shall be made at the top of the concrete in accordance with ASTM F593, washers (conforming to ASTM F594), washers, and nuts conforming to American Society for Testing and Materials (ASTM) F593, washers, and nuts conforming to American Society for Testing and Materials (ASTM) F594, shall be Type 304 stainless steel. Bolts shall extend 1 1/2” (in) to 2” (in) max. above the concrete pad prior to placing them.

4. The grounded end bushing on each conduit and the end bushing on PVC conduit shall achieve a 2” (in) diameter x 9” (in) diameter x 9” (in). All threaded rod (conforming to ASTM F593), washers (conforming to ASTM F594), nuts (conforming to ASTM F594), shall be Type 304 stainless steel. Bolts shall extend 1 1/2” (in) to 2” (in) max. above the concrete pad prior to placing them.

5. All reinforcing steel shall be embedded at a location shown.

6. Place a 1/2” (in) of concrete between获得 and foundation.

7. Two ground rods are required for foundations with a service cabinet or transformer cabinet. See Standard Plan J-60.05 for details.

8. Concrete shall be 3000. See Standard Specification 8-20.34.

9. Verify dead front locations from manufacturer prior to placing conduit in foundation.

10. Foundations installed in or adjacent to sidewalks shall be constructed with the top flush with the sidewalk surface and grade, not including concrete risers for cabinets.

11. The slope is 1:1 or greater, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

12. For Type 333SD Controller Cabinet, the cabinet vendor shall install the Utility Transfer Switch to be installed on either side of the cabinet. The Utility Transfer Switch unit shall be shipped inside the cabinet for field installation by Regional Maintenance personnel.

13. Height of cabinet riser shall be adjusted to suit environmental needs. Type D Service cabinet shall have no riser. NEMA P44, Type 333SD, and Type B Modified shall have a 9” (ft) riser. All other cabinets shall have a 3 1/2” (in) riser.

14. Use (1) #4 coupling for a 3/4” (in) cabinet footing and (2) #4 coupling for a 9” (in) cabinet footing.

15. The Panel Box location is set by industry standards on all Controller Cabinets.

16. See Standard Plan J-10.20 for additional Foundation Construction and Conduit Routing for Type D and Type E Service Cabinets.

17. As an alternate, #3 rebar spaced at 7’-9” on center (O.C.) longitudinally and transversely may be used.

18. 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.

19. The slope is 1:1 or greater, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

20. Field bend #4 rebar around the Generator Anti-Theft Tie-Down Unit when required.

21. See Standard Plans J-10.21 and J-10.22 for additional details for Type D and Type E Service Cabinets.

22. As an alternate, #3 rebar spaced at 7’-9” on center (O.C.) longitudinally and transversely may be used.

23. 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.

24. The slope is 1:1 or greater, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

25. Field bend #4 rebar around the Generator Anti-Theft Tie-Down Unit when required.

26. See Standard Plans J-10.21 and J-10.22 for additional details for Type D and Type E Service Cabinets.

27. As an alternate, #3 rebar spaced at 7’-9” on center (O.C.) longitudinally and transversely may be used.

28. 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.

29. The slope is 1:1 or greater, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.
With Meter Base mounted on inside of Service Cabinet, allow 8" (in) between cabinets.
With Meter Base mounted on outside of Service Cabinet, allow 36" (in) from face of meter to adjacent cabinet. See Standard Plan J-10.31.

CONCRETE UTILITY REQUIRES MATERIAL #4 REBAR
MAINTENANCE EACH CORNER LOCATION SERVICE
(SEE NOTE ORHMA METER MOUNTED ON BASE
OUTSIDE OF PREFERRED)

---

CONDUIT LAYOUT
FOUNDATION DETAIL

TWO-CABINET FOUNDATION
(TYPE D SERVICE AND TYPE 332D CONTROLLER CABINET SHOWN)

THREE-CABINET FOUNDATION
(TYPE E SERVICE, 7.5 KVA TRANSFORMER AND
TYPE 332 CONTROLLER CABINET SHOWN)

---

CABINET OR HMA MATERIAL
3/8" PREMOLD JOINT FILLER
CONCRETE OR HMA MATERIAL

8" MIN. (TYP.)
6" MIN. (TYP.)
6" MIN. (TYP.)
6" MIN. (TYP.)
6" MIN. (TYP.)

30" (IN) LEGS
30" (IN) LEGS
30" (IN) LEGS
30" (IN) LEGS
30" (IN) LEGS

WELDED WIRE FABRIC (WWF)
WELDED WIRE FABRIC (WWF)
WELDED WIRE FABRIC (WWF)

#4 HOOP (SEE NOTE 14)
#4 HOOP (SEE NOTE 14)
#4 HOOP (SEE NOTE 14)

TO UTILITY
TO UTILITY
TO UTILITY

GENERATOR ANTI-THEFT TIE-DOWN UNIT
GENERATOR ANTI-THEFT TIE-DOWN UNIT
GENERATOR ANTI-THEFT TIE-DOWN UNIT

18" (IN) X 18" (IN) DRAINAGE WELL
18" (IN) X 18" (IN) DRAINAGE WELL
18" (IN) X 18" (IN) DRAINAGE WELL

---

JOINT FILLER 3/8"
PREMOLD (IN)

---

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CABINET ORIENTATION
CONDUIT LAYOUT AND FOUNDATION DETAIL
STANDARD PLAN J-10.10-03

SHEET 2 OF 6 SHEETS

APPROVED FOR PUBLICATION
FABRIC, PASCO
JAN 3, 2015 4:18PM

TIEDOWN UNIT / FRON
4"-0-7.7 (IN) X 4"

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HEADQUARTERS
WASHINGTON, TIDAL

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J-10.10.7.7 (SEE NOTE 20)
J-10.10.7.7 (SEE NOTE 20)
J-10.10.7.7 (SEE NOTE 20)

---

ADJACENT METER PAD TO
30" (IN) X 4"

---

GENERATOR ANTI-THEFT TRANSFER SWITCH
GENERATOR ANTI-THEFT TRANSFER SWITCH
GENERATOR ANTI-THEFT TRANSFER SWITCH

---

WELDED WIRE FABRIC (WWF)
WELDED WIRE FABRIC (WWF)
WELDED WIRE FABRIC (WWF)

---

18" (IN) X 18" (IN) X 18" (IN)
18" (IN) X 18" (IN) X 18" (IN)
18" (IN) X 18" (IN) X 18" (IN)

---

TO SERVICE CABINET
TO SERVICE CABINET
TO SERVICE CABINET

---

SERVICE METER BASE (TYP.) - PREFERRED LOCATION WHEN UTILITY REQUIRES METER TO BE MOUNTED ON OUTSIDE OF CABINET
CONTROLLER CABINET FOUNDATION NOTES

1. Slope conduit reserve area floor 1/4" (in) per 1' (ft) to the sump in the center.
2. All other dimensions shall be approved by the Engineer.
3. Provide 2" (in) clearance between conduit and edge of foundation well for cable slack.
4. For the rest of the foundation, see Standard Plan J-10.20 for details.
1. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Obtain Engineer's approval of maintenance pad orientation prior to proceeding with construction.

2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications, 6th Edition, 2012.

3. Concrete for walls and bases shall be class 4000.

4. Height of wall varies to match slope of existing grade. Contractor shall field-determine wall height and each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.

5. 3/4" (in) chamfer for all exposed corners.

6. For grounding details not shown, see Standard Plan J-60.05.

7. For cabinet and conduit details not shown, see Standard Plan J-10.10.

8. The cabinets shall be attached to the foundation with 4 each: 1/2" (in) x 12" (in) x 2" (in) x 4" (in) anchor bolts (see Detail on this Sheet), washers, and nuts conforming to Standard Specification 9-06.5(1) and galvanized after fabrication in accordance with AASHTO M 232. Locate anchor bolts per cabinet manufacturer. Stainless steel epoxy anchors may be used as an alternative, and shall be Type 304 stainless steel. Bolts shall extend 1 1/2" (in) min to 2" (in) max above the concrete pad.
1. Metering arrangements may vary with different serving utilities. The Contractor shall verify the requirements of the utility prior to installing the service equipment.

2. All service pole conduits shall be secured to the pole with two-hole conduit straps spaced at 5' (1) maximum centers. See Standard Plans J-60.13 and J-60.14 for steel channel support and mounting details. Where required by the Utility, an alternative-use hot-dip galvanized standoff bracket may be used. See Standard Plan J-10.16 for ALTERNATE STANDBOFF BRACKET DETAIL.

3. All risers and service equipment shall be installed on side of pole that is away from traffic.

4. Where required by the serving utility, service breakers shall be installed above meter socket in a separate rain-tight enclosure.

5. See Standard Plan J-60.05 for grounding details.

6. See Breaker Schedule in Contract for breaker and contactor sizes.


NOTES (CONTINUED)

10. Hinges shall have stainless steel or brass pins.

11. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.


13. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:
   - Key Numbers 2, 3, 4, 6, 7, 8, and 9.
   - Key Number 4 name plate shall read as follows: "PHOTOCELL BYPASS TEST OFF" AND "PHOTOCELL TEST OFF - AUTOMATIC."
   See service cabinet detail.

14. Metering arrangements vary with serving utilities. The Contractor shall verify the serving utility's requirements prior to fabrication and installation of the service equipment.

15. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

16. All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the buswork. Jumpering of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.

17. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.

18. All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the Schedules. Approved PVC or polyolefin wire marking sleeves shall be used.

19. All nuts, bolts, screws, and washers used for mounting the photoelectric control enclosure, conduit body covers, and junction box cover shall be ASTM F693 or A193 Type 304 or Type 316 stainless steel.

20. A 1% tolerance is allowed for all dimensions.

21. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.

22. Install conduit couplings on all conduits.

23. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or solder in place. See Standard Plan J-10.20 for alternate door hinge details.

24. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded steel mesh with weaved seams and mounting flanges and shall be hot-dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" (in) x 5/8" (in) expanded steel mesh may be used as an alternative material. See Standard Plan J-10.20 for enclosure mounting details.

25. See Contract for Breaker Schedule.
NOTES (CONTINUED)

10. Hinges shall have stainless steel or brass pins.
11. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.
12. The metering equipment door shall be pad-lockable. Each door shall be gaseted. See Standard Plan J-10.20 for door hinge details. Concealed heavy-duty stainless steel lift-off hinges are allowed as an alternative. Upper left door shall have three hinges, lower left door shall have two hinges, and right door shall have three hinges. All doors shall have a two-position door stop assembly.
13. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:
   "PHOTOCELL BYPASS TEST OFF" AND "PHOTOCELL TEST OFF - AUTOMATIC."
   See service cabinet detail.
14. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
15. All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the buswork. Jumping of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
16. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.
17. All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the Schedules. Approved PVC or polyethylene wire marking sleeves shall be used.
18. All nuts, bolts, screws, and washers used for mounting the photoelectric control enclosure, conduit body covers, and junction box cover shall be ASTM F593 or A183 Type 304 or Type 316 stainless steel.
19. A 1% tolerance is allowed for all dimensions.
20. See Contract for Breaker Schedule.
21. Install conduit couplings on all conduits.
22. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded steel mesh with weld seams and mounting flanges and shall be hot-dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" (in) x 5/8" (in) expanded steel mesh may be used as an alternative material. See Standard Plan J-10.20 for enclosure mounting details.
23. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.
24. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or solder in place. See Standard Plan J-10.20 for alternate door hinge details.

KEY
1. METER BASE PER SERVING UTILITY REQUIREMENTS - AS A MINIMUM, THE METER BASE SHALL BE A SAFETY SOCKET BOX WITH FACTORY-INSTALLED TEST BITUP FACILITY THAT MEETS THE REQUIREMENTS OF NEMA DRAWING 304. METER BASE ENCLOSURE SHALL BE FABRICATED FROM TYPE 304 STAINLESS STEEL.
2. MAIN BREAKER (DPST - SIZE PER BREAKER SCHEDULE).
3. PHOTOCCELL CONTROL BREAKER (DPST - 15 AMP = 120/240 VOLT).
4. TEST SWITCH (SPOT - SNAP ACTION - POSITIVE CLOSE - 15 AMP = 120/277 VOLT = "T" RATED).
5. PHOTOCELL CONTROL UNIT - SEE STANDARD SPECIFICATION 9-29.12 (1/2).
6. BRANCH BREAKER (DPST - SIZE PER BREAKER SCHEDULE).
7. SPARE BREAKER (SEE BREAKER SCHEDULE). (DPST - 20 AMP = 240/480 VOLT).
8. CONTACTOR (SEE BREAKER SCHEDULE).
9. RECEPTACLE BREAKER (DPST - 20 AMP = 120/240 VOLT).
10. RECEPTACLE - GROUNDED (GFCI) - 20 AMP = 125 VOLT.
11. ISOLATED NEUTRAL BUSS - 14 LUG COPPER.
12. MOUNTING HOLE - SEE STANDARD PLAN J-10.20 FOR MOUNTING DETAILS.
13. 1/4" (in) DIAMETER DRAIN HOLE - DRILL BEFORE GALVANIZING.
14. HINGED DEAD FRONT WITH 1/4 TURN FASTENERS OR SLIDE LATCH - DEAD FRONT PANEL BOLTS SHALL NOT EXTEND INTO VERTICAL LIMITS OF THE BREAKER ARRAYS.
15. CABINET MAIN BONDING JUMPER ASSEMBLY - BUSS SHALL BE 12 LUG TURNED COPPER (SEE STANDARD PLAN J-10.20 FOR CABINET MAIN BONDING JUMPER ASSEMBLY DETAILS.
16. METAL WIRING DIAMETER HOLDER.
17. REMOVABLE SUBPANEL FOR EQUIPMENT.
18. SCREENED VENTS - TWO REQUIRED (ONE EACH SIDE) - LOUVERED PLATES.
19. TRANSFORMER BREAKER (DPST - 15 AMP = 480 VOLT).
20. DRY TRANSFORMER (480/120 VOLT) - 3 KVA - COPPER BUSSED AND COPPER WOUND.
21. 12-CIRCUIT PANEL BOARD - MINIMUM SIZE WITH MAIN BREAKER.
22. LABEL CABINET WITH BUSSWIRK RATING.
23. 6-CIRCUIT PANEL BOARD - MINIMUM SIZE.
24. UTILITY DISCONNECT SWITCH ENCLOSURE WITH COVER - OMIT IF UTILITY DOES NOT REQUIRE THE DISCONNECT SWITCH.
2. Hinges shall have stainless steel or brass pins.
3. Cabinets shall be rated NEMA 3R and shall include two rash-light vents.
4. Metering equipment door shall be pad-lockable. Each door shall be gasketed. Install Best CX Construction Core on right side door. See Door Hinge Detail.
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, 5, 6, 7, 8, 9, & 10
   - Key Number 4 name plate shall read: "PHOTOCCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF-AUTOMATIC". See Service Cabinet Detail.
6. Metering arrangements vary with different serving Utilities. The Utility may require meter base mounting in the enclosure, on the side, or on the back of the enclosure. The Utility may require the dimension between the door and the front of the safety socket box to be less than the 11" (in) shown in the Left Side - Safety Socket Box Mounting Detail. The Contractor shall verify the serving Utility’s requirements prior to fabrication and installation of the service equipment.
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 shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell without removal of the photocell unit or the photocell enclosure.
10. All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or polyethylene 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. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dipped galvanized steel or stainless steel.
14. The meter base portion of this service was designed to meet metering portion of EUBERG Drawing 309 requirements.
15. When using alternate door hinge:
   - Remove hinge pin prior to welding hinge to cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with brass pin and solder in place.
16. Verify the service utility stand-off dimension. Adjust the removable panel to the measurement provided by the Utility Company. After adjustment, cut off all-thread bolts so that no less than two and no more than three full threads extend past the face of the nuts.
17. As an alternate to the bolted or field welded strut mount supports, 1 5/8" (in) x 3 1/4" (in) 12-gage continuous slotted steel channel or factory welded 1 5/8" (in) x 1 5/8" (in) 12-gage back to back continuous slotted steel channel may be used. Three pairs required.
DRIVE GROUND RODS BEFORE PLACING CONCRETE – MOVE RODS AND DRAIN TILE(S) WITH COVER(S) AS REQUIRED TO ACHIEVE FULL GROUND PENETRATION – MAINTAIN A 6 (IN) MINIMUM CLEARANCE BETWEEN GROUND RODS AS DETAILED ON STANDARD PLAN J-40.05.

ALL RMC CONDUITS PENETRATING CABINET SHALL BE TERMINATED WITH GROUNDING END BUSHING AND BONDED TO THE CABINET GROUNDING BUS.

4" (IN) DIA. x 12" (IN) DEEP SUMP, SLOPE FOUNDATION "TOWARD SUMP" – 3/8" (IN) DAMP, POLYETHYLENE OR COPPER DRAIN PIPE – SLOPE TO DRAIN OUTSIDE FOUNDATION – LOCATE DRAIN AWAY FROM ACCESS DOORS.

TO SERVICE GROUND – PER STANDARD PLAN J-40.05.

INSTALL CONDUIT COUPLINGS ON ALL CONDUITS – TOP OF CONDUIT COUPLINGS SHALL BE Flush WITH TOP OF CONCRETE – IF PVC CONDUITS ARE SPECIFIED, THE CONDUIT Stub AND END BELL BUSHING SHALL NOT BE GLUED TO THE COUPLING.

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**SERVICE CABINET TYPE B MODIFIED (0 - 200 AMP TYPE)**

**120/240 SINGLE PHASE**

**standard plan J-10.20-02**

**sheet 4 of 5 sheets**

**Approved for publication**

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**DRAWN BY: FERN LIDDELL**

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**KEY**

1. **GROUND ROD (TYP.)** – One required at each corner – See Std. Plan J-10.10
2. **SERVICE CABINET**
3. **WELDED WIRE FABRIC** 4 x 4 – W.0 x 4.0 – Placed in center of pad – See Std. Spec. Sec. 9-40.7
4. **POLICE PANEL**
5. **WELDED CONNECTION**
6. **BOLTED CONNECTION**
7. **ELEVATION VIEW** (field welded or bolted)
8. **SECTION D** (BOLTED CONNECTION)
9. **SECTION C** (WELDED CONNECTION)
10. **FEILD WELD OR BOLT POINT – See Section C or Section D as applicable**
11. **CONDUIT COUPLING (TYP.)**
12. **ANCHOR BOLT (TYP.)**
13. **#4 BASIS EACH CORNER**
14. **#4 HOOPS**
15. **TO UTILITY OR SERVED DEVICES**
16. **TO CONTROLLER CABINET**
17. **FRONT OF SERVICE CABINET**
18. **WELDED WIRE FABRIC** 4 x 4 – W.0 x 4.0 – Place in center of pad – See Std. Spec. Sec. 9-40.7
19. **SPACING TABLE**

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**drawing notes**

- See controller cabinet foundation details on standard plan J-10.10 for cabinet dimension table and details not shown.

---

**spacing table**

<table>
<thead>
<tr>
<th>Cabinet Type</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>332 or 334 Type Cabinet</td>
<td>26&quot;</td>
</tr>
<tr>
<td>332D Type Cabinet</td>
<td>24&quot;</td>
</tr>
<tr>
<td>332D or 334 Type Cabinet</td>
<td>26&quot;</td>
</tr>
<tr>
<td>NEMA PJ# Type Cabinet</td>
<td>16 1/2&quot;</td>
</tr>
</tbody>
</table>

For a special design cabinet that is not listed on std. plan J-10.10:
- X = Width of door open to 180° plus 2 inches

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**plan view of service cabinet**

- Cabinet base
- Anchor bolt (typ.) – one required at each corner – See Std. Plan J-10.10
- Two #4 hoops
- Service cabinet
- Generator with or without unit
- 18" (IN) x 18" (IN) x 18" (IN) drainage well

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**right side of service cabinet**

- Control panel
- Cabinet
- Conduit as required – Plumb conduit
- 1/2" (TYP.)
- 1/3" (DIA.) with approved cover (TYP.)
- 15" (MIN) DRAW TIE with approved cover (TYP.)
- Foot weld or bolt point – See Section C or Section D as applicable
- Welded wire fabric 4 x 4 – W.0 x 4.0 – placed in center of pad – See Std. Spec. Sec. 9-40.7
BRONZE GROUND CLAMP > WITH BRONZE J-BOLT, WASHERS AND SET SCREWS

# 6 INSULATED STRANDED

DETAL A

BRONZE GROUND CLAMP (TYP.) > WITH BRONZE J-BOLT, WASHERS AND SET SCREWS

# 8 AWG MIN. + 1 FT OF TINNED BRAIDED COPPER

CONDUIT

DETAL B

END OR CORNER POST (TYP.) - SEE STANDARD PLAN L-20.10

GENERATOR ANTITHEFT RE-GUARD UNIT

CONTROLLER CABINET

TYPE 3 CHAIN LINK FENCE (TYP.) - SEE STANDARD PLAN L-20.10

SERVICE CABINET

MAINTENANCE PAD

SERVICE METER BASE OR DISCONNECT SWITCH

PLAN VIEW

TYPE 3 CHAIN LINK FENCE (TYP.) - SEE STANDARD PLAN L-20.10

SERVICE CABINET

END OR CORNER POST (TYP.) - SEE STANDARD PLAN L-20.10

PLAN VIEW

SIDE VIEW

SERVICES CABINET

SIDE VIEW

ELEVATION VIEW

PAD MOUNTED SERVICE CABINET WITHIN RIGHT-OF-WAY FENCE
FOR CONDUCTS NOT SHOWN, DRAIN TILE FOR GROUNDING, DRAIN TUBES, REINFORCING STEEL, ETC.
OMIT FOR CLARITY, SEE SHEET 4 FOR ADDITIONAL DETAILS.

ELEVATION VIEW

POST MOUNTED SERVICE CABINET WITHIN RIGHT-OF-WAY FENCE
FOR CONDUCTS NOT SHOWN, DRAIN TILE FOR GROUNDING, DRAIN TUBES, REINFORCING STEEL, ETC.
OMIT FOR CLARITY, SEE SHEET 4 FOR ADDITIONAL DETAILS.
NOTES
1. Metering Arrangements vary with different serving utilities. The utility may require meter base mounting in the
   enclosure, on the side, or on the back of the enclosure. The utility may require the dimension between the
   door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting
detail, see Standard Plan J-3b. The Contractor shall verify the serving utility's requirements prior to fabrication
   of and installing the service equipment.
2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor
   shall verify the serving utilities requirements prior to fabrication and installing the service equipment.
4. Hinges shall have stainless steel or brass pins.
5. Cabinets shall be rated NEMA 3R and shall include two rain tight vents.
6. Metering equipment doors shall be pad lockable. Each door shall be gasketed. Install best construction core on
   bottom left and right doors. See door hinge detail, Standard Plan J-3b. Concealed heavy duty stainless steel lift
   off hangers are allowed as an alternative. Upper left door shall have 3 hinges, lower left door shall have 2 hinges,
   and right door shall have 3 hinges. All doors shall have a two position door stop assembly.
7. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate
   attached with screws or rivets: Key number 2, 3, 4, 5, 6, 7, 8, 9, 16, 21 and 24. Key number 4 name plate shall
8. The dimension shown are minimum and shall be adjusted to accommodate the various sizes of equipment
   installed.
9. All bushwork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall
   bolt onto the bushwork. Jumping of breakers shall not be allowed. Bushwork shall accommodate all future
   equipment as shown in the breaker schedule.
10. The photocell unit shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell
    without removal of the photocell unit or the photocell enclosure.
11. All internal wire runs shall be identified with "To-From" coded tags labeled with the code letters and/or numbers
    shown on the schedules. Approved PVC or Polyolefin wire marking sleeves shall be used.
12. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.
13. A 1% tolerance is allowed for all dimensions.
14. See plans for breaker schedule.
15. Install conduit couplings on all conduits. Place couplings flush with top of concrete foundation.
16. Seal cabinet to foundation with a 1/2" bead of silicone. Apply silicone to dry surface only.
17. The meter base portion of this service was designed to meet metering portion of Euseco Drawing 309
    requirements.
KEY
1. Meter base per serving utility requirements. As a minimum, the meter base shall be safety socket box with factory installed test bypass facility that meets the requirements of National Electrical Code.
2. Main Breaker (See Breaker Schedule).
4. Test With (SPDT snap action, positive close 15 AMP - 120/277 volt .11. rate)ed).
6. Branch Breaker (see Breaker Schedule).
7. Signal Transformer Breaker (see Breaker Schedule).
8. Contactor (see Breaker Schedule).
11. Neutral Bus, 14 lg copper with stainless steel Allen head screws.
12. Photocell Enclosure - enclosure to be fabricated from 5/8" expanded steel mesh with welded seams and mounting flanges. Hot dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" x 5/8" openings equivalent to 5/8" expanded steel mesh may be used as alternative material. See Photocell Enclosure Mounting details, Standard Plan J-3b.
13. Hinged front facing door with 4" x 4" min. polished wire glass window.
14. Hinged dead front with 1/4 turn fasteners or slide latch.
17. Metal Wiring Diagram Holder.
19. 6" x 6" min. underground feed - service wire-way (left rear corner).
20. Screened Vents. 2 required, 1 each side, louvered plates.
22. Thermostat, 40°F closure 3 differential.
23. Strip Heater (100 watt nominal), with terminal strip cover.
25. Dry Transformer (480/120 volt) 3 KVA copper bussed and copper wound.
26. Reserved for meter, current transformer and/or disconnect switch as required by the utility.
27. 24 circuit panel board - minimum size with separate main breaker.
28. Label Cabinet with Bus work rating.
29. 6 Circuit Panel Board - minimum size.
30. Molded Case Switch. Rating of switch shall equal or exceed main breaker rating.
31. Hinged door facing switch enclosure with cover. (Omit if utility requires the disconnect switch to be mounted externally, or if the utility does not require the disconnect switch).
NOTES
1. Cabinet construction shall meet the requirements of Standard Specification 9-20.25. Aluminum cabinets shall have mill finish.
2. Busswork shall be rated for 100 Amps minimum.
3. Transformer size, input voltage, and output voltage shall be as shown in the Contract Plans.
5. Secondary branch breakers may be either single or double pole breakers. Only two double pole breakers may be used.
6. Cabinet anchor bolt pattern is determined by the cabinet manufacturer. All anchor bolts shall either be hot dip galvanized or stainless steel cinch bolts. Bolts shall extend a minimum of 1.5 inches above the concrete pad. See Standard Plan J-10.10 for Foundation details.
7. Transformers 7.5 KVA and larger shall be supplied with two full capacity taps, one at 5%, and one at 10% below normal capacity.
8. Engraved phenolic nameplate shall read "SUPPLIED FROM SERVICE CABINET S77 ????". See Contract Plans for service cabinet S number. Nameplate shall be attached with screws or rivets.
9. Cabinet shall be oriented such that it opens away from traffic.
10. Available fault current label shall meet the requirements of National Electrical Code Article 110.24.

STANDARD PLAN J-10.25-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Washington State Department of Transportation

TRANSFORMER CABINET
(480V/240V - 240V/120V)
NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TEES

NOTES

1. Cabinet construction shall meet the requirements of Standard Specification Section 9-29.13(10). Aluminum cabinets shall have mill finish.

2. Cabinet construction shall conform to the requirements of Chapter 6, Section 2, of the California Department of Transportation (CalTrans) Transportation Electrical Equipment Specifications (TEES) as currently published, including all errata, with modifications as described in Standard Specification Section 9-29.13(10).

3. The Housing and Cage numbers refer to the designations shown in the TEES. Cabinet Housing #2 (ALT) and Cage #2 (ALT) are modified versions of Cabinet Housing #2 and Cage #2, respectively, using the shorter vertical dimensions shown. All other dimensions and features are the same.

4. Housing #1B shall always use Cage #1. Housing #2 shall always use Cage #2. Housing #2 (ALT) shall always use Cage #2 (ALT).

5. Cage mounting points are designated by rack units (U), which are numbered starting from the bottom of the cage.

6. Install the following in PANEL A location for the applicable cabinet type:
   - Type 331L and 334L Cabinets: Do not install PANEL A.
   - Type 332L Cabinets: Install Generator Transfer Switch.

7. Install the following in PANEL B location for the applicable cabinet type:
   - Type 331L Cabinets: Install Generator Transfer Switch when specified in the contract.
   - Type 332L and 334L Cabinets: Install Police Panel.

8. All cabinet locks shall accept Best 6-pin or 7-pin cores, with the exception of the Police Panel. The Police Panel shall use a standard Police Panel Lock and Keys.
NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TEES

PLAN VIEW
LED LIGHT STRIP LOCATION (TYP.)
BA RACK CAGE LOCATION (TYP.)

ISOMETRIC VIEW

CABINET BASE DETAIL
HOLE SLOT (TYP.) - SEE HOLE SLOT DETAIL "A"

DETAIL A
HOLE SLOT DETAIL
R. = 0.500"

DETAIL B
HOLE SLOT DETAIL
R. = 0.188"

DETAIL C
UPPER CAGE CENTER SUPPORT
HOLE SLOT (TYP.) - SEE HOLE SLOT DETAIL "A"

DETAIL D
LOWER CAGE CENTER SUPPORT
HOLE SLOT - SEE DETAIL "B" (TYP.)
- SEE NOTE 9

LOWER CAGE SUPPORT DETAIL
LOWER CAGE SIDE SUPPORT (TYP.) - SEE DETAIL "B"
LOWER CAGE CENTER SUPPORT - SEE NOTE 9

EXTERIOR FRONT VIEW
CABINET HOUSING #1X

EXTERIOR SIDE VIEW
NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TEES

1. Cabinet construction shall meet the requirements of Standard Specification Section 9-29.13(10). Aluminum cabinets shall have mill finish.
2. Cabinet construction shall conform to the requirements of Chapter 6, Section 2, of the California Department of Transportation (CalTrans) Transportation Electrical Equipment Specifications (TEES) as currently published, including all errata, with modifications as described in Standard Specification Section 9-29.13(10).
3. The Housing and Cage numbers refer to the designations shown in the TEES. Cabinet Housing #1X is a double-width version of Cabinet Housing #1 with overall dimensions as shown.
4. Housing #1X shall always use two of Cage #1 - see Standard Plan J-12.16. Housing #3 shall always use two ITS Cages.
5. Cage mounting points are designated by rack units (U), which are numbered starting from the bottom of the cage - see Standard Plan J-12.15.
6. Install the following in PANEL A: Location for the applicable cabinet type: - Type 331D and 3340 Cabinets, Do not install PANEL A, - Type 332D Cabinets, Install Generator Transfer Switch.
7. Install the following in PANEL B location for the applicable cabinet type: - Type 331D Cabinets, Install Generator Transfer Switch when specified in the contract, - Type 332D and 3340 Cabinets, Install Police Panel.
8. All cabinet locks shall accept flat 6-pin or 7-pin cores, with the exception of the Police Panel. The Police Panel shall use a standard Police Panel Lock and Keys.
9. Cage side supports for Cabinet Housing #1X shall be as shown in the TEES for Cabinet Housing #1B. Cage upper and lower center supports shall be as shown here, and installed in the same manner as shown in the TEES for the Cabinet Housing #3 center cage supports.
NOTES
2. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.
4. Junction box serving the Standard shall preferably be located 5' - 0" (150 - 0' Max.) from the Standard.
5. Two button installation may require adaptor(s).
2. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (H) to the PPS post height to accommodate plaque and leave a 2" (H) space between signs.
4. Junction Box serving the Standard shall preferably be located 5'-0" (15'-0" Max.) from the Standard.
5. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete; Provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
6. Two button installation may require adaptor(s).
NOTES

1. See Standard Specification 9-08.16 for Breakaway Base Connection details. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The Breakaway Base Connection details are only shown on this plan to illustrate how parts are assembled.


4. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.

5. Mounting distances vary between manufacturers. See manufacturer's recommendations for mounting information.

6. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
NOTES
2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11 gage, 4 1/2" (in) O.D. at slipfitter weld. Taper shall be 0.14" (in) per foot.
3. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Hand holes shall include a removable, rain-tight cover and gasket, fastened with two stainless steel screws (ASTM 593).
7. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete. Provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
8. The junction box serving the standard shall preferably be located 5'-0" (10'-0" max.) from the standard.
9. Where shown in the plans, install plaque (R10 - 32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" two inches above the Accessible Pedestrian Signal (APS) Assembly.
1/4" WEEP HOLE

SEENOTE3
FOR SIGNAL
HEAD
MOUNTING
DETAILS; SEE STANDARD
PLAN J-20.16

1/4" WEEP HOLE
SLIPFITTER - OFFSET TOP MOUNT,
PLACE OFFSET TO FRONT OF POLE,
DRILL TO SEAT SET SCREWS

IMSA 20-1 SC #14 CABLE

BRONZE COLLAR
AND
TERMINAL COMPARTMENT

IMSA 20-1 7C #14 CABLE
FROM CONTROLLER
(SEE NOTE 3)

DOUBLE PEDESTRIAN SIGNAL
WIRING DETAIL
(TYPE C MOUNTING SHOWN)

PEDESTRIAN SIGNAL WIRING DETAIL
(TYPE D MOUNTING SHOWN)

ACCESSIBLE PEDESTRIAN
PUSHBUTTON WIRING DETAIL

INSULINER SLEEVE

IMSA 20-1 7C OR 5C #14 CABLE
TO SIGNAL DISPLAY (SEE CONTRACT
PLANS FOR WIRE SIZE AND QUANTITIES)

2C (SH) CONDUCTOR - FROM CONTROLLER

ACCESSIBLE PEDESTRIAN
PUSHBUTTON DETAILS - SEE STANDARD PLAN J-20.26

1/4" WEEM HOLE
SUPFITTER - OFFSET TOP MOUNT,
PLACE OFFSET TO FRONT OF POLE,
DRILL TO SEAT SET SCREWS

IMSA 20-1 5C #14 CABLE

2C (SH) CONDUCTOR TO PUSHBUTTON
(SEE CONTRACT PLANS FOR QUANTITIES)

HAND HOLE
EQUIPMENT GROUNDING
CONDUCTOR - SEE NOTE 5

LEVELING NUT (TYP.)

STAINLESS STEEL WASHERS (TYP.)

GROUNDING CONDUCTOR - SEE NOTE 4

FULL CIRCLE CRIMP-ON
CONNECTOR (TYP.)

STAINLESS STEEL NUT

3/8" DRAIN TUBE

EQUIPMENT GROUNDING
CONDUCTOR - SEE NOTE 4

CONTACT PLANS FOR WIRE SIZE AND QUANTITIES)

3C PEDESTRIAN HEAD TERMINATIONS
TERMINAL NUMBER COLOR CODE USE
7*1 R DON'T WALK DISPLAY
7*2 G WALK DISPLAY
7*3 W NEUTRAL CONDUCTOR
7*6 B SPARE CONDUCTOR
7*7 O SPARE CONDUCTOR

* ASSOCIATED PHASE NUMBER

7C PEDESTRIAN HEAD TERMINATIONS
TERMINAL NUMBER COLOR CODE USE
7*1 R DON'T WALK DISPLAY
7*2 G WALK DISPLAY
7*3 W NEUTRAL CONDUCTOR
7*6 B SPARE CONDUCTOR
7*1 O DON'T WALK DISPLAY
7*2 BL WALK DISPLAY
7*3 WB NEUTRAL CONDUCTOR

* ASSOCIATED PHASE NUMBER

PEDESTRIAN SIGNAL
STANDARD (TYPE PS)
ELECTRICAL DETAIL
STANDARD PLAN J-20.20-02

NOTES
2. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Install heat shrink caps on all spare conductors not terminated on a terminal strip.
4. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete; provide 3' - 0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with manufacturer's recommended crimper).
5. Equipment grounding conductor shall attach to grounding stud with a full circle crimp-on connector (crimped with a manufacturer's recommended crimper).
NOTES
1. Clamping bolts shall be tightened to 50 ft-lbs max. torque. After state inspection, burrs threads to prevent rust. DO NOT OVERTIGHTEN.
2. The final height of the Anchor Bolts shall be below the top of the slip plate assembly to ensure proper function of the slip base.
3. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: Provide 3'-0" X 0". Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
4. Junction box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
5. Provide cable tie at wiring entering the junction box (for slip base installations only) — See Detail A.
6. Keep Plate shall not extend beyond the edges of the pole base plate.

**REINFORCEMENT STEEL BENDING DIAGRAM**

- Dimensions are cut to cut.
- SEE DETAILS ABOVE MATCHLINE FOR SQUARE CONCRETE FOUNDATION

**SECTION A**
- See Detail C.
- Electrical Conduit—See Contract for Dia.
- Anchor Bolt Assembly—Anchor Bolt Plate—Two Req'd. Per Assembly
- Anchor Bolts—3/4" (In) Diameter Steel Heavy Hex Nuts—Four Req'd. Per Anchor Bolt
- Flat Washers—Four Req'd. Per Anchor Bolt

**SECTION B**
- Center Anchor Bolt Assembly in Foundation
- See Note 1

**SECTION C**
- See Detail C.
- Electrical Conduit—See Contract for Diameter
- Anchor Bolt Assembly—Anchor Bolt Plate—Two Req'd. Per Assembly
- Anchor Bolts—3/4" (In) Diameter Steel Heavy Hex Nuts—Four Req'd. Per Anchor Bolt
- Flat Washers—Four Req'd. Per Anchor Bolt

**REINFORCING STEEL BENDING DIAGRAM**

- Dimensions are cut to cut.
- SEE DETAILS ABOVE MATCHLINE FOR SQUARE CONCRETE FOUNDATION

**MATCHLINE**
- Electrical Conduit—See Contract for Dia.
- Anchor Bolt Assembly—Anchor Bolt Plate—Two Req'd. Per Assembly
- Anchor Bolts—3/4" (In) Diameter Steel Heavy Hex Nuts—Four Req'd. Per Anchor Bolt
- Flat Washers—Four Req'd. Per Anchor Bolt

**ROUND CONCRETE FOUNDATION DETAIL**
- Fixed Base
- See Detail C.
- Electrical Conduit—See Contract for Diameter
- Anchor Bolt Assembly—Anchor Bolt Plate—Two Req'd. Per Assembly
- Anchor Bolts—3/4" (In) Diameter Steel Heavy Hex Nuts—Four Req'd. Per Anchor Bolt
- Flat Washers—Four Req'd. Per Anchor Bolt

**ELEVATION**
- Square Concrete Foundation Detail

**FOOTNOTES**
- See Details Above Matchline for Square Concrete Foundation
- Electrical Conduit—See Contract for Diameter
- Anchor Bolt Assembly—Anchor Bolt Plate—Two Req'd. Per Assembly
- Anchor Bolts—3/4" (In) Diameter Steel Heavy Hex Nuts—Four Req'd. Per Anchor Bolt
- Flat Washers—Four Req'd. Per Anchor Bolt

**DETAIL C**
- See Detail C.
- Electrical Conduit—See Contract for Diameter
- Anchor Bolt Assembly—Anchor Bolt Plate—Two Req'd. Per Assembly
- Anchor Bolts—3/4" (In) Diameter Steel Heavy Hex Nuts—Four Req'd. Per Anchor Bolt
- Flat Washers—Four Req'd. Per Anchor Bolt

2. Steel shaft shall be tapered either round or dodecagon (12 sided), 11 gauge, 4 1/2" O.D. at slipfitter. Taper shall be 0.14 inches per foot.

3. All poles shall be hot dip galvanized per AASHTO M111.

4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.


6. Pedestrian signal displays mounted on the side of an octagonal (8 sided) traffic signal pole with a pole attachment angle other than 0°, 45°, 90°, 135°, 160°, 225°, 270°, or 315° shall utilize:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.

7. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.

2. All poles shall be hot dip galvanized per AASHTO M111.

3. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.

4. Visor shall be 8" Polycarbonate, fully enclosed circle at bottom to reduce glare on sign. Display shall be of appropriate color needed.


6. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
NOTES

1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. Heat shrink cap all spare conductors not terminated on a terminal strip.
5. When a Pedestrian Push Button is specified in contract plans, see Standard Plan J-20.20 for details.
6. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.

TERMINAL BLOCK

<table>
<thead>
<tr>
<th>TERMINAL NUMBER</th>
<th>MARK</th>
<th>DEFINITION</th>
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<td>R</td>
<td>RED DISPLAY</td>
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<td>6-2</td>
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<tr>
<td>6-6</td>
<td>W</td>
<td>NEUTRAL CONDUCTOR</td>
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* ASSOCIATED PHASE NUMBER
NOTES

2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11-gage, 4 1/2" (in) O.D. at slipfitter. Taper shall be 0.14" (in) per foot.
3. All poles shall be hot-dip galvanized per AASHTO M111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Junction Box serving the Standard shall be located no more than 10' - 0" (5' - 0" preferred) from the Standard.
7. A backplate shall be installed on the Upper Traffic Signal Head. Install a backplate on the Lower Traffic Signal Head only when required by the contract. Do not install retro-reflective tape on backplates.
10. For Signal Head Mounting Details, see Standard Plan J-76.10.
11. Standard shall use slip base if installed closer than 4' (ft) from the face of guardrail.
12. Treat surrounding pole with galvanizing repair paint meeting the requirements of Standard Specification 9-08.12). Apply two coats. Paint shall be dry before applying second coat.
13. Hand hole shall face toward roadway for Elbow Mount Barrier installations. For all other installations, hand hole shall face the opposite direction from the Upper Traffic Signal Head. Hand hole face shall remain accessible after pole and sign installation is complete.

RAMP METER SIGNAL STANDARD

SLIP BASE SHOWN

LONG catty

BACKPLATES NOT SHOWN FOR CLARITY.
TOP OF POLE

SIGN R10-601 – SEE SIGN PLACEMENT DETAIL

BOTTOM OF LOWER TRAFFIC SIGNAL HEAD

HAND HOLE (BEYOND) (SEE NOTE 13)

TOP OF BASE PLATE

CONCRETE FOUNDATION (SEE NOTE 1)

TOP OF ROADWAY

CUT SECTION BEHIND BARRIER (GROUND-MOUNTED)

TOP OF POLE

BOTTOM OF LOWER TRAFFIC SIGNAL HEAD

HAND HOLE (BEYOND) (SEE NOTE 13)

TOP OF BASE PLATE

MAINTENANCE PAD – SEE STANDARD PLAN J-28.24 FOR DETAILS

CONCRETE FOUNDATION (SEE NOTE 1)

TOP OF ROADWAY

EMBANKMENT SECTION BEHIND BEAM GUARDRAIL (GROUND-MOUNTED)

 Emblem of State of Washington, Todd

STANDARD PLAN J-22.15-02

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Theodore Joseph, PE

Tod Flesher

RECEPTIONS FOR PUBLICATION

Jul 8 2013 3:07 PM
NOTES
3. Top of Leveling Nut height shall be 1" (in) max. above foundation.
4. Heat-shrink cap for all spare conductors not terminated on a terminal strip.
5. Provide Cable Tie at wiring entering the Junction Box (Slip Base installations only).
NOTES

1. All material and workmanship shall be in accordance with the requirements of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.

2. The analysis and design for Adaptors 1 and 2 have been done in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals - Fifth Edition - Dated 2009, and Interims, using basic wind speed of 90 MPH and 50 years of design life.

3. Adaptors' parameters are based on field data and existing signal standard anchor bolts and bolt circles. Adaptor 1 shall be used for 15' (ft) thru 45' (ft) mast arm signal standards and Adaptor 2 for 46' (ft) thru 65' (ft).

4. Adaptors shall only be used for temporary installation of knocked down signal standards.

5. Materials specifications:

   All structural steel, except as otherwise noted
   Pipes
   Connecting/clamping bolts
   Nuts
   Washers

   ASTM A572 GR. 50 OR
   ASTM A586
   ASTM A36 GR. B OR A500 GR. B
   ASTM F3125 GRADE A325
   ASTM A663 GRADE DH
   AASHTO M 293 (ASTM F436)

6. All bolts, rods, and related hardware shall be galvanized after fabrication per ASTM F2329.

7. Steel surfaces shall be galvanized after fabrication in accordance with AASHTO M 111.

8. Install and secure adaptor to existing support anchor bolts. Then install signal standard on adaptor top plate. Rake to be plumb after all load has been placed.

9. All holes in top and bottom plates of Adaptor 1 and Adaptor 2 are thru holes. See engraved or stamped text for bolt hole diameter.

DETAIL A

EDGE OF PLATE

SECTION 1

TOP VIEW

ADAPTOR 1 TOP PLATE

ADAPTOR 1 TOP SHOWN

(ADAPTOR 1 BOTTOM, ADAPTOR 2 TOP, AND ADAPTOR 2 BOTTOM SIMILAR)

ALL FONTS MARKED "A" SHALL BE ENGRAVED OR STAMPED

TEMPORARY SIGNAL STANDARD ADAPTOR

STANDARD PLAN J-26.20-01

SHEET 1 OF 5 SHEETS

APPROVED FOR PUBLICATION

Jan 24 2016 10:32 AM

Washington State Department of Transportation
ELEVATION VIEW
ADAPTOR LIFTING TOOL
REMOVE ALL BURRS AND SHARP EDGES

ADAPTOR 2 TOP PLATE SHOWN
(ADAPTOR 1 TOP PLATE SIMILAR)

2 - 2" (IN) DIA. BOLTS WITH
WASHERS FOR 2" (IN) B.C.
2 - 1-1/2" (IN) DIA. BOLTS WITH
WASHERS FOR 1" (IN) B.C.

ASSEMBLED VIEW
ADAPTOR LIFTING TOOL
WITH ADAPTOR 2 SHOWN
(ADAPTOR 1 SIMILAR)

SECTION 1
### ALTERNATE #1 DRILLED SHAFT-TYPE CONSTRUCTION - DEPTH "D"

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<td>ALLOWABLE LATERAL BEARING PRESSURE</td>
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<td>FOUNDATION TYPE</td>
<td>POLE CLASS - RESULTANT HORIZONTAL TENSION (LBS)</td>
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<tr>
<td>1000 PSF</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
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<td>11'-0&quot;</td>
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<td>3'-0&quot; SQUARE</td>
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</tr>
<tr>
<td>4'-0&quot; ROUND</td>
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<tr>
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### ALTERNATE #2 CORRUGATED METAL PIPE TYPE CONSTRUCTION - DEPTH "D"

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</tr>
<tr>
<td>4'-0&quot; SQUARE</td>
<td>10'-0&quot;</td>
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When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" or 48" (in) diameter corrugated metal pipe form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed 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.

Shoring or Extra Excavation as required. Excavated area shall be backfilled with Controlled-Density Fill (CDF), or with soil in accordance with Standard Specification Section 8-20.3(2) and Compaction Method 1 of Standard Specification Section 2-09.3(1E).

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**NOTES**

1. This structure has been designed according to the Fifth Edition 2009 AASHO Standard Specifications for Structural Supports for Highway Sign, Luminaires, and Traffic Signals. Basic wind velocity 90 mph. Design Life/Recurrence Interval 50 years, and Fatigue Category III.

2. Foundations are designed for Type IV and V Strain Pole Standards with a maximum mast arm length of 16' - 0".

3. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office for the Engineer for Special Foundation Design.

4. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.

5. The top 2 feet of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.


1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals: Basic wind velocity 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.

2. 2 1/2" diameter weatherhead may be substituted for the elbow and nipple assembly.

3. Pole shaft shall have 0.14"/ft taper.


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.

1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50' (H1).

3. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.


STEEL LIGHT STANDARD

STANDARD PLAN J-28.10-02

Sheet 1 of 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
NOTES
1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer.

TAPER NOTE
End Taper (on approach from opposing traffic):
20' (longitudinal) = use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.

BONSAI LIGHT STANDARD PLACEMENT (SLIP BASE)
STANDARD PLAN J-28.22-00
SHEET 1 OF 2 SHEETS
EXPRES AUGUST 5, 2001

Washington State Department of Transportation
NOTES
CONSTRUCTION METHODS

METHOD 1
NO SUBSURFACE FORM

This option is used only when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

METHOD 2
METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal (pipe) form. The corrugated metal form shall not extend more than 5" (in) +/- 1" (in) below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT - SEE TABLE - STD. PLAN J-28.30
ROUND WASHER (TYP.) - SIZE TO MATCH ANCHOR BOLT
LUMINAIRE POLE
POLE BASE PLATE
KEEPER PLATE
ANCHOR/SLIP PLATE ASSEMBLY - SEE STD. PLAN J-28.40

EXPLODED VIEW

PLATE WASHER DETAIL

PLATE WASHER (TYP.) - SEE TABLE - STD. PLAN J-28.30
3/8" (IN) I.D. DRAIN TUBE IN GROUT PAD

PLAN VIEW

SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30

SECTION A
(CONDUCT NOT SHOWN)

ASSEMBLED ISOMETRIC VIEW
SLIP BASE

ASSEMBLED ISOMETRIC VIEW
FIXED BASE

LUMINAIRE POLE
POLE BASE PLATE
SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30
3" (IN) DIAM. x 3/4" (IN) GROUT WELL (TYP.)

EXPLODED VIEW

3/8" (IN) I.D. DRAIN TUBE IN GROUT PAD

APPLIED EVEN WITH THE BOTTOM OF THE POLE BASE PLATE AFTER PLUMBING THE LUMINAIRE POLE

BOLT CAN PROTRUDE 5/8" (IN) MAX. WITH A MIN. OF TWO THREADS EXPOSED ABOVE NUT

ASSEMBLED AND GROUTED

ELEVATION VIEW

F I XED BASE

NOTES
1. 50' (ft) (H1) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.
2. Galvanizing shall be in accordance with AASHTO M 111.
3. See Standard Plans C-8b, C-85.15, and J-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.
4. See Standard Specification Sections 6-03.3(33) and 8-20.3 (4) for the torque requirements for all of the anchor bolt installations. Install 1" (in) diameter clamping bolts in all slip bases to a torque of 95 Foot-Pounds - See Standard Specification Section 8-20.3 (13A). DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.
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 A568. All Slip Plate notched surfaces shall be finished smooth.

3. The clamping bolts shall be high-strength steel, manufactured from AASHTO M 164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M 232.


5. Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

6. Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or reusing a luminaire pole.

For 1" (in) clamping bolts, tighten to 95 ft-lbs.

For 1 1/4" (in) clamping bolts, tighten to 104 ft-lbs.

DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.
1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111. All bolts, nuts, and related hardware shall be galvanized after fabrication per ASTM F2329.


3. The presence of pedestrian railing shall be verified prior to light standard fabrication. When pedestrian railing is present or to be installed, locate hand hole as detailed in the Bridge Pedestrian Barrier details.


**Steel Light Standard Elbow Detail**

For Luminare Poles with Single Mast Arm 12" - 0" or less and Double Mast Arms 8" - 2" or less, mounted on Bridge or Retaining Walls.

**Notes:**
- The face shall be plane after fabrication, to provide a seal between the barrier and the elbow.
- See Contract Plan for slope of parapet face.
NOTES

1. Pole Base Plate for a Slip Base design shall be 1 1/4" (in) steel manufactured from ASTM A572 GR.50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" (in) steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" (in) manufactured from ASTM A36. All Pole Base Plate notched surfaces shall be finished smooth.


3. Galvanizing shall be in accordance with AASHTO M 111.

4. See Standard Plans C-8b, C-85.14, and J-28.60 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barrier.


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**ELEVATION VIEW**

CONFIGURATION AND LOCATION OF THE HAND HOLE VARIES AMONG MANUFACTURERS - MINIMUM SIZE OPENING SHOWN

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**SECTION D**

1/4" BACK-UP RING

---

**VIEW C**

6" DIAM. HOLE

---

**VIEW B**

FOR DETAILS NOT SHOWN, SEE VIEW A ABOVE

ORIENTATION FOR INSTALLATION ON BRIDGE OR RETAINING WALL - SEE STANDARD PLAN J-28.45

---

**VIEW A**

TYPICAL HAND HOLE ORIENTATION

---

**DIAGRAM**

CONDUCTOR ATTACHMENT BRACKET - 1/4" (in) THICK STEEL + 2" (in) WIDE + 4" (in) LONG

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

T = RIM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR

---

**TOP VIEW**

POLE BASE PLATE DETAIL

---

**ISOMETRIC VIEW**

STEEL LIGHT STANDARD POLE BASE AND HAND HOLE DETAILS

STANDARD PLAN J-28.50-03

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**NOTE**

(cover not shown for clarity)

---

**DATE**

PASSENGER, JEFF

STATE: WASHINGTON

DEPARTMENT OF TRANSPORTATION

**DESIGNER**

ZELDEK\#1

STATE: WASHINGTON

DEPARTMENT OF TRANSPORTATION

**APPROVED FOR PUBLICATION**

**ARTWORK**

ZELDEK\#1

STATE: WASHINGTON

DEPARTMENT OF TRANSPORTATION
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.

NOTES

REMovable Raintight Hand Hole Cover with Gasket — Fasten with Two Stainless Steel (ASTM F 593) Screws

VIEW A

SECTION B

CONDUCTOR ATTACHMENT DETAIL
CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS

T = Rim Plate Thickness by Luminaire Pole Fabricator

D = Size of Fillet Weld by Luminaire Pole Fabricator

STEEL LIGHT STANDARD BARRIER MOUNTED BASE

STANDARD PLAN J-28.60-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

STEVE D. CARRASCO

C83-2914  1-19

Washington State Department of Transportation

STEEL LIGHT STANDARD BARRIER MOUNTED BASE
STANDARD PLAN J-28.60-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

STEVE D. CARRASCO

C83-2914  1-19

Washington State Department of Transportation
1. Each wire shall be physically separated by at least 1/4" (6mm) so that sealant material can fill in between the wires; where heat shrink tubing is used for the outer splice enclosure, it shall meet one of the following requirements:

   a. Have separate ports for each conductor ("VYE" or "X" shaped tubing).  ~ or ~

   b. Have rubber electrical mastic tape wrapped around each conductor to ensure a weatherproof seal. See "Rubber Electrical Mastic Tape Installation Detail, Standard Plan J-60.05.

2. Heat shrink tubing shall extend a minimum of one inch onto the original wire insulation of each wire in the splice. Rigid splice enclosures shall be centered over the crimped connection.

3. Electrical tape used in splicing applications shall be 3/4" (20mm) wide, be UL listed under UL 510, and be CSA Certified under C22.2 NO. 197-M1983.

4. Crimp splices shall be installed with an approved crimping tool for the type and size of crimp splice used. Fliers and similar multi-purpose tools may not be used.

---

**NOTES**

**CONNECTOR AND INTERNAL SEALING DETAILS**

**STEP 1 - CRIMP CONNECTION**

**STEP 2 - WRAP CONNECTION**

**TAPE OVERLAP DIAGRAM**

*When using wrapped vinyl electrical tape:
* Install two layers of spiral wrapped tape.
* Each spiral layer shall have an overlap of 1/2 of the tape width (see diagram above).
NOTES

1. These Foundations are designed for a minimum of 1,500 PSF allowable lateral bearing pressure for the soil. A Special Foundation shall be required for soil with allowable lateral bearing pressure lower than 1,500 PSF.
2. These Foundations are designed for installation on level ground, or on sloping ground, not to exceed 2H : 1V slopes. Slopes steeper than 2H : 1V require a special design.
3. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.
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.

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 (CDF), or with soil in accordance with Standard Specification Section 6-20.3(2) and Compaction Method 1 of Standard Specification Section 2-08.3(1)(E).
- GROUNDING CONDUCTOR #4 AWG STRANDED COPPER WITH 3' (85) MIN. SLACK. ROUTE CONDUCTOR TO CCTV TRAFFIC SIGNAL STANDARD (CAMERA POLE) GROUNDING STUD.
- CLAMP CONDUCTOR TO STEEL REINFORCING WITH LISTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE.
- SEE NOTE 3.

FOUNDATION REINFORCEMENT DETAIL
(Concrete cast directly against undisturbed earth)

ALTERNATE #1

FOUNDATION REINFORCEMENT AND BACKFILL DETAIL
(Concrete cast inside corrugated metal pipe stay-in-place form) (see NOTE 5)

ALTERNATE #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-29.15.

2. Round and smooth all edges along wire-way to protect conductors.

3. The manufacturer shall verify that the Elbow Top Plate matches the Camera Pole Base, and shall submit the shop drawings for approval.

4. Galvanize after fabrication according to AASHTO M111.

5. Install galvanized steel protective band (3/16" thick x 4" high (ASTM A36) on all four sides, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.
Zeldenrust, Richard
2015.06.11 15:07:03 -07'00'

NOTES
1. All material and workmanship shall be in accordance with the Standard Specifications.
2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
3. Concrete for 12" (in) thick maintenance pad shall be class 4000. Concrete for 4" (in) thick maintenance pad shall be class 3000.
4. Height of wall varies to match slope of finished grade. Contractor shall field-determine wall height at each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.
5. All exposed corners shall have 3/4" (in) chamfers.
6. For grounding details not shown, see Standard Plan J-60.06
7. Where concrete cover (clear) thickness is not shown, the clear distance from the face of the concrete to the face of any reinforcing steel shall be as follows: 3" (in) for bottom of maintenance pad, 2" (in) for top of maintenance pad, and 1 1/2" (in) at all other locations.
8. Falsework shall be carefully released to prevent impact or undue stress on the structure.
9. See Contract Plans for number, type, and location of conduits and conduits.
10. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Engineer's approval of maintenance pad slope and orientation required prior to proceeding with construction.
11. Use 4" (in) Maintenance Pad on level ground or slopes not exceeding 10H : 1V. Use 12" (in) Maintenance Pad on slopes steeper than 10H : 1V. Slopes steeper than 2H : 1V shall require a special design.

KEY NOTE
1. LIMITS OF PIGMENTED SEALER, TYPICAL FOR ALL RETAINING WALLS.

REINFORCING STEEL BENDING DIAGRAM
SEE STD. SPEC. I-07.12 FOR BENDING DIAM. ALL DIMENSIONS ARE OUT TO OUT VARIES

NOTE
1. WHEN THE MAINTENANCE PAD ABUTS ASPHALT OR CONCRETE THE CONTRACTOR SHALL MODIFY THE FINISHED GRADE 1" (in) MINIMUM TO 2" (in) MAXIMUM

SECTION A
SEE CONTRACT PLANS FOR DRILLED SHAFT

LEGEND
★ FRACTURED FIN FINISH
β EXTEND BAR 8" (IN) INTO FOOTING
Ω ADJACENT TO SOIL

high mast luminaire maintenance pad
standard plan J-30.10-00
sheet 1 of 2 sheets
approved for publication
jan 18 2015 7:54 am
state design engineer
washington state department of transportation
SECTION B

4" (IN) THICK MAINTENANCE PAD IS SHOWN IN THIS VIEW – 12" (IN) THICK MAINTENANCE PAD DETAIL IS SIMILAR
(REINFORCING, ANCHOR BOLTS, AND GUIDEPPOSTS NOT SHOWN IN THIS VIEW FOR CLARITY)

SECTION D

3/8" - 16 NC STAINLESS STEEL CAP SCREW

BOLTS, NUTS, AND WASHERS = ASTM F593 OR A193 TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)
3/8" (1/2) x 2" (1/2) x 2" (1/2) Frame Bonding Stud Plate with 1/4 NC x 1" Stainless Steel Bonding Stud.
- Weld Bonding Stud to Frame Bonding Plate.
- Weld to lid support frame.
- 1/4" (1/2) 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" (1/2) charmer or rounding.
- Protect conductors with fireproof cloth prior to welding.
- Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

2. Weld all around lid bonding stud ~ 1/4 NC x 1" stainless steel ~ liberally coat entire assembly w/ anti-seize compound.

KEY

1. BONDING JUMPER
2. EQUIPMENT GROUNDING CONDUCTOR
3. BONDING JUMPER ATTACHED TO BOX WALL COUPLING NUT
4. BONDING JUMPER ATTACHED TO BOX LID(S) GROUND STUD. # 8 AWG (MIN) + 4" (FT) TINNED BRAIDED COPPER.

PLAN

LID BONDING DETAIL

FRAME BONDING DETAIL

ELEVATION

STANDARD PLAN J-40.05-00

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Washington State Department of Transportation
1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. Minimum lid thickness shown. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lip cover plate, and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" (3 mm) thickness formed with a mild steel weld bead and shall be placed prior to hot-dip galvanizing.

3. Lid support members shall be 3/16" (5 mm) minimum thick steel C, L, or T shape, welded to the frame.

4. A 1/4-20 NC x 3/4" (19 mm) stainless steel ground stud shall be welded to the bottom of the lid, include (2) stainless steel nuts and (2) stainless steel flat washers.

5. Bolts and nuts shall be lubricated coated with anti-seize compound.

6. Equipment Bonding Jumper shall be #8 AWG min. x 4' (1.2 m) of bunched braided copper.


8. When required in the Contract, provide a 10" (250 mm) x 27 1/2" (700 mm), 10 gauge divider plate, complete, with fasteners, in each Type 2 Junction Box where specified.

9. When required in Contract, provide a 12" (300 mm) deep extension for each Type 2 Junction Box where specified.

10. See the Standard Specifications for alternative reinforcement and class of concrete.

11. Headed Anchor Shear Studs must be welded to the Steel Cover Lip Plate and wired in two places to the vertical Welded Wire Fabric when in contact with each other. Wire be all other Headed Anchor Shear Studs to the horizontal Welded Wire Fabric.

12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement, actual configurations of assembly will vary among manufacturers. See approved manufacturers' shop drawings for specifics.

13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the sidewalks, walkways, shared use paths, traveled ways or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.

14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" (150 mm) max. for final grade of new construction only. See Standard Specification 8-20.3(6). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 2" (50 mm) min. to 10" (250 mm) max. See Standard Specification 8-20.0.3(6).
NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. All lid thicknesses are minimum.

3. Lid perimeter shall bear on frame. Mill to bearing seat and lid perimeter for full even contact after fabrication of frame and lid. Lid and frame units with uneven bearing will be rejected.

4. The installed lid and frame shall fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation on the contact surfaces.

5. A 1/4-20 NC x 1" (in) S. S. ground stud shall be welded to the bottom of each lid: include (2) each S. S. nuts and (3) each S. S. flat washers.

6. The hinges shall allow the lids to open 180°. When lid assembly is Ductile Iron (Alternative) and equipped with Safety Bars, lids shall open 110°.

7. Bolts and nuts shall be liberally coated with anti-seize compound.

8. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-18 NC x 1" (in) S. S. bolt, (2) each S. S. nuts, and (3) each S. S. flat washers. Equipment bonding jumper shall be #8 AWG min. x 4" (ft) 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" (in) min. to 8" (in) max., for final grade of new construction only. See Standard Specification 9-20.3(6). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" min. to 10" (in) max. See Standard Specification 9-20.3(6).

13. Junction Box Types 4, 5, or 6 may be equipped with Ductile Iron ( Alternative) Lid(s) and a Cast Iron (Alternative) Frame. Junction box shall meet the requirements of Standard Specification 9-29.2 and shall be in accordance with approved shop drawings.
1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. Minimum lid thicknesses are shown. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lip cover plate and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" (8) line thickness formed with a mild steel weld bead and shall be placed prior to hot-dip galvanizing.

3. Lid support members shall be 3/16" (6) min. thick steel C, L, or T shape, welded to the frame. Exact configurations vary among manufacturers.

4. A 1 1/4"-20 NC x 3/4" (8) 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 x 3/4" (8) S. S. bolt, (2) each S. S. nuts, and (2) each S. S. flat washers. Equipment Bonding Jumper shall be #8 AWG min. x 1/4" (6) of stranded copper.


9. See the Standard Specifications for alternative reinforcement and class of concrete.


11. Capacity ~ conduit diameter = 24" (8)

12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement; actual configurations of assembly will vary among manufacturers. See approved manufacturers' shop drawing for specifics.

13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults and Pull Boxes shall not be placed within the sidewalk, walkway, shared use path, traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.

14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 8" (200) min. to 11" (280) max. for final grade of new construction only. See Standard Specification 8-20.3(6). Where adjustments are to be made to Existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" (150) min. to 10" (250) max. See Standard Specification 8-20.3(6).
1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction. Finish shall be #4 for backbox and #4 for the cover. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System Identification numbers shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification S-28.2(4) for details.

3. Conduit Capacity = 8" (4" per end).
1. UNIVERSAL LID

- 0.25\" (IN) Diam. Thru Hole
- 0.531\" (IN) Diam. x 0.02\" (Typ.)

2. GASKET

- 0.25\" (IN) Thck Neoprene Gasket

- 0.25\" (IN) Diam. Hole (Typ.)

SYSTEM IDENTIFICATION (SEE NOTE 2)

UNIVERSAL BARRIER LID
0.168\" (IN) TYPE 304 STAINLESS STEEL (0.010\")

R = 0.50\" (Typ.)

0.50\" (IN) Diam. HOLE

MOUNTING TAB DETAILS

PLAN VIEW

ISOMETRIC VIEW

ELEVATION VIEW

NEMA 4X
NON-ADJUSTABLE
FLUSH-MOUNT
JUNCTION BOX
STANDARD PLAN J-40.36-02

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY BILL BROWER
NOTES

1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with steel welded seam construction. Finish shall be # 2B for barrier box and # 4 for the cover. Support anchor shall be constructed of 12-gage, Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 9-29.2(4) for details.

3. Conduit capacity = 8" (4" per end).

4. Box shall include # 8 AWG (min.) x 1 foot tinned, braided copper Bonding Juniper for bonding Box and Telescoping Top.

NEMA 3R ADJUSTABLE
FLUSH-MOUNT
JUNCTION BOX
STANDARD PLAN J-40.37-02

Sheet 2 of 3 Sheets

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July 18, 2013 6:54 AM

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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).
2. Mount the stainless steel support using an approved resin-bonded anchor system installed per manufacturer's recommendation. Anchor bolt embedment shall be 4 1/2" minimum. Resin-bonded anchors shall be stainless steel and shall be 3/8" diameter. Expansion Anchors are not allowed.
3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in the concrete.
5. The System identification letters on the box lid shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specifications 8-29.2(4).
6. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimensions.
7. Equipment Bonding Jumper shall be #8 AWG (min.) = 1 foot of tinned, braided copper.
8. Fittings shall be UL listed and CSA-certified water tight on the outside of the Junction Box conduit connection. An insulated ground end bushing shall be used to terminate Rigid Metal Conduit.
9. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and #4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.
1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6-03.20(2).

2. Mount the stainless steel support using an approved resin-bonded anchor system, installed per manufacturer’s recommendation. Resin-bonded anchors shall be stainless steel and shall be of 3/8” diameter (Expansion Anchors are not allowed). Anchor bolt embedment shall be 4 1/2” min.

3. There shall be a minimum of 3" edge distance to the centerline of anchor holes. See Standard Plan J-60.13 for Stainless Steel Channel details.

4. The System Identification letters on the box lid shall be 1/8” line thickness formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specifications 2-3.2(4).

5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimensions.

6. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit connection. An insulated grounded end bushing shall be used to terminate Rigid Metal Conduit.

7. Equipment Bonding Jumper shall be # 6 AWG (min.) × 1 foot of tinned, braided copper.

8. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.
1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel. Cover shall be constructed of ASTM A 36 steel with slip-resistant surfacing.

2. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box connection. Use an insulated, grounding and bushing on the inside for Rigid Metal Conduit.

3. Equipment Bonding Jumper shall be # 6 AWG (min.) x 3 feet minimum of stranded, braided copper.

4. The System Identification letters shall be 1/8" (Min) thickness formed by a mild steel weld bead. See Standard Specification, Section 9-29.2(4).

5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimension.


7. Field drill 1/2" (in) diameter hole for Drain Tube from the inside to the outside of Junction Box. One place, on the lowest side only. Seal with bead of silicone. See Standard Specification, Section 9-29.2(3). For drain tube routing, see Standard Plan J-50.16.

8. Conduit capacity is 12" (in) - 4" (in) per side.

9. Conduits shall enter through the sides as shown. Conduits shall not enter through the bottom of Junction Box.

10. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.

NEMA 4X JUNCTION BOX IN SIDEWALK LOCATED ON STRUCTURE

STANDARD PLAN J-40.40-02
1. Each wire shall be physically separated by at least 1/4" (in) so that sealing material can fill in between the wires; where heat shrink tubing is used for the outer splice enclosure, it shall meet one of the following requirements:

   a. Have separate ports for each conductor ("Y" or "X" shaped tubing). ~ or ~
   b. Have rubber electrical mastic tape wrapped around each conductor to ensure a weatherproof seal. See Rubber Electrical Mastic Tape Installation Detail.

2. Heat shrink tubing shall extend a minimum of one inch onto the original wire insulation of each wire in the splice. Rigid splice enclosures shall be centered over the crimped connection(s).

3. Electrical tape used in splicing applications shall be 3/4" (in) wide, be UL listed under UL 510, and be CSA certified under C22.2 No. 197-M1983.

4. No more than two splices may be installed in the same splice enclosure.

5. Crimp splices shall be installed with an approved crimping tool for the type and size of crimp splice used. Pliers and similar multi-purpose tools may not be used.
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 additional Induction Loop details, see Standard Plan J-50.15.

5. For writing details, see Standard Plan J-50.18.
1. For an odd number of lanes, the higher number of loops shall be cut to the right side of the roadway (example: 1 left and 2 right), unless the left-most lane is an HOV lane, in which case the higher number of loops shall be cut to the left side of the roadway.

2. Square loops may be used in place of round loops - see Standard Plan J-50.11 for square saw cut details.

3. For Installation Notes and Details, see Standard Plan J-50.15.

4. For Sections A, B, C or D, see Standard Plan J-50.15.
**LOOP INSTALLATION NOTES**

1. Install the Junction Box and the stub-out conduit with Sch. 80 PVC stub-out 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" (in) 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" (in).

4. Sawcut the loop slots and the lead-in slots. File edges to remove burr of all saw-cuts into stub out sleeve.

5. Lay out the loop wire starting at the Junction Box, allowing 9' (ft) 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. See Standard Plan J-50.05 for Loop Splice details.

11. All loop circuits shall be tested per Standard Specification Section B-20.3(14D) once installation is complete.

12. Existing stub-out 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" (in) from edge of pavement and within six inches outside of lane or fog line when possible. Maintain 12" (in) separation between parallel cuts or joints.

14. The loop stub-out sleeve shall have an inside diameter 1" (in) larger than the outside diameter of the End Bell Bushing. Sleeve shall be notched 5/8" (in) to 3/4" (in) to accommodate loop wires. Plug conduit and fill sleeve with sand until loops are installed to keep out Hot Asphalt during paving operations.

**INDUCTION LOOP DETAILS**

**STANDARD PLAN J-50.15-01**

Sheet 2 of 3 Sheets

Approved for Publication

Washington State Department of Transportation

Bailey, Ted
Jul 18 2017 9:37 AM
1. Installation of signal detection loops in the bridge deck shall be cast-in-place and installation by saw cutting an existing bridge deck shall not be allowed. This plan is intended for new construction only (not allowed for existing structures).

2. For Supplemental Splice in adjacent junction box, see Splice Detail, per Standard Plan J-50.15.

3. Preformed loops shall conform to the layouts, numbering details, marking requirements, and wiring diagrams of Standard Plan J-50.12 for the number and types of loops shown in the Contract Plans.

4. Loops shall be tested immediately prior to pouring concrete, per Standard Specification 8-20.3(14)D.

5. Layout Preformed loops and loop lead-ins to maintain 1’ (ft.) clearance from joints.

6. Construct a supplemental splice containing any series loop connections in adjacent Junction Box as required in the Plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice, as shown in Standard Plan J-50.12.

7. Barrier Junction Box - 8” x 8” x 18” NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slip-form barrier. (Junction Box can be recessed up to 1/8”). See Standard Plan J-40.36 or J-40.37.

8. For installation of Junction Box in the sidewalk, see Standard Plan J-40.40.
**TYPE R1 AND R1W LOOP WIRING DIAGRAM**

**TYPE R2 AND R1WA LOOP WIRING DIAGRAM**

**TYPE R1S SPEED LOOP WIRING DIAGRAM**

---

**TYPE R1 AND R1W LOOP TURNS TABLE**

<table>
<thead>
<tr>
<th>Wire Length (Cabinet to Loop (FT))</th>
<th>Number of Turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 400</td>
<td>4</td>
</tr>
<tr>
<td>401 - 600</td>
<td>5</td>
</tr>
<tr>
<td>801+</td>
<td>8</td>
</tr>
</tbody>
</table>

---

**NOTES**

1. The number of loop turns for Type R1 and Type R1W loops vary depending on the wire length from the cabinet to the center of the loop. See table for number of turns.

2. All lead In wires shall return to the junction box.

3. Cable identification sleeves shall be verified before splices are installed.

4. Detector Loop Wire shall meet the requirements of Standard Specification Section 9-29.3(2F) unless otherwise required by the Contract.

5. Where the Type R3S Alternate Splicing Detail is used, the Loop Number Marking Sleeves for the Demand Loops shall use the same Loop ID Numbers, but include the suffix “A” or “B”, as applicable.

---

**METERING AND DATA INDUCTION LOOP WIRING DETAILS**

**STANDARD PLAN J-50.19-00**

Sheet 1 of 1
**INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION**

Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P2, Loop L4

**PLAN VIEW**

**TYPICAL 2 LANE PTR LAYOUT**

**NOTES**

1. See Standard Plan J-50.30 for Piezo axle sensor General Installation instructions, and Modified Type 2 Loop wiring details.

2. The contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo ohms readings shall be OΩ from shield to center conductor. See piezo specifications for piezo capacitance readings.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @16 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete lanes, install the loops 4° and 6° away from the expansion joints.

6. The shoulder notch length along the roadway shall be the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in the contract.

8. Use Schedule 40 PVC conduit from the Junction box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit in each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation see Standard Specification 8-20.3(5).

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 9.23.3(1)B for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets, according to the Color Code Identification Chart. For Wire Color Code Detail see Standard Plan J-50.30.

12. Cabinet can be placed on either side of road depending on terrain/slope, etc. It does not have to be placed on increasing milepost side of the roadway.

13. For 6 - lane layouts and above, see Contract.
**PERMANENT TRAFFIC RECORDER INSTALLATIONS**

**STANDARD PLAN J-50.20-00**

**PLAN VIEW**

**TYPICAL 4 LANE PTR LAYOUT WITH MEDIAN**
1. See Standard Plan J-50.30 for Piezo Axle Sensor General Installation instructions, and Modified Type 2 Loop Wiring Details.

2. The Contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo ohms readings shall be OIL from shield to center conductor. Class WIM piezo capacitance shall be 6nf to 20nf.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PPR loops shall be spaced @ 16 ft. leading edge to leading edge.

5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete pavement lanes, install the loops 4" to 6" away from the expansion joints.

6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the shoulder size plus 1/4".

7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in Contract.

8. Use Schedule 40 PVC conduit from the Junction Box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit for each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.

9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation, see Standard Specification B-20.3(5).

10. Junction Boxes installed in the paved shoulder or median shall be a Heavy Duty Junction Box. If box is installed in unpaved shoulder use type 1 or 2. See Standard Plan J-40.10 for size and type. See Standard Specification 9-29.2(1)B for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets. For Wire 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 pieces. Asphalt lanes with 1" shoulder or less may use 12" pieces. For shoulders over 1", use 13 pieces.
THESE ARE GENERAL INSTALLATION INSTRUCTIONS

SEE SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS
IN THE SPECIAL PROVISIONS OF THE CONTRACT

1. Using paint and a straight edge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 8 ft. of cable inside the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" blade width, cut the piezo slot approximately 4 to 6 inches longer than the piezo length. The piezo slot depth must be a minimum of 1" to a maximum of 1 1/2".

3. Lead-ins or home run cuts shall not exceed shoulder depth.

4. After piezo cut is dry, wire brush sides and bottom of entire piezo slot. Blow out loose debris.

5. Completely dry piezo slot. No moisture or oily residue shall be allowed in piezo slot.

6. Mix epoxy according to manufacturer's recommendations and pour into slot. Using a putty knife with a notched center, spread the epoxy smooth the length of the sensor.

7. Place two pieces of wiring into the piezo coax to piezo attachment point. Repeat until the slot is completely filled. Use a belt sander with a coarse grit paper to get an even surface finish. Make sure grout pours into slot slowly to avoid air pockets. Start at the piezo end and pour toward the coax to piezo attachment point.

8. 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.

9. 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".

10. Lead-ins or home run cuts shall not exceed shoulder depth.

11. Mix epoxy according to manufacturer's recommendations and pour into slot. Using a putty knife with a notched center, spread the epoxy smooth the length of the sensor.

12. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor.

13. Place two pieces of wiring into the piezo coax to piezo attachment point. Repeat until the slot is completely filled. Use a belt sander with a coarse grit paper to get an even surface finish.

14. 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.
INSTALLATION BRACKET (TYP.)

SENSOR END

FILL SENSOR SLOT WITH GROUT - SEE NOTE 7

PIEZO AXLE SENSOR CLASS 1 OR 2 - SEE NOTES

TOP OF ROADWAY

3/8" - SEE NOTE 7

SIDE VIEW

SENSOR LEAD ATTACHMENT END

PIEZO AXLE SENSOR CLASS 1 OR 2

HOME RUN SLOT

INSTALLATION BRACKET (TYP.)

PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS
STANDARD PLAN J-50.30-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. The Loop and Piezo leads in all Junction Boxes and Cabinets are to be color-coded. Use colored tape on each specific wire, see table. Wrap the tape on the wires approximately 6" beyond conduit in all Junction Boxes.

2. The maximum load in the cabinet is 5 Amps.

3. The cabinet may be pedestal or pad mount. See Standard Plan J-10.10 for details.


5. For Grounding Details, See Standard Plan J-60.05. See Standard Specification 8-20.3(9) for other requirements.


PERMANENT TRAFFIC RECORDER AND WEIGHT-IN-MOTION DETAILS
STANDARD PLAN J-50.30-00
SHEET 3 OF 3 SHEETS
APPROVED FOR PUBLICATION: 6/2/2001
Washington State Department of Transportation
NOTES
1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". Use NEMA 4X Junction Box with stationery-forms - See Standard Plan J-40.36. Use NEMA 3R Junction Box with slip-forms - See Standard Plan J-40.37.

RMC conduit may be used only in stationery-form barriers. Connect to RMC using a PVC adapter.

RMC conduit may be used in stationery-form barriers, but it shall be used in slip-form barriers.

2. See Standard Plan D-15.10 for additional information on F-Shape barrier, or see Standard Plan D-15.20

3. Pipe wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

KEY NOTES

1. Journal Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 1/8" recessed).


2. Type DX Deflection (DX) Fitting with Internal Bonding Jumper.

Wrap conduit from Conduit Deflection Fitting to 1' - 0" beyond (inside) b-barrier surface.

3. 1' - 0" long, 3/4" thick expanded closed-cell foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.

Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1' - 0" on each side of the joint.

10' - 0" long section of RMC conduit.

Deflection Fitting shall be in neutral state at installation.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

S-15-13

CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL

STANDARD PLAN J-60.11-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
KEY NOTES

 Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and flush recessed). Use NEMA 4X Junction Box with stationery-forms. See Standard Plan J-40.10. Use NEMA 3R Junction Box with slip-forms. See Standard Plan J-40.37.

 Where conduit in a structure is routed across a cold joint with continuous reinforcing steel, install premolded joint filler and wrap the conduit pipe for 1" - 0" on each side of the joint. Omit pipe-wrap tape on PVC conduit.

 Where conduit exits from a structure, wrap the conduit pipe for 1" - 0" on each side from the exiting point.

 10' - 0" long section of RMC conduit.

 Conduit Deflection Fitting shall be in neutral state after installation.

 Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1" - 0" on each side of the joint.

 NOTES

 1. Install a Conduit Deflection (DX) Fitting "A" at the exit from the barrier. Install a Conduit Deflection (DX) Fitting "B" to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-60.11 for Conduit Deflection Fitting details.

 2. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A." RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adapter in the barrier. PVC conduit may be used only in stationery-form barriers. Connect to RMC using a PVC adapter. RMC conduit may be used in stationery-form barriers, but it shall be used in slip-form barriers.

 3. See Standard Plan C-80.10 for additional details on Single-Slope Concrete Barrier.

 4. See Standard Plan J-60.11 for Conduit Deflection Fitting "B" detail - "Convert RMC to PVC in stationery-form barrier."

 5. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

 CONDUIT INSTALLATION IN SINGLE-SLOPE CONCRETE BARRIER (DUAL-FACED)

 STANDARD PLAN J-60.12-00

 SHEET 1 OF 1 SHEET

 APPROVED FOR PUBLICATION

 Joseph E. Million
 State Engineer
 Washington State Department of Transportation
PLUMB LINE - SEE NOTE 4

CONCRETE SLAB BRIDGE (AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL WHERE VERTICAL CLEARANCE IS CONstrained)

3/8" DIAM RESIN BONDED ANCHOR WITH 4 1/2" MIN EMBEDMENT - SEE NOTE 1

SECTION A

STAINLESS STEEL CHANNEL SUPPORT

3/8" MAX.

CONDUIT SUPPORT DETAIL

CLAMP SHALL FULLY SPAN THE ENTIRE WIDTH OF THE CHANNEL HARDWARE - SEE STRAP THICKNESS CHART (SEE NOTE 2)

ISOMETRIC VIEW

STAINLESS STEEL CHANNEL SUPPORT DETAIL (VERTICAL MOUNT SHOWN)

ISOMETRIC VIEW

STAINLESS STEEL CHANNEL SUPPORT

HOT DIP GALVANIZED STEEL OR STAINLESS STEEL SPACERS, 1/4" MIN. (TYP.) - INSTALL AND SIZE AS REQUIRED

CONDUIT DIMENSIONS

<table>
<thead>
<tr>
<th>NOMINAL TRADE SIZE (IN.)</th>
<th>1/2</th>
<th>3/4</th>
<th>1</th>
<th>1 1/4</th>
<th>1 1/2</th>
<th>2 2/3</th>
<th>3 7/8</th>
<th>3A 2/3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOMINAL PIP SIZE (IN.)</td>
<td>0.84</td>
<td>1.05</td>
<td>1.31</td>
<td>1.55</td>
<td>1.90</td>
<td>2.38</td>
<td>3.00</td>
<td>4.00</td>
<td>4.50</td>
<td>5.53</td>
<td>6.62</td>
</tr>
</tbody>
</table>

NOTE:

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. Size spacer to maintain plumb line. When barrier is not plum, size spacer to maintain back of barrier line.

NOTES

1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" (in) diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" (in) 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. See Standard Specification 8-29.16 for backplate requirements. Where required, prismatic sheeting shall be applied in accordance with the manufacturer's recommendations. The application surface of the backplate shall be cleaned, degreased, and isopropyl alcohol, and dried prior to application of the sheeting.
7. Drill a 1/4" (in) drain hole in the bottom of each signal display assembly, and one in the bottom of each pedestrian head. When signal display assembly is mounted horizontally, drill a 1/4" (in) drain hole at the lowest point of each section of the signal assembly.
1. Type M mounting shall have "O" ring groove and seal on top and bottom of signal attachment.
2. Type M mounting for conventional heads shall have a 2" (in) diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2" (in) diameter opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 14" (in) nominal arms.
5. See Standard Plan J-75.30 for tether wire and backplate requirements.
6. Apply bead of silicone around the perimeter of all top end cap openings prior to installation of the end cap assembly.
7. See Standard Specification 9-29.16 for backplate requirements. Where required, prismatic sheeting shall be applied in accordance with the manufacturer's recommendations. The application surface of the backplate shall be cleaned, degreased with isopropyl alcohol, and dried prior to application of the sheeting.
8. Drill a 1/4" (in) drain hole in the bottom of each signal assembly. When signal display assembly is mounted horizontally, drill a 1/4" (in) drain hole at the lowest point of each section of the signal assembly.

NOTE: BACKPLATES NOT SHOWN FOR CLARITY

SIGNAL HEAD MOUNTING DETAILS ~ MAST ARM AND SPAN WIRE MOUNTINGS

STANDARD PLAN J-75.20-01
SPAN WIRE
TYPE P (1 HEAD)

SPAN WIRE
TYPE P-SS
(TYPE P WITH 5-SECTION HEAD)

SPAN WIRE
TYPE Q (2 HEADS)
TYPE R (3 HEADS)
TYPE S (4 HEADS)

NOTE: BACKPLATES NOT SHOWN FOR CLARITY
NOTES
1. Sign bridge, sign support structure and signal bridge foundation shall be designed by the Engineer of Record for all installations (at grade, mounted on a bridge structure or on a wall structure).
2. Typical view shown. See Contract Plans for quantities and locations of signal heads. EVP detectors, cameras, and signs.
3. Route signal cable(s) from terminal cabinet along inside bottom of the Signal Bridge to the Tenon(s) connector(s) at hand hole(s). Provide sufficient slack wire to allow the conductor or cable to be pulled a minimum of 18" (in) outside the Signal Bridge at the nearest hand hole to the equipment connection point.
4. All conductors shall be labeled in accordance with Standard Specification 8-20.3.0. Labels shall be provided at the terminal cabinet (at the terminal board and conduits), equipment terminals, and at the hand hole nearest equipment connection point.
5. All RMC conduits embedded in foundation shall be terminated with a grounding end bushing and bonded to the structure grounding terminal. All PVC conduits embedded in foundations shall be terminated with end bell bushing.
6. Hand hole shall be designed by the Engineer of Record and installed at time of fabrication.
7. Install hand hole on outside of the post at beam level when foundation is cast at grade. Install hand hole on traffic side of post when signal bridge is mounted on bridge, retaining wall or other structure.
8. Equipment grounding conductor shall be non-insulated # 4 AWG copper with 3/8" (in) minimum slack. Clamp to horizontal steel reinforcing with a listed connector suitable for use in concrete. For details, see Elevation View Signal Bridge Hand Hole Placement on Standard, Sheet 2. Or see Foundation Detail in Bridge Deck or Bridge Deck Island, Sheet 2.
9. Equipment grounding conductor shall be non-insulated #4 AWG copper with 3/8" (in) minimum slack. Clamp to vertical steel reinforcing with a listed connector suitable for use in concrete. For Detail, see Partial Foundation Detail, Sheet 2.
10. Variable Message Signs (VMS) shall not be installed on signal bridge.
11. No sign larger than 12' (ft) long x 4' (in) tall shall be installed on signal bridge.
**TERMINAL CABINET MOUNTING**

- **3/8" (IN) DIAM. + 1 1/2" (IN) BOLT** with washer & machine screw drill and tap pole to accept
- 1/4" (IN) CAP WITH 1/4" (IN) THICK NYLON BUSHING WASHER FOR SPACER = FOUR LOCATIONS
- 2" (IN) DIAM. NIPPLE WITH THREADED CONDUIT AND LOCK NUT (TYP.)

**J-HOOK**

PULLING GRIP - SIZE TO SECURE CONDUCTORS

**MULTI-SIDED (ROUND) TERMINAL CABINET MOUNTING DETAIL**

- NEMA 3R STAINLESS STEEL TERMINAL CABINET 4" - SEE STANDARD SPECIFICATION 8-29.25
- SQUARE TUBE SHOWN FOR MULTI-SIDED (ROUND) MONOTUBE STRUCTURE
- ATTACH TERMINAL CABINET AS DETAILED PER MULTI-SIDED (ROUND) TERMINAL CABINET MOUNTING DETAIL

**SECTION @ TERMINAL CABINET**

**SQUARE MONOTUBE CABINET MOUNTING DETAIL**

- "1" REINFORCEMENT RING OR WELD SIZE TO MEMBER THICKNESS
- 1/8" (IN) MAX. - SEAL WITH APPROVED SEALANT AT INSTALLATION OF HAND HOLES ON TOP OF BEAM ONLY
- "1" COVER PLATE 1/8" (IN) THICK x 5/8" (IN) *NEOPRENE HAND HOLE GASKET (TYP.) EXCEPT AT BOTTOM OF BEAM

**SECTION A**

- 6" (IN) x 11" (IN) HAND HOLE SHOWED 1/4" (IN) DIAM. HAND HOLE SIMILAR
- EXCEPT AS SHOWN

**SQUARE MONOTUBE STRUCTURE EXAMPLE HAND HOLE DETAIL**

- OPENING DIMENSIONS ALSO APPLY TO MULTI-SIDED (ROUND) STRUCTURES

**KEY NOTES**

1. 6 x 8.2 LB/FT CHANNEL = HOT-DIP GALVANIZED
2. TWO EACH:
   - 1/2-13 NC x 2 1/2" (IN) HEX HEAD BOLT
   - LOCK WASHERS (DRILL AND TAP POLE TO ACCEPT)
3. WIRES (SEE DETAIL THIS SHEET)
4. METAL POST
5. CABINET
6. END BUSHING (TYP.)
7. SEALING LOCKNUT (TYP.)
8. POLE WALL DRILLED SO BUSHING WILL PASS THROUGH (TYP.)
9. CABINET WITH BACK WALL DRILLED 1 1/8" (IN) OVERSIZE OF NIPPLE (TYP.)
10. CHANNEL DRILLED 1 1/8" (IN) OVERSIZE OF NIPPLE (TYP.)
11. 2" (IN) DIAM. - 4" (IN) NIPPLE (UNLESS OTHERWISE NOTED) (TYP.)

**BOLTS, NUTS, AND WASHERS**

- ASTM F593 OR A193 TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)
NOTES
1. Upper and lower channel identification labels shall match the detector channels shown in the Contract Plans.
2. Connectors DT38, DT39, DT4S, and DT4P are Type DD60 D-Sub connectors with pin layouts and assignments as shown. The suffix "S" indicates a socket (female connector) and the suffix "P" indicates a plug (male connector).
3. Detector Termination Interface Panel terminals not shown due to variations in arrangement and numbering between manufacturers.
4. Connectors DT38 and DT4S shall be installed in one of the following arrangements:
   a. Mounted to the back of the Detector Test Panel. Connectors shall use a spring latch (ball) to secure the connection.
   b. Mounted on a cable, within six inches of the back of the Detector Test Panel. Connectors shall use thumb-screws to secure the connection.
5. Connectors DT38 and DT4P shall be designed such that they can be connected directly, bypassing the Detector Test Panel.
6. The Detector Termination Interface Panel shall be installed electrically between the Detector Test Panel and the C1 connector. A second additional terminal block may be installed electrically between the Input File(s) and the Detector Test Panel.
7. Test switches shall be three position switches with the "Test" position being a momentary contact with spring return to the "Off" position. Test switch position functions shall be as described in Standard Specification section 9.29.13(10).
8. Location of the Display On/Off switch is approximate. This switch shall be located to the right of all of the individual channel test switches and clear of the mounting rack.

CONNECTION PIN ASSIGNMENTS (SEE NOTE 3)

PIN CONNECT TO FUNCTION PIN CONNECT TO FUNCTION PIN CONNECT TO FUNCTION
1. DT38 2. DT38 3. DT38
1. DT39 2. DT39 3. DT39
1. DT4S 2. DT4S 3. DT4S
1. DT4P 2. DT4P 3. DT4P

PIN CONNECT TO FUNCTION PIN CONNECT TO FUNCTION
1. DD50 D-SUB CONNECTOR PINS (PLUG MALE) CONNECTOR SHOWN - MIRROR FOR SOCKET (FEMALE) CONNECTOR - SEE NOTE 2

FUNCTIONAL BLOCK DIAGRAMS

PIN TABLE EXAMPLES:
JHF: Input File J, Slot 1, Terminal F
DIT, 14: Detector #14
IHH - IN: Detector Test Panel Position 9.
Upper Channel, Test Terminals
C1 -86: C1 Connector, Pin 88
N/A: Not Applicable
NC: Not Connected

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Washington State Department of Transportation
DISPLAY PANEL NOTES

D1. The Display Panel shall be 0.125" (in) thick aluminum with a brushed finish. All text on the Display Panel shall be a minimum of 0.25" (in).

D2. The Cabinet Name Plate shall be a phenolic label, with white minimum 0.375" (in) text on a black background, permanently affixed to the panel. See Contract Plans for cabinet identification number.

D3. The Detector Labels shall have 0.5" (in) black text on a white background. The labels may either be phenolic or industrial grade outdoor vinyl, and shall be permanently affixed to the panel.

D4. All other text shall be black and screened directly onto the panel.

D5. The Sign Relay socket and connectors P1P, P2S, and CSP shall be installed on the back of the panel. Connectors P1P/S and P2P/S are Type DD690 D-Sub connectors with pin assignments as shown on sheet 3. The suffix "S" indicates a socket (female connector) and the suffix "P" indicates a plug (male connector).

D6. The Sign Relay shall be DPDT, wired as shown, with a contact rating not less than 10 amps continuous duty. The relay shall operate on ground output from the controller, and draw less than 75 milliamps when energized.


---

SIGN LAY RELAY DETAIL

SIGN RELAY DETAIL (SEE NOTE 20)

SHOWS DE-ENERGIZED (NOT METERING)

SIGN FLASHER DETAIL

SIGN FLASHER MODEL 204

T-1-5 (LOAD CTK #2) T-1-5 (LOAD CTK #1)
4G (NEUTRAL) 4G (GND. EQ. GND)
NOT CONNECTED T-1-1 (4G+)

SIGN SWITCH (SS) DETAIL

SHOWN IN AUTOMATIC MODE

SIGN SWITCH (SS) DETAIL (SEE NOTE 7)

POLICE CONTROL (PC) SWITCH DETAIL

SHOWN IN POLICE CONTROL MODE (GMR)

POLICE CONTROL (PC) SWITCH DETAIL (SEE NOTE 8)

---

TYPE 334
RAMP METER
DATA STATION CABINET
STANDARD PLAN J-81.10-00

Sheet 2 of 3 sheets

ACM. MATHEW
JAN 18 2018 11:17 AM

WASHINGON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
JAN 26 2019 10:26 AM
### C1 Connector Pin Assignments

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### C4, C5, and C6 Connector Pin Assignments

#### C4 Connector Pins

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### Display Panel Inputs

**Functional Block Diagram**

- **Connector P15**
- **Connector P16**
- **Connector P25**

**Note:** Connectors P15 and P25 shall be mounted to the back of the display panel and shall be secured using a spring latch (ball) type connection.

### Pin Table Examples:

- J/1F: Input File 2, Slot 1, Terminal F
- DP: Display Panel
- DET-7: Display Panel, Detector 7 Position

---

**Type 334 Ramp Meter/Data Station Cabinet Standard Plan J-81.10-00**

APPROVED FOR PUBLICATION
Captive AL

Washington State Department of Transportation
1. Under FCC Rules & Regulations 90.242, the antenna is limited to a maximum height of 15 meters (49.2 feet). Mount the antenna to the pole with a bracket and high-strength insulated antenna mounts with stainless steel hardware.

2. The antenna shall be center or base loaded vertical featuring a low-loss, embedded weatherproof loading coil.

3. The amplitude modulated transmitter must be FCC type approved. See Contract for the transmitter frequency.

4. The voice storage shall be as specified in the Contract.

5. See Standard Plan J-60.14 for details on mounting a NEMA junction box to a timber pole.

6. All HAR conduits shall be secured to the pole with two-hole conduit straps spaced at 5" (127 mm) maximum centers. See Standard Plans J-60.13 and J-60.14 for steel channel support and mounting details.

7. The shield shall be tightly wrapped around the center conductor when attaching the PL 259 connector to the UG 175/U adapter. The shield wrapping on the center conductor may ONLY come in contact with the center pin at the solder point. The shield MUST NOT come in contact with the PL 259 shell.

8. The shield shall be soldered through all of the holes on the PL 259 connector, and the center conductor shall be soldered at the tip of the connector. The shield and center conductor MUST NOT be shorted together.

9. The shield shall be tightly wrapped around the center conductor. Crimp and solder the center conductor and shield to the terminal lug and attach securely to the antenna. Seal the entire connection assembly, including the antenna connection point, with butyl tape or heat shrink.

**NOTES**

**HIGHWAY ADVISORY RADIO (HAR) TRANSMITTER**

**STANDARD PLAN J-86.10-00**

Sheet 1 of 3 sheets

Approved for publication 1/2013 10:05 AM

Washington State Department of Transportation
CONSTRUCTION NOTES

1. Backfill material shall meet ANSI/NSF Environmental Standard 60. Follow manufacturer's mixing recommendations.

2. Ground Pipe and types of non-hazardous salts will vary per manufacturer. See the WSDOT Qualified Products List (QPL) for approved manufacturers and follow guidance provided.

ELEVATION VIEW
GROUND ROD DETAIL

FACTORY INSTALLED EXOTHERMIC WELD CONNECTION

10" DIAMETER

HOE BELOW GRADE ENCLOSURE WITH LID

FINISHED GRADE

#2 AWG SOLID TINNED COPPER PIGTAIL DIRECT BURY AND CONNECT TO #2 AWG GROUND WIRE

BACKFILL MATERIAL
(SEE NOTE 1)

GROUND PIPE FILLED WITH NON-HAZARDOUS SALTS
(SEE NOTE 2)

EXOTHERMIC WELD TO PIGTAIL (TYP.)

GROUND PIPE (TYP.)
- SEE GROUND ROD DETAIL

#2 AWG BARE STRANDED COPPER GROUND WIRE (TYP.)

35' (FT) CLASS 4 TREATED TIMBER SERVICE SUPPORT POLE - SEE STD. SPEC. SECT. 2-29.603

2" (IN) DIA. CONDUIT - ANTENNA COAX CABLE

1 1/2" (IN) DIA. CONDUIT - CONTROLLER CABINET GROUND WIRE

PLAN VIEW
GROUND ROD LAYOUT

120°

(TYP.)

ELEVATION VIEW
GROUND ROD DETAIL

TRIAD GROUNDING SYSTEM DETAILS
NOTES
1. The Heavy Duty Lid thickness varies by installation type:
   a) 9" (in) for all new installations
   b) 6" (in) for existing boxes with no roadway overlay
   c) Such that it flush with the surface of the new overlay, when a new overlay is specified
2. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" (in) thick.
3. Slip-resistant lids shall be identified with a permanent marking on the underside of the lid, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The marking shall use 1/8" (in) thick lines formed with a web bed, and shall be placed prior to galvanizing.
4. For Standard Duty Lids, attach a 1/4-20 UNC x 1" (in) S. S. ground stud coated with anti-seize compound. For Heavy Duty Lids, install a 1/2-13 UNC x 1 1/4" (in) S. S. bolt in a 5/8" (in) diameter cored hole in the ductile iron lid gusset as a ground stud. All ground studs shall include 3 S. S. nuts and 2 S. S. flat washers. See Standard Plan J-90.80 for grounding and bonding details.
5. The bonding jumper between the lid and frame shall be #8 AWG (min.) x 4" (ft) stranded bared copper.
6. System identification letters shall be used 1/8" (in) wide lines. Cover marking for steel lids shall be formed by caving or with a mild steel weld bead. Cover marking for ductile iron lids shall be recessed. See COVER MARKING DETAIL and Standard Specification section 9-29.2(4) for additional details. Ductile iron lids shall also provide a minimum 1 1/2" (in) wide x 3/16" (in) thick, flat area for lifting purposes.
7. Cement concrete shall be Class 4000.
8. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.
9. Conduit capacity = 40 inches (sum total of all conduit diameters).
10. 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.
11. The lid is an assembly consisting of the metal lid and frame, reinforcing steel, brass ground inserts, and concrete.
12. #3 reinforcing bar shall be capable of being bent out of the way and restored, to allow for conduit installation.
OPEN BOTTOM PULL BOX ASSEMBLY

(Shown with Heavy Duty Lid)

See pull box, sheet 1, for dimensions not shown.
HEAVY DUTY LID
SEE NOTE 1

SECTION A
(DUCTILE IRON COVER NOT SHOWN)

EQUIPMENT BONDING JUMPER (SEE NOTE 5)
SYSTEM IDENTIFICATION (SEE NOTE 6)
AGENCY LOGO (SEE DETAIL, SHEET 2)

STANDARD DUTY LID (HINGED, SPRING ASSISTED)

NOTES
1. The Heavy Duty Lid thickness varies by installation type:
   a. 5/8" (8) for new installations
   b. 3/4" (8) for rebar boxes with no roadway overlay
   c. Such that it is flush with the surface of the new overlay, when a new overlay is specified
2. Minimum lid thickness shown. The maximum pattern shall be a minimum of 3/8" (8) thick.
3. Silt-resistant lids shall be identified with a permanent marking on the underside of the lid, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The marking shall use 1/8" (8) thick lines formed with a weld bead, and shall be placed prior to galvanizing.
4. For Standard Duty Lids, attach a 1/4-20 UNC x 1" (8) S.S. ground stud, coated with anti-surface compound. For Heavy Duty Lids, install a 1/2-13 UNC x 1 1/4" (8) S.S. bolt in a 5/8" (8) diameter core hole in the ductile iron lid gasket as a ground stud. All ground studs shall include (3) S.S. nuts and (2) S.S. flat washers. See Standard Plan J-80.59 for securing and bonding details.
5. The bonding jumper between the lid and frame shall be #8 AWG (min.) x 4" (8) thick braided copper.
6. System identification letters shall use 1/8" (8) wide lines. Cover markings for steel lids shall be formed by casting or welding. Cover marking for ductile iron lids shall be recessed. See COVER MARKING DETAIL and Standard Specification section B-29.2(4) for additional details. Ductile iron lids shall also provide a minimum 1 1/2" (8) wide x 3 1/2" high x 3 1/8" (8) thick flat area for lifting purposes.
7. Concrete concrete shall be Class 4000.
8. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.
9. Conduit Capacity = 60 inches (Sum total of all conduit diameters).
10. This drawing depicts a typical assembly. Reinforcing not shown. Each manufacturer’s assembly will vary. Refer to the approved manufacturer’s shop drawings for all dimensions and the actual arrangement.
11. The lid is an assembly consisting of the metal lid(s) and frame, reinforcing steel, brass ground inserts, and concrete.
12. #3 reinforcing bar shall be capable of being bent out of the way and restored, to allow for conduit installation.
NOTES

1. The diamond pattern shall be a minimum of 3/32" (in) thick.

2. Slip-resistant lids shall be identified with a permanent marking on the underside of the lid, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The marking shall use 1/8" (in) thick tags formed with a weld bead, and shall be placed prior to galvanizing.

3. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and two flat washers shall be welded to each lid and coated with anti-seize compound. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and four washers shall be welded to the frame and coated with anti-seize compound. See Standard Plan J-90.60 for grounding and bonding details.

4. The bonding jumper between the lid and the frame shall be #8 AWG (min.) x 4 (ft) tinned braided copper.

5. The system identification letters shall be 1/8" (in) thick, formed with a mild steel weld bead. See COVER MARKING DETAIL, See Standard Specification Section 9-29.2(4).

6. Cement concrete shall be Class 4000.

7. Conduit Capacity = 40 Inches (sum total of all conduit diameters).

8. Typical Small Cable Vault features and arrangement shown. Reinforcing not shown. Dimensions and arrangements will vary slightly by manufacturer. See Approved shop drawings.

9. Small Cable Vaults for WSDOT Projects shall only be installed with the lid frame bearing on the concrete portion of cable vault.

† BOLTS, NUTS AND WASHERS - ASTM F593 OR A193, TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)

‡ EQUIPMENT BONDING JUMPER (SEE NOTE 4)
NOTES

1. Vaults (including Pull Boxes) installed within the traveled way or paved shoulder must use Heavy Duty Lids. Small Cable Vaults (Standard Plan J-90.21) shall not be installed in the traveled way or paved shoulder.

2. 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.

3. Small Cable Vaults for WSDOT Projects shall only be installed with the lid frame bearing on the concrete portion of cable vault.

4. Vault shall be installed on 6" (in) crushed surfacing pad in accordance with Standard Specification Section 8-20.3(6).

5. Conduit Capacities (sum total conduit of all conduit diameters):
   - Pull Box and Small Cable Vault = 4.0" (in)
   - Cable Vault = 6.0" (in)

6. The bonding jumper shall be #8 AWG min. x 1" (ft), of stranded bared copper between the lid and the frame, and shall be #6 AWG min. from the frame to the hex coupling nut. See Contract Plans and Standard Plan J-60.06 for bonding jumper requirements.

7. Connect the equipment grounding conductor(s) to the vault wall bonding connection with a #8 AWG (min.) equipment bonding jumper. For RMC conduits, the conduit end bushing shall be bonded to the equipment ground conductor and the vault wall bonding connection.

8. Each cable shall be coiled such that the cable's minimum bending radius limitations are not compromised. For coils in pull boxes, form a figure 8 loop first, then fold it in half (cable should twist slightly, not bend) to form a single loop.

9. Knockouts shall be restored with grout after conduit installation – see Standard Specification Section 8-20.3(6). For open bottom vaults, field bend #3 reinforcing bars to allow conduit into vault, then field bend back into place. Restored #3 bars shall be wire tied in two places, and the vault floor and wall completed with commercial concrete.
KEY NOTES

1. EQUIPMENT GROUNDING CONDUCTOR
2. COPPER SOLDERLESS CRIMP CONNECTOR
3. EQUIPMENT BONDING JUMPER (SEE NOTES 6 & 7)
4. SEE CONTRACT FOR CONDUIT SIZE AND NUMBER
5. RMC SHOWN = SEE CONTRACT FOR CONDUIT TYPE
6. PVC OR HDPE (PVC SHOWN) = SEE CONTRACT FOR CONDUIT TYPE

STANDARD PLAN J-90.50-00

SHEET 2 OF 2 SHEETS

VAULT INSTALLATION DETAILS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPOROVED FOR PUBILCATiON

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STANDARD DUTY LID BONDING CONNECTION DETAIL

HEAVY DUTY LID BONDING CONNECTION DETAIL

HEAVY DUTY LID FRAME BONDING CONNECTION DETAIL

VAULT WALL BONDING CONNECTION DETAIL

VAULT WALL 1 5/8" (IN) X 1 5/8" (IN) S.S. CHANNEL

HEX COUPLING NUT ★ FLAT WASHERS

FULL CIRCLE CRIMP CONNECTOR (TYP.) ★ GROUND BOLT

VAULT WALL 1 5/8" (IN) X 1 5/8" (IN) S.S. CHANNEL

HEX COUPLING NUT ★ FLAT WASHERS

FULL CIRCLE CRIMP CONNECTOR (TYP.) ★ GROUND BOLT

OPEN BOTTOM VAULT FINISHING DETAIL (SEE NOTE 9)

BOLTS, NUTS AND WASHERS - ASTM F813 OR A193, TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)
NOTE

1. For Hot Mix Asphalt Paving projects - "DO NOT PASS" and "PASS WITH CARE" signs shall be included for passing zones.
NOTES
1. For sign installation details, see Standard Plan G-series.
2. Where it is impractical to locate a sign with the lateral offset, a minimum of 2'(6) offset may be used. A 1' (6) lateral offset may be used in business, commercial or residential areas.
3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

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<td></td>
<td>PLAQUE)</td>
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<tr>
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<td>5' MINIMUM</td>
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<tr>
<td>URBAN</td>
<td>7' MINIMUM</td>
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| TO BOTTOM OF |
| SUPPLEMENTAL |
| PLAQUE (WHEN |
| REQUIRED)    |
| RURAL       | 4' MINIMUM       |
| URBAN       | 6' MINIMUM       |

CLASS A CONSTRUCTION SIGNING INSTALLATION
STANDARD PLAN K-80.10-01

DRAWN BY: FERN LIDDELL

APPROVED FOR PUBLICATION
Washington State Department of Transportation
### Notes

1. All fasteners may be zinc plated, galvanized or stainless steel. All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.

2. Install one lightweight Type A Low-Intensity flashing warning light on the traffic side of the barricade. Install two Type A Low-Intensity flashing warning lights per barricade when the barricades are used to close a roadway. Attach the light to the barricade according to the light manufacturer's recommendations or use the details shown on this plan.

3. Stripes on barricade rails shall be alternating orange and white retroreflective stripes (sloping downward at an angle of 45 degrees in the direction traffic is to pass).

4. The Type 3 barricade design shown on this plan meets the crash test requirements of NCHRP 350. Alternative designs may be approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.

5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.

6. When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.
USEABLE TRAFFIC LANE 2 MIN AREA CLOSED TO TRAFFIC

TYPE 3L BARRICADE

STRIPE ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

TYPE 3R BARRICADE

AREA CLOSED TO TRAFFIC 2 MIN USEABLE TRAFFIC LANE

TYPE 3R BARRICADE

BARRICADE PLACEMENT

WORK AREA

_TYPE 3L BARRICADE_ TYPE 3R BARRICADE

ROAD CLOSURE AT INTERSECTION

_TYPE 3L BARRICADE_ TYPE 3R BARRICADE

ROAD CLOSURE AT OTHER LOCATIONS

_TYPE 3L BARRICADE_ TYPE 3R BARRICADE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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**

- 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.

- Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

- Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

- 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.

- After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
NOTES

1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.

3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

4. Use shims to properly fit the anchors to the barrier and roadway surfaces.

5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
NOTES
1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.
2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts that mark the angle point of any sudden change in topography.
3. See Standard Specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2 x 4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

PIPE ROLL FORMED T-POST

<table>
<thead>
<tr>
<th>POST SPECIFICATIONS</th>
<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; DIAM.</td>
<td>Y</td>
<td>5.10</td>
<td></td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIAM.</td>
<td>Z</td>
<td>1.85 1.33</td>
<td></td>
</tr>
</tbody>
</table>
NOTES
1. All concrete post bases shall be 10" (in) 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.
4. Fencing shall be used for security and boundary delineation only.

POST AND RAIL SPECIFICATIONS

<table>
<thead>
<tr>
<th>POST AND RAIL SPECIFICATIONS</th>
<th>PIPE</th>
<th>ROLL FORMED</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOM. SIZE (SCH. 40) L.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END, CORNER, OR PULL POST</td>
<td>2 1/2&quot; DIA.</td>
<td>5.10</td>
</tr>
<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIA.</td>
<td>1.85</td>
</tr>
</tbody>
</table>

FABRIC LOOP = 2 SIDES
NOTES
1. Materials shall meet the requirements of Standard Specification 9.16.
GATE POST
DETAIL A

EYE BOLT
TENSION WIRE
FABRIC BAND
TOP HINGE
STRETCHER BAR

PULL POST
DETAIL B

EYE BOLT
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)

GATE POST
DETAIL C

EYE BOLT
TENSION WIRE
FABRIC BAND
BOTTOM HINGE
STRETCHER BAR

PULL POST
DETAIL D

EYE BOLT
TENSION WIRE
FABRIC BAND (TYP.)
STRETCHER BAR (TYP.)
TENSION WIRE (TYP.) (NOT REQUIRED FOR CHAIN LINK FENCE TYPE 4)

CHAIN LINK GATE
STANDARD PLAN L-30.10-02
SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
Washington State Department of Transportation
NOTES
1. All glare screen posts shall be 2 1/2" I.D. galvanized steel.
2. Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toenailed to post with 16d galvanized nails to prevent block rotation. See Standard Specification 9-16.3(2).
3. Attach blocks to steel posts using bolt holes on approaching traffic side of post web.

FABRIC BAND (TYP.) - SPACED @ 12" MAX.

HOG RINGS (TYP.) - SPACED @ 24" MAX.

TENSION WIRE (TYP.) - POST - SEE DETAIL

PULL POST - SEE DETAIL

TENSION WIRE

STRETCHER BAR (TYP.)

GLARE SCREEN FABRIC - 1" DIAMOND WIRE MESH

BEAM GUARDRAIL

END OR CORNER (BRACE) POST - SEE NOTE 1

STEEL POST - SEE NOTE 1

STEEL BODY PLATE - SEE DETAIL

1/2" DIAMETER U-BOLT

1/2" HEAVY HEX NUT

1/2" EYE NUT

16d ANTI-ROTATION NAIL (TYP.) - SEE NOTE 2

STRETCHER BAR (TYP.)

POST - SEE NOTE 1

STEEL BODY PLATE - SEE DETAIL

TENSION WIRE (TYP.)

WOOD BLOCK (TYP.) - SEE NOTE 4

STEEL POST - SEE NOTE 1

NAIL DRIVEN INTO WOODEN POST FOR STEEL POST SUPPORT

END OR CORNER (BRACE) POST WITH EXISTING WOOD POST

STEEL POST - SEE NOTE 4

WOOD POST - SEE NOTE 4

WOOD BLOCK (TYP.) - SEE NOTE 4

BEAM GUARDRAIL

END OR CORNER (BRACE) POST

PULL POST - WITHIN RUN

VIEW C

DETAIL C

ISOMETRIC VIEW

ELEVATION VIEW

Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toenailed to post with 16d galvanized nails to prevent block rotation. See Standard Specification 9-16.3(2).

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.)

5/8" Diam. Wire Rope

PADLOCK - AGENCY PROVIDED

SEE MOUNTING DETAIL

TOP OF ROADWAY

ELEVATION

WOOD SPACER
- 3" x 2 1/2" x 15'

TIMBER POST
- 4" x 6" (NOM.)

PLASTIC PIPE - 12" (NOM.) x 2" - 7' LONG
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW - 5/8" Diam. x 6" WITH 2" FLAT WASHER

HEX LAG BOLT - 3/8-7UNC x 5"
WITH 1" DIAM. FLAT WASHER
(4 SETS TOTAL)

1 1/2" Diam. Hole (TYP.)

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M222.

ACCESS CONTROL GATE

STANDARD PLAN L-70.10-01

EXPIRES JUNE 30, 2008

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP - 48" x 12" (TYP.)

SEE MOUNTING DETAIL

MIDDLE POST - REMOVABLE

END POST

5/8" DIAM. WIRE ROPE

PADLOCK (TYP.) - AGENCY PROVIDED

TOP OF ROADWAY

YELLOW REFLECTIVE TAPE - 3" (TYP.)

PLASTIC PIPE - 12" (NOM.) - 2' - 7" long
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW - 5/8" DIAM. x 6" WITH 2" FLAT WASHER (TYP.)

HEX LAG BOLT - 3/8-7UNC x 5" WITH 1" DIAM. FLAT WASHER (4 SETS TOTAL)

1 1/2" DIAM. HOLE (TYP.)

GALV. LAG SCREW - 3/8" DIA. W. FLAT WASHER (TYP.) (2 SETS REQ.)

GALV. STEEL TUBE

COMMERCIAL CONCRETE

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

5/8" S.S. EYE STRAP - FASTENED TO THE SIGN PANEL WITH 1/8" DIAM. SCREWS AND 2 HEX NUTS (TYP.)

SIGN PANEL MOUNTING DETAIL

END POST

MIDDLE POST

TOP VIEW (CAP NOT SHOWN)

TOP VIEW (CAP NOT SHOWN)

SIDE OPPOSITE STRIPES

TOP OF TIMBER POST

EYE SCREW - 3/8" DIAM. x 6" WITH 2" FLAT WASHER

HEX LAG BOLT - 3/8-7UNC x 5" WITH 1" DIAM. FLAT WASHER (4 SETS TOTAL)

1 1/2" DIAM. HOLE (TYP.)

GALV. LAG SCREW - 3/8" DIA. W. FLAT WASHER (TYP.) (2 SETS REQ.)

GALV. STEEL TUBE - 3/8" x 4" x 6"
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

WHITE EDGE LINE
YELLOW EDGE LINE
WIDE LANE LINE
WIDE DOTTED LANE LINE

SINGLE-LANE ON-CONNECTION

SINGLE-LANE OFF-CONNECTION

FOR ONE-LANE REDUCTION

END OF TAPER — SEE CONTRACT

MATCH LINE A

MATCH LINE B

MATCH LINE C

MATCH LINE D

WHITE EDGE LINE
YELLOW EDGE LINE
WIDE LANE LINE
WIDE DOTTED LANE LINE

TRAFFIC ARROW TYPE MAY VARY — SEE CONTRACT FOR TYPE SPECIFIED

STOP LINE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
NOTES
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.
2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

RAMP CHANNELIZATION
TWO LANE
STANDARD PLAN M-1.40-02
SHEET 1 OF 1 SHEET

Two-Lane On-Connection

Two-Lane Off-Connection
COLLECTOR-DISTRIBUTOR ROAD
ON-CONNECTION

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
OFF-CONNECTION

RAMP CHANNELIZATION
COLLECTOR-DISTRIBUTOR ROAD
STANDARD PLAN M-1.60-02
Washington State Department of Transportation

APPROVED FOR PUBLICATION
State Engineer
Washington State Department of Transportation
NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. 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>POSTED MAIN LINE SPEED</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 MPH</td>
<td>565'</td>
</tr>
<tr>
<td>40 MPH</td>
<td>610'</td>
</tr>
<tr>
<td>45 MPH</td>
<td>712'</td>
</tr>
<tr>
<td>50 MPH</td>
<td>845'</td>
</tr>
<tr>
<td>55 MPH</td>
<td>990'</td>
</tr>
<tr>
<td>60 MPH</td>
<td>1100'</td>
</tr>
<tr>
<td>65 MPH</td>
<td>1200'</td>
</tr>
<tr>
<td>70 MPH</td>
<td>1290'</td>
</tr>
</tbody>
</table>

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTE
1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' (ft) spacing is standard; however, for gore areas shorter than 150' (ft), use a 25' (ft) spacing, and for gore areas greater than 400' (ft), a spacing of 100' (ft) may be used.
NOTE

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' (ft) spacing is standard; however, for gore areas shorter than 150' (ft), use a 25' (ft) spacing, and for gore areas greater than 400' (ft), a spacing of 100' (ft) may be used.
STOPPING POINT FOR LEFT TURN LANE

LEFT-TURN CHANNELIZATION
SYMMETRICAL WIDENING ABOUT CENTERLINE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

50'

OPTIMAL DOTTED EXTENSION LINE

WHITE EDGE LINE

LEFT-TURN CHANNELIZATION
ASYMMETRICAL WIDENING LEFT OF CENTERLINE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

50'

OPTIONAL DOTTED EXTENSION LINE

WHITE EDGE LINE

LEFT-TURN CHANNELIZATION
ASYMMETRICAL WIDENING RIGHT OF CENTERLINE

SEE CONTRACT FOR LENGTH OF STORAGE LANE

50'

OPTIONAL DOTTED EXTENSION LINE

WHITE EDGE LINE

LEFT-TURN CHANNELIZATION
SYMMETRICAL WIDENING ABOUT CENTERLINE

APPROACH TAPER A

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

50'

APPROACH TAPER C

CENTERLINE STRIPE - SEE NOTES

OPTIONAL MARKED DECELERATION TAPER

APPROACH TAPER C

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

CENTERLINE STRIPE - SEE NOTES

OPTIONAL DOTTED EXTENSION LINE

LEFT-TURN CHANNELIZATION
ASYMMETRICAL WIDENING ABOUT CENTERLINE

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

POSTED SPEED

APPROACH TAPER A

APPROACH TAPER B

APPROACH TAPER C

60 MPH 360' 60' 720'

55 MPH 330' 55' 660'

50 MPH 300' 50' 600'

45 MPH 270' 45' 540'

40 MPH 240' 40' 480'

35 MPH 210' 35' 420'

30 MPH 180' 30' 360'

25 MPH 150' 25' 300'

20 MPH 120' 20' 240'

NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways, with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double centerline.

6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.
LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - SYMMETRICAL WIDENING
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING RIGHT OF CENTER LINE
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

LEFT-TURN CHANNELIZATION
REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING LEFT OF CENTER LINE
(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass In accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
- Type 2L (SL) Traffic Arrow

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER</th>
<th>DIMENSION A</th>
<th>APPROACH TAPER</th>
<th>DIMENSION B</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 MPH</td>
<td>180'</td>
<td>27'</td>
<td>320'</td>
<td>57'</td>
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<td>35 MPH</td>
<td>160'</td>
<td>17'</td>
<td>240'</td>
<td>42'</td>
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<tr>
<td>30 MPH</td>
<td>140'</td>
<td>11'</td>
<td>180'</td>
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<tr>
<td>25 MPH</td>
<td>120'</td>
<td>7'</td>
<td>120'</td>
<td>13'</td>
</tr>
</tbody>
</table>

L = 12' Typical Lane Width. See Contract for specified lane widths.
LEFT-TURN CHANNELIZATION
TEE INTERSECTION
WITH ACCELERATION LANE

NOTEs
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

LEFT-TURN CHANNELIZATION
TEE INTERSECTION AND
BACK-TO-BACK TURN LANES
STANDARD PLAN M-3.30-03

APPROVED FOR PUBLICATION (DATE)

SHEET 1 OF 5 SHEETS
LEF T-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-1. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double centerline.

6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND

L = 12 Typical Lane Width. See Contract for specified lane widths.

~ Type 2L (SL) Traffic Arrow

Can be reduced to a minimum of 50' to increase storage capacity.

TWO-WAY LEFT-TURN AND MEDIAN CHANNELIZATION
STANDARD PLAN M-3.40-03
SHEET 1 OF 1 SHEET
NOTES
1. The channelization shown on this plan 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.
4. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
5. Centerline striping on four lane undivided highways shall be double centerline.
6. All turn traffic arrows are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.
Type 2L (SL) Traffic Arrow
Type 2R (SR) Traffic Arrow

DOUBLE LEFT-TURN CHANNELIZATION
STANDARD PLAN M-3.50-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double center line.
6. All Traffic Arrows not required are optional, but recommended. Arrows may be added for longer storage lanes, or deleted for shorter storage lanes. See Contract Plans.

LEGEND

- Type 2R (SR) Traffic Arrow
- Type 3L (SL) Traffic Arrow

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

RIGHT-TURN CHANNELIZATION
STANDARD PLAN M-5.10-02
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION

Washington State Department of Transportation
When specified in the contract plans, the HOV symbol marking shall be installed with an offset of 1 foot max. from the lane centerline.
**KEY NOTES**

1. Bid Item "Bicycle Lane Symbol" includes Bike Lane Arrow and Bike Rider Symbol.
2. 2' (ft) x 6' (ft) White Bike Lane Arrow.

**GENERAL NOTE**

See Contract for location and material requirements.
NOTE:
1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle, (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.
GENERAL NOTES

1. Bowl item "Railroad Crossing Symbol Includes "X" symbol, letters, and two 24" (in) white transverse lines.

2. 24" (in) white transverse line.

3. Place Stop Line 15 (ft) minimum from nearest rail. If gate is present, place stop line approximately 8' (ft) from RR gate.

4. See contract for location, material requirements, and W10-1 sign information.
TYPICAL APPLICATIONS

NOTES
1. See the Contract Plans for locations of crosswalk centerlines.
2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.
3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.


NOTES

LEGEND

- Reserved Parking Sign and post with Plaque, if indicated (See Sign Fabrication Manual)

- Access Parking Space Symbol

- Manufactured wheel stop

- Detectable Warning Pattern

EXPRES AUGUST 9, 2009
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.
4. 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.
1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80’ (ft) intervals on tangents and on horizontal curves with a radius of 1500’ (ft) or more, and at 40’ (ft) intervals on horizontal curves having radii of less than 1500’ (ft). Center the RPMs in the gaps between the pavement marking lines.

2. Type 2Y RPMs, when specified, shall be placed outside the left edge line at 80’ (ft) intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL."

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPMs on multilane one-way roadways, and Type 2YY RPMs on two-lane two-way roadways.

4. The Type 2W RPMs placed on multilane one-way roadways and all RPMs set in recesses shall have an abrasion-resistant coating.

5. Do not recess side-to-side RPMs on Wide Dotted Lane Lines.

TYPE 2 RPM RAISED FACE COLORS

<table>
<thead>
<tr>
<th>Type</th>
<th>Color Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2Y</td>
<td>Yellow and Yellow</td>
</tr>
<tr>
<td>Type 2W</td>
<td>White - One Side Only</td>
</tr>
<tr>
<td>Type 2Y</td>
<td>Yellow - One Side Only</td>
</tr>
</tbody>
</table>

WIDE DOTTED LANE LINE DETAIL
(SEE NOTE 6)

LEFT EDGE OF LANE PLACEMENT DETAIL
(SEE NOTE 2)
SECTION A

TWO-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT

SECTION B

ONE-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT
NOTES
1. Raised pavement markers shall be installed only when specified in the Contract Plans.
2. See the Standard Plans for marker designation.
3. The portion labeled "OPTIONAL" is used only when the Optional Marked Deceleration Tape (see Standard Plans M-3.10 and M-3.20) is specified in the Contract Plans.

Type 2L (SL) Traffic Arrow
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).

LONGITUDINAL MARKING
SUBSTITUTION W/RAISED
PAVEMENT MARKERS
STANDARD PLAN M-20.50-02
NOTE

Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher and on all on-ramps and off-ramps.
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
SYMBOL MARKINGS - TRAFFIC ARROWS FOR LOW-SPEED ROADWAYS
STANDARD PLAN M-24.40-02

MARKING AREA
15.94 SQ.FT.

TYPE 6SL (LEFT) TRAFFIC ARROW

MARKING AREA
15.94 SQ.FT.

TYPE 6SR (RIGHT) TRAFFIC ARROW

MIRRORS IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

MARKING AREA
15.94 SQ.FT.

SYMMETRICAL ABOUT GRID IS 4" (IN) SQUARE
MARKING AREA 19.08 SQ.FT.

TYPE 7S TRAFFIC ARROW

SYMBOL & LANE MARKING AREA 4.79 SQ.FT.
SYMBOL MARKINGS - TRAFFIC ARROWS FOR LOW-SPEED ROADWAYS
STANDARD PLAN M-24.40-02

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STANDARD PLAN M-24.40-02

MARKING AREA
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SYMMETRICAL ABOUT GRID IS 4" (IN) SQUARE
MARKING AREA 19.08 SQ.FT.
1. If Rumble Strips are present, install marking outside of the Rumble Strip.
STORMWATER BMP DELINEATION DETAIL

STORMWATER BMP MARKING DETAIL
MARKING AREA = 1.78 SQ. FT. FOR PAIR

NOTES:
1. If rumble strips are present, install marking outside of the rumble strip.
3. WSDOT BMP sticker to be placed on first flexible guide post only.

WSDOT STORMWATER BMP STICKER
(FACING TRAFFIC)

FLEXIBLE GUIDE POST DETAIL
TYPICAL FOR ALL STORMWATER BMP GUIDE POSTS AS DETAILED ON THIS SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION
Corporate JFF
Jul 13, 2017 11:14 AM

Hollan, Julie
Jan 22, 2017 10:07 AM
STORMWATER BMP MARKING ~ (SEE STORMWATER BMP MARKING DETAIL) ONLY ONE (1) MARKING REQUIRED (SEE NOTE 1)

SEE NOTE 1

EDG LINE

EDGE OF SHOULDER

MAINTENANCE ACCESS ROAD

STORMWATER BMP (POND TYPE)

FLEXIBLE GUIDE POST – SEE FLEXIBLE GUIDE POST DETAIL (SEE NOTE 2)

STORMWATER BMP DELINEATION DETAIL

POND TYPE

NOTES:
1. If rumble strips are present, install marking outside of the rumble strip.

STORMWATER BMP MARKING DETAIL

MARKING AREA = 0.89 SQ. FT.

STORMWATER BMP NAME AS SHOWN IN THE CONTRACT PLANS

WHITE ON GREEN

WSDOT STORMWATER BMP STICKER

(FACING TRAFFIC)

NTS

STORMWATER BMP (UNDERGROUND TYPE)

STORMWATER BMP DELINEATION DETAIL

UNDERGROUND TYPE

FLEXIBLE GUIDE POST DETAIL (SEE NOTE 2)

MANUFACTURER’S BURY DEPTH

FLEXIBLE GUIDE POST

SEE NOTE 3

2" - 0" MIN.

3 - 6" MIN.

2 - 0" MIN.

EDGE OF SHOULDER

EDGE LINE

CATCH BASIN CURB AND GUTTER

EDGE OF SHOULDER

WSDOT STORMWATER BMP STICKER (SEE NOTE 3)

1" LETTER HT.

(TYP.)
BARRIER DELINER REQUIREMENTS

- Spacing of Barrier Delinators 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 Delinators shall be one-sided for single direction traffic, or two-sided for bi-directional traffic.
- Color shall be white on the right of traffic, and yellow on the left of traffic.
- The reflective surface shall be rectangular or trapezoidal.
- Reflective Sheeting: 12 square inches minimum surface area, Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.
- Plastic Reflector: 9 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Specific Intensity (cd/ft-c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>0°</td>
<td>126</td>
</tr>
<tr>
<td>0°</td>
<td>20°</td>
<td>56</td>
</tr>
<tr>
<td>0°</td>
<td>30°</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTES

1. When the Contract Plans requires a guide post with concurrent guardrail runs, the Contractor shall:
   - Drive the flexible guide post in line with the guardrail posts, or
   - Mount the shorter flexible guide post onto the guardrail post.

2. Guide posts shall be fastened to the wooden guardrail post using two 2" (in) × 3/8" (in) lag screws with washers, along centerline of post. Also acceptable is any approved attachment method submitted by the guard post manufacturer.

3. Guide posts shall be fastened to the steel guardrail posts using two galvanized 2" (in) × 3/8" (in) bolts with a washer on both sides, a lock washer, and nut. The nut shall be tightened to properly compress the lock washer. The drilled holes in the guardrail post web shall be painted with galvanizing repair paint as described in Standard Specification Section 8-11.3(1). Also acceptable is any approved attachment method submitted by the guard post manufacturer.

4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delinators where guide posts are required.

GUIDE POST TYPE DEFINITIONS - REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>TYPE W</th>
<th>TYPE WW</th>
<th>TYPE Y</th>
<th>TYPE YY</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACING TRAFFIC</td>
<td>FACING TRAFFIC</td>
<td>BACK SIDE</td>
<td>FACING TRAFFIC</td>
</tr>
<tr>
<td>WHITE</td>
<td>WHITE</td>
<td>YELLOW</td>
<td>YELLOW</td>
</tr>
</tbody>
</table>

GUIDE POSTS AND BARRIER DELINATORS

STANDARD PLAN M-40.10-03
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

DIVIDED HIGHWAY

REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>TYPE G1</th>
<th>TYPE G2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACING</td>
<td>BACK</td>
</tr>
<tr>
<td>TRAFFIC</td>
<td>SIDE</td>
</tr>
<tr>
<td>3&quot; WHITE</td>
<td>3&quot; WHITE</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>8&quot; WHITE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>4&quot; WHITE</td>
<td></td>
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</tbody>
</table>

LEGEND
- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STANDARD PLAN M-40.10

UNDIVIDED HIGHWAY
WITHOUT ILLUMINATION
GUIDE POST SPACING (FEET)

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>S</th>
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<tbody>
<tr>
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<td>8,800</td>
<td>280</td>
</tr>
<tr>
<td>10,000</td>
<td>300</td>
</tr>
<tr>
<td>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
NOTES

1. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

2. Locate the initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

CROSSOVER

MEDIAN CROSSES

NOTE

LEGEND

SEE TYPE DEFINITIONS.
STD. PLAN M-40.10

GUIDE POST PLACEMENT
MISCELLANEOUS
STANDARD PLAN M-40.60-00

APPROVED FOR PUBLICATION
Washington State Department of Transportation
SINGLE-LANE ON-CONNECTION

END RUMBLE STRIP ON RIGHT SHOULDER ADJACENT TO BEGINNING OF ON RAMP WIDE LANE LINE

SHOULDER RUMBLE STRIP ON LEFT SHOULDER

WIDE LANE LINE

BEGIN RUMBLE STRIP ON RIGHT SHOULDER AT END OF ACCELERATION TAPER

SHOULDER RUMBLE STRIP ON OUTSIDE SHOULDER

607' 450'

450'

SHOULDER RUMBLE STRIPS ON MEDIAN SHOULDERS

SHOULDER RUMBLE STRIP ON OUTSIDE SHOULDER

MEDIAN CROSSOVER

SHOULDER RUMBLE STRIPS

STRUCTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH

SHOULDER RUMBLE STRIPS

MEDIAN SHOULDER

4' MIN - 5' MIN WITH BARRIER OR GUARDRAIL AT EDGE OF SHOULDER

4' MIN - 2' MIN WITH BARRIER OR GUARDRAIL AT EDGE OF SHOULDER

100' MIN

60' MIN

SHOULDER TAPER DETAIL

5' MIN IN MUDDIER BARRIER OR GUARDRAIL AT EDGE OF SHOULDER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHOULDER RUMBLE STRIP

TYPE 1

FOR DIVIDED HIGHWAYS

STANDARD PLAN M-60.10-01

SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE END OF THE TAPER.

IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

4D MIN.

RUMBLE STRIP PLACEMENT AT INTERSECTIONS
SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4 FOR UNDIVIDED HIGHWAYS

TYPE 2 - 12' GAP AND 12" WIDE STRIP
TYPE 3 - 16' GAP AND 16" WIDE STRIP

TYPE 4 - 12" WIDE STRIP

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

SHOULDER TAPER DETAIL

NOT LESS THAN 4' - PROVIDE 5' WHEN BARRIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

SHOULDER RUMBLE STRIP

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STANDARD PLAN M-60.20-02

APPROVED FOR PUBLICATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

1. Centerline Rumble Strip installation requires a minimum distance of 12 feet from Centerline to edge of paved shoulder.

2. When directed by the Engineer, Rumble Strips may be installed along the turn pocket taper where there is a history of rear-end collisions in the turn pocket.
RUMBLE STRIP OPTIONAL - SEE NOTE 2

INSTALL RUMBLE STRIP

TERMINATE AT END OF LEFT TURN
CHANNELIZATION STRIPING

INTERSECTION WITH LEFT TURN
CHANNELIZATION

APPROX. MIDWAY
BETWEEN MILLED
GROOVES

MARKER

RAISED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

OMIT CENTERLINE RUMBLE STRIPS IN THIS AREA

2' - 0''

RECESS LENGTH

OMIT CENTERLINE RUMBLE STRIPS IN THIS AREA

2' - 0''

REFER TO STANDARD PLAN M-20.30 FOR
RECESSED PAVEMENT MARKER DETAIL

RECESSED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP
STANDARD PLAN M-65.10-02
SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CENTERLINE
RUMBLE STRIP

LONGITUDINAL MARKING (TYP.)

RADIUS POINT (TYP.)

UNCHANNELIZED INTERSECTIONS
AND COMMERCIAL ROAD APPROACHES

TERMINATE RUMBLE STRIP AT
BEGINNING AND END OF
APPROACH OR INTERSECTION

LONGITUDINAL MARKING (TYP.)

RUMBLE STRIP (TYP.)

 BRIDGE APPROACH SLAB

BRIDGE

NON-COMMERCIAL ROAD APPROACHES AND DRIVEWAYS
TRAFFIC LETTER AND NUMERAL APPLICATIONS

STANDARD PLAN M-80.10-01

SHEET 1 OF 2 SHEETS

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