Publications Transmittal

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<td>September 2020</td>
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Originating Organization
Design Office, Engineering and Regional Operations

Remarks and Instructions
The complete manual and revision packages can be accessed at www.wsdot.wa.gov/design/standards/plans.htm.

Please contact Bill Berens at 360-705-7256 or berensb@wsdot.wa.gov with comments, questions, or suggestions for improvement to the manual.

Instructions
• Replace Cover page with new Cover page provided.
• Remove pages 3 ~ 12 from your current manual.
• Insert pages 3 ~ 12.
• Refer to the REMOVE & INSERT INSTRUCTIONS ~ Standard Plans Revision 9-30-2020

To get the latest information, please sign up for email updates for individual publications at www.wsdot.wa.gov/publications/manuals.

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

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

Approved By

Signature
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<td>Off-Ramp Gore Area Marking Layouts</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>Railroad Crossing Layout</td>
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<td>BMP Delineation - Linear Type</td>
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<td>BMP Delineation - Underground and Pond Type</td>
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<td>Guide Post Placement Grade Intersections</td>
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<td>Guide Post Placement Horizontal Curves</td>
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<td>Traffic Letters and Numerals (High Speed Roadways)</td>
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<td>Traffic Letters and Numerals (Low Speed Roadways)</td>
<td>6/10/08</td>
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NOTE
THE METAL COMPONENTS OF THE APPROACH EXPANSION ANCHOR SHALL EITHER
BE PAINTED WITH ONE COAT OF INORGANIC ZINC PAINT CONFORMING TO
STANDARD SPECIFICATION SECTION 9-8.1(2)F OR BE GALVANIZED
IN ACCORDANCE WITH AASHTO M 232.

APPROACH EXPANSION ANCHOR – METHOD A
SEM-I INTEGRAL TYPE ONLY

NORMAL TO
OF SEAL

ELASTOMERIC COMPRESSION SEAL – SEE "COMPRESSION SEAL TABLE" @ RIGHT

TOP OF SLAB OR FACE OF CURB

FULLY COMPRESSED SEAL HEIGHT = SEAL HEIGHT VARIES WITH MANUFACTURER – VERIFY PRIOR TO SLAB CONSTRUCTION

USE 3/8" (IN) EDGER

EXPANDED POLYSTYRENE (OMIT IN BARRIER)

1 5/8" (IN) INSTALLATION WIDTH FOR 2 1/2" (IN) COMPRESSION SEAL SIZE

COMPRESS SEAL DETAIL

COMPRESSION SEAL TABLE

D. S. BROWN WATSON BOWMAN
ACME

SEAL WIDTH SEAL WIDTH
CV-2502 2 1/2 WA-250 2 1/2

TESTING SHALL BE PER ASTM D3472 PRIOR TO USE

APPROACH EXPANSION ANCHOR – METHOD B
SEM-I INTEGRAL TYPE ONLY

1" (IN) DIAM. POLYSTYRENE OR PVC PIPE

3/4" (IN) DIAM. ANCHOR ROD

3/4" (IN) X 4" (IN) SQUARE POLYSTYRENE (DRILLED AND CUT TO FIT ANCHOR HEAD) WRAP BLOCK 2 TIMES WITH DUCT TAPE

1" (IN) X 4" (IN) SQUARE POLYSTYRENE (DRILLED AND CUT TO FIT ANCHOR HEAD)
### PIPE ALLOWANCES

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<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER (INCHES)</th>
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<tr>
<td>Reinforced or Plain Concrete</td>
<td>12&quot;</td>
</tr>
<tr>
<td>All Metal Pipe</td>
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<tr>
<td>CIP (STD. SPEC. RECT. A-06.20)</td>
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<td>Solid Wall PVC (STD. SPEC. RECT. A-06.121B)</td>
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<tr>
<td>Profile Wall PVC (STD. SPEC. RECT. A-06.122B)</td>
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**NOTES**

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

2. The knockout diameter shall not be greater than 20" (m). Knockouts shall have a wall thickness of 2" (m) minimum to 2.5" (m) maximum. Provide a 1.5" (m) 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.

---

**RECTANGULAR ADJUSTMENT SECTION**

---

**PRECAST BASE SECTION**

---

**CATCH BASIN TYPE 1**

**STANDARD PLAN B-5.20-03**

Sheet 1 of 1 Sheet

Approximately for Publication

Dated and signed by Roark, Steve
Date: 2020.09.01 07:52:50 -0700

Washington State Department of Transportation
NOTES

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

2. The knockout shall not be greater than 26" (in), 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 9-04.3.

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.
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" (9). Attach the pipe supports to the manhole with 5/8" (16) stainless steel expansion bolts or embed the supports into the manhole wall 2" (50).

2. The vertical riser stem of the flow restrictor shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 6" (15).

3. The flow restrictor shall be fabricated from one of the following materials:
   - 0.060" (1.5) Corrugated Aluminum Alloy Drain Pipe
   - 0.064" (1.6) Corrugated Galvanized Steel Drain Pipe with Protection 1
   - 0.064" (1.6) Corrugated Aluminum Drain Pipe
   - 0.060" (1.5) Aluminum alloy flat sheet in accordance with ASTM B 209, 5052 H32 or EPSPolyethylene 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.
   - The lift handle shall be made of a similar material to the gate (to prevent galvanic corrosion), or 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.
   - The mating surfaces of the lid and the body shall be machined for proper fit.

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.
NOTES
1. Drain basin to be custom manufactured according to plan details. Risers are needed for basins over 84" (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 70-50-50, 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.

8. This item requires approval from HQ Hydraulics before use on a project.

9. Optional ladder is available for 36" diameter catch basin.
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 slits. The frame shall accept the 304 Stainless Steel (9.3) 5/8" (in) - 11 NC x 2" alien 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 9-06.15(2) for additional requirements.


4. Size and dimensions of drains vary by Manufacturer, but open area shall be 1.5 square feet minimum.
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 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.

3. Refer to Standard Specification Section 9-06.15 and 9-06.15(2) for additional requirements.
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 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.

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

3. Grate alternatives 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.
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NOTES
1. For dimensions not shown, refer to Standard Plan B-30.90.
2. See Standard Specification, Section 9-07.12(2) for bending diameters.
4. Reinforcement shall meet the requirements of AASHTO M199 and is shown for informational purposes only.
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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.
3. See Standard Specifications Section 2-08.4 for Measurement of Trench Width.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.

CLEARANCE BETWEENPIPES FOR MULTIPLE INSTALLATIONS

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

1. The Concrete Collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum Concrete Collar width shall be 12" (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 6 x 6 W1.4 x W1.4 (10 Gage) Steel Welded Wire Fabric or one wrap for any of the following sizes:
   - 6 x 6 W2.1 x W2.1 (8 Gage)
   - 6 x 6 W2.9 x W2.9 (6 Gage)
   - 4 x 4 W2.9 x W2.9 (6 Gage)
   - 4 x 4 W4.0 x W4.0 (4 Gage)
   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'' (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'' (in) or less.

6. Heat shrink shall have a width of 24'' (in). The material shall be wrapped around the outside of the pipe with a 2'' (in) minimum overlap. There shall also be a 4'' (in) minimum closure patch of material centered along the entire length of the seam.
NOTES

1. Remove all rail washers, also called "Snow Load Rail Washers" when encountered during Raising Beam Guardrail work and when the guardrail raising work requires removal of the rail.

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

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

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

5. For steel posts, holes shall be located on approach traffic side of web.
NOTES

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

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

3. W6 x 8.5 or W6 x 10 steel posts and timber blocks are alternates for 6 x 8 timber posts and blocks, W6 x 15 steel posts and timber blocks are alternates for 10 x 10 timber posts and blocks.

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

5. When "Beam Guardrail Type - ___ Ft. Long Post" is specified in the contract, the post length shall be stamped with numbers, 1 1/2" (in) min. high and 3/4" (in) wide at the location where the letter "F" 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.
THREE BEAM GUARDRAIL REDUCER SECTION

**TYPE A**

(Left section shown, right section reversed)

**THREE BEAM GUARDRAIL REDUCER SECTION**

**TYPE B**

(Left section shown, right section reversed)

See Note 1

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.

NOTES

Post bolt slots

Splice bolt slots

Cap plate

Cop plate

10 Gage

ADDED 10 GAGE STEEL DESIGNATION; REV. NOTE 1

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.

NOTES

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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.
NOTES

1. Refer to Standard Plan C-1b and C-20.11 for additional details not shown on this plan.

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

3. Use a single block or combination of blocks no more than two (2) to achieve the actual 12" (in) offset. See Standard Specification, Section 9-16.3(2).

4. Wood blocks shall be secured to the posts with anti-rotation nails. If combination blocks are used, the adjacent blocks shall be bolted with two 16-ga. galvanized nails to prevent block rotation.

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

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

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

8. Anti-rotation holes in steel posts are not required when using blocks with anti-rotation features (e.g., route blocks).
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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.
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NOTES

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

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

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

Refer to SECTION "C":

Elevation G = [(Elevation S - D x 0.1)] + (31" / 12])

4. Timber or steel post. Steel post shown.

FLARE RATE TABLE

<table>
<thead>
<tr>
<th>RATE (FT)</th>
<th>POSTED SPEED (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 : 1</td>
<td>70</td>
</tr>
<tr>
<td>14 : 1</td>
<td>60</td>
</tr>
<tr>
<td>12 : 1</td>
<td>55</td>
</tr>
<tr>
<td>11 : 1</td>
<td>50</td>
</tr>
<tr>
<td>10 : 1</td>
<td>46</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 or LESS</td>
</tr>
</tbody>
</table>

2020.08.27
09:46:30 - 07'00'

BEAM GUARDRAIL TYPE 31 - BURIED TERMINAL TYPE 2
STANDARD PLAN C-22.16-07

APPROVED FOR PUBLICATION
Date: 2020.08.16 09:52:52

Washington State Department of Transportation
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 Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

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

3. An MSKT-SP-MGS (TL-3) as manufactured by Road Systems, Inc., SOFTSTOP (TL-3) as manufactured by Trinity Highway Products, LLC, or MAX-TENSION (TL-3) 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 2 feet so that the impact head does not approach 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 0 (Softstop or Max-Tension). Provide 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.

9. The widened embankment dimensions shown on this plan will satisfy the installation requirements of all 3 guardrail terminal systems shown on this plan.
NOTES

1. The implementation of the Manual for Assessment of Safety Hardware (MASSH) 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 Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

2. This terminal is MASSH 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 post so 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 0 (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.

9. The widened embankment dimensions shown on this plan will satisfy the installation requirements of all 3 guardrail terminal systems shown on this plan.
NOTES

1. For use on the end of guardrail runs 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 Plane C-7 and C-7a.
4. Use details for Wood Breakaway post shown on this plan and components shown on Standard Plan C-1b.
5. Fasten the Anchor Cable using two 1" (in) nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft.-lbs.
6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification, Section 9-16.3(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 1/2" (in) machine bolts with hex nut and washer. Place washer on face side of rail.
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NOTES

1. Concrete for Barrier Type F (Precast) 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 for the stirrup bars (see Stirrup Bar Narrow Base Detail). Bar 6 runs along the vertical face of the narrow base barrier with a 1 1/2" (in) clearance.
NOTES (Anchoring and Joining Barrier)
1. Precast Concrete Barrier Type F can be installed in the following configurations:
   A. Unanchored on hot mix asphalt (HMA), or cement concrete pavement in permanent or temporary installations, and on compacted soil in temporary installations. It is permissible to manufacture the Type F barrier without pin slots and pin slots bars when barrier is not anchored.
   B. Anchored on hot mix asphalt (HMA) or cement concrete pavement in permanent or temporary installations as shown on this plan. See Standard Plan K-80.35 and K-80.37 for anchoring Type F Narrow Base in temporary installations on cement concrete pavement or bridge decks.
2. See Standard Plan C-60.70 for anchoring patterns when transitioning from Type F anchored runs to another type of barrier run.
3. After removing the anchoring pins, clean the pin holes and fill them with sealant according to Standard Specification Section 9-04.2.
4. Remove slack between barrier segments after inserting the connecting pin.
NOTES
1. The intent of this plan is to provide a transition from the anchored Type F concrete barrier system to various types of concrete barrier systems (e.g., Single Slope) up to 42" (in) tall. This transition plan applies to roadside engines along medium gradients where the barrier transition can be impacted on the traffic side only. This transition can be installed on cement concrete pavement or hot mix asphalt pavement.

2. Transition Installation Procedure:
   1) Procure a segment of Type F Concrete Barrier (Standard Plan C-60.10).
   2) Cut the end loops off of the Loop Bars of the Type F section located closest to the dissimilar shaped concrete barrier section.
   3) Abut the two sections and align the top front edges (traffic side) of the barrier sections. (See Section C, this sheet)
   4) Install the nested thin beam rail on the traffic side, the barrier connection strap bar on the field side, and the transition shield to secure the two barrier sections together.
   5) Install the anchor pins.

3. Refer to Standard Plan C-60.10 Concrete Barrier Type F for additional details not shown on this plan.

4. Refer to Standard Plan C-7a Beam Guardrail (Thre Beam) and C-7a Thre Beam End Sections for additional details not shown on this plan.

5. Install rectangular guardrail plate washers under the bolt head on upstream end and under the nut on the downstream end. See sheet 2 for details.

6. Lap thin beam and thin beam end section in direction of adjacent traffic. The upstream thin beam end section is installed on top of thin beam rail, and the downstream thin beam end section is installed under thin beam rail.

7. Embed anchor bolt 6" (in) into barrier and secure to barrier with Type I epoxy. Core drill 1 1/2" (in) diameter holes into top of barriers.

8. For barrier transition pinning details. See Standard Plan C-60.70.
TRANSITION SHROUD DETAIL
(10" IN. TALL TRANSITION SHROUD SHOWN)
3/8" IN. THICK STEEL PER ASTM A36
HOT DIP GALVANIZE AFTER FABRICATION PER ASTM F2323

TRANSITION SHROUD NOTES:

1. Prior to transition shroud fabrication, verify the height of the dissimilar shaped barrier that the 32" (in) Tall F-shape transition is abutting to. Shroud height (H) ranges from 1" to 10" tall.

2. For dimensioning not shown in the table, interpolate dimensions.

3. No transition shroud is necessary if the dissimilar shaped barrier is the same height, or up to 1" (in) taller than the 32" (in) Type F barrier.

4. Barriers that Type F barrier may transition to include but are not limited to:
   A) Concrete Barrier Type 2 – See WSDOT Plan Sheet Library for details
   B) Single-Slope Concrete Barrier (Precast) – See Standard Plan C-70.10 for details
   C) Single-Slope Concrete Barrier (CIP) – See Standard Plan C-80.10 for details
   D) High Performance (HP) Single-Shaped Concrete Bridge Barrier – See Bridge Standard Drawings
   E) High Performance (HP) F-Shape Bridge Barrier – See Bridge Standard Drawings

ELEVATION

RECTANGULAR GUARDRAIL
PLATE WASHER DETAIL
SEE NOTE 5
RECTANGULAR PLATE WASHER SHALL BE HIGH STRENGTH AND CONFORM TO STD. SPEC. SECTION 5.16.3(4) AND BE GALVANIZED PER STD. SPEC. SECTION 5.16.3(3)
1. Concrete for Type F transition to Type 2 barrier shall be Class 5000.

2. Remove slack between barrier segments after inserting the connecting pin.

3. See Standard Plan C-60.10 and C-60.70 for Barrier Anchoring Details (when being anchored).

4. Provide 2" minimum concrete cover over reinforcing steel, except for areas noted on plan.

---

**REINFORCING STEEL BENDING DIAGRAM**

LENGTH: 12' - 2" - 144" (144")

- **QTY = 8 BARS**
  - **VARIATION:** 3/4" - 1 1/2"

**LONGITUDINAL BAR**

- **VARIANTS:**
  - 7 1/2" - 8"
  - 3" - 8 1/4"
  - 4 1/2" - 7 1/4"

**PIN SLOT BAR**

- WHEN REQUIRED
  - H/D/P GALVANIZED AFTER FABRICATION PER ASTM A677

**LOOP BAR DETAIL**

- 3/4" DIA., LOOP BAR (ASTM A36)
  - HOT ROLL
  - HOT DIP GALVANIZED AFTER FABRICATION (AASHTO M 111)

**CONNECTING PIN ASSEMBLY DETAIL**

- 1" DIAM. PER ASTM A648
  - HOT DIP GALVANIZED AFTER FABRICATION PER ASTM F2229

**CONNECTION DETAILS**

- **STIRRUP BAR A**
  - QTY = 10 BARS
- **STIRRUP BAR B**
  - QTY = 6 BARS
- **CONNECTING PIN**
  - SEE DETAIL @ LEFT

---

**SECTION A**

- (BARRIER MIDSPAN POINT)

---

**SECTION B**

- (SEE NOTE 2)

---

**CONNECTING PIN ASSEMBLY DETAIL**

- **ELEVATION**
  - **TOP**
  - **CONNECTING PIN**
  - **SEE DETAIL @ LEFT**

---

**BARRIER TRANSITION END**

- **ELEVATION**
  - **TOP**
  - **CONNECTING PIN**
  - **SEE DETAIL @ LEFT**

---

**STANDARD PLAN C-60.30-00**

- SHEET 1 OF 1 SHEET

---

**APPROVED FOR PUBLICATION**

- Date: 2020.09.24
  - 07:56:27 -0700

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**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

- Date: 2020.09.17
  - 10:59:13 -0700
NOTES

1. The intent of this plan is to show the anchoring pin pattern when transitioning from:
   1) Type F unanchored barrier runs to Type F anchored barrier runs
2) Type F unanchored barrier runs to other types of barrier runs (i.e., Type 2, Type F, Single-Stripe).
2. Roadside/Shoulder anchoring patterns shown (barrier subject to impacts on one side only). For barrier located in medians and/subject to impacts on both sides, anchor both sides of barrier by placing an anchoring pin directly opposite of the anchoring pin(s) shown.
3. See Standard Plan C-60.10 Concrete Barrier Type F (Precast) for anchor detailing.

BARRIER ANCHORING TRANSITION: UNANCHORED TYPE F BARRIER TO VARIOUS TYPES
SECTION A
3'-6" BARRIER SHOWN LEVEL

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

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

SECTION D
6'-0" BARRIER FOR USE WITH A GREATER THAN 7" (IN) TO 10" (IN) MAX. GRADE SEPARATION

SINGLE SLOPE BARRIER 2'-10" MINIMUM REVEAL
(EMBEDDED 3" (IN) MINIMUM IN ASPHALT OR CONCRETE)
HIGH PERFORMANCE SINGLE SLOPE BARRIER - 3' - 6' MINIMUM REVEAL
(EMBEDDED 3" (IN) MINIMUM IN ASPHALT OR CONCRETE)
HIGH PERFORMANCE SINGLE SLOPE BARRIER - 3'-6" MINIMUM REVEAL  
(EMBEDDED 10" (IN) MINIMUM IN COMPACTED SOIL)
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (n) minimum in asphalt or concrete. Embed barrier 10" (n) minimum in compacted soil. Install 3/8" (n) Premolded Joint Filler between segments. Fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.

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

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

4. 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 5'-6" and a minimum embedment of 3" (n) asphalt or concrete, or 10" (n) minimum in compacted soil.

**NOTES**

**PLAN**
- 1 & 2 - 3 SPACES @ 4" = 1'-0".
- 3 - 4 SPACES @ 6" = 2'-0".
- 4 - 12 SPACES @ 12" = 2'-0".

**ELEVATION**
- 3/8" (n) PREMOLDED JOINT FILLER - FOR PERMANENT INSTALLATION.

**SECTION A**
- 3/4" (n) CHAMFER (TPY).
- BARRIER HEIGHT (SEE NOTE 4).
- VARIOUS.

**SECTION B**
- 3/4" (n) CHAMFER (TPY).
- BARRIER HEIGHT (SEE NOTE 4).
- VARIOUS.

**SECTION C**
- 3/4" (n) CHAMFER (TPY).
- BARRIER HEIGHT (SEE NOTE 4).
- VARIOUS.

**REINFORCING STEEL BENDING DIAGRAM**
- VARIOUS: 5" to 1'-0".

**DIMENSION TABLE**

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

**ISOMETRIC VIEW**

2020.08.27 09:48:12 07:00'00" 09:56:28 - 07:00'00"
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (min) in asphalt or concrete; Embed barrier 10" (in) minimum in compacted soil; 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. See Standard Plan C-70.10 for REBAR GRID DETAIL and BARRIER CONNECTION DETAIL.

3. 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.

4. 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) in asphalt or concrete, or 10" (in) minimum embedment in compacted soil.

NOTE:
STEELE LDGED WIRE REINFORCEMENT DESIGNED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION, SECTION 6-103.

---

**DIMENSION TABLE**

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

**REINFORCING STEEL BENDING DIAGRAM**

SEE STD. SPEC. 3-44.1(2) FOR BENDING DIAMETERS

---

**SECTION A**

---

**SECTION B**

---

**ISOMETRIC VIEW**

---

**SINGLE-SLOPE CONCRETE BARRIER (PRECAST) VERTICAL BACK STANDARD PLAN C-75.20-02**

---

**APPROVED FOR PUBLICATION**

Date: 2020.09.16

09:57:18 - 07:00"
1. **PERMANENT INSTALLATION** requirements: Embed barrier 3" (in) minimum in asphalt or concrete; Embed barrier 10" (in) minimum in compacted soil. 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. **See Standard Plan C-70.10** for REBAR GRID DETAIL and BARRIER CONNECTION DETAIL.

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

4. 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) in asphalt or concrete, or 10" (in) minimum embedment in compacted soil.

---

**NOTES:**

- **REINFORCING STEEL BENDING DIAGRAM**
  - Steel welded wire reinforcement deformed for concrete may be substituted for reinforcing steel in accordance with Standard Specification, Section I-10.3

**DIMENSION TABLE**

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

**REINFORCING STEEL BENDING DIAGRAM**

- See Std. Spec. Sect. 3-6x10 for bending diameters
- Varies: 7.12" to 1'-4"
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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'-0" reveal, see Sheet 2. For High-Performance Barrier with a 3'-0" reveal, see Sheet 3.

**NOTES**

**EXPANSION JOINT DETAIL**

- Ensure no cement concrete enters the PVC conduit when pouring.
- EPOXY COATED
- PREMOLDED JOINT FILLER
- STEEL REINFORCEMENT SYMMETRICAL ABOUT

**SECTION B**

**REINFORCING STEEL BENDING DIAGRAM**

SEE STD. SPEC. SECT. S-07.12(2) FOR BENDING DIAMETERS

**DIMENSION TABLE**

<table>
<thead>
<tr>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-6&quot;</td>
<td>8&quot;</td>
<td>2&quot;-0&quot;</td>
<td>2&quot;-0&quot;</td>
<td>1&quot;-8&quot;</td>
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<tr>
<td>4'-0&quot;</td>
<td>9 1/4&quot;</td>
<td>2'-2 1/4&quot;</td>
<td>3'-0&quot;</td>
<td>1'-10&quot;</td>
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<tr>
<td>4'-6&quot;</td>
<td>10 1/4&quot;</td>
<td>2'-4 1/2&quot;</td>
<td>3'-6 1/2&quot;</td>
<td>2'-0&quot;</td>
<td>12</td>
<td></td>
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</tbody>
</table>
SECTION A

3'-4" BARRIER SHOWN LEVEL

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

EMBEDMENT 3" MIN.

TOP OF ROADWAY

2'-0" MIN. LAP

GRADE SEPARATION 3'-0" MIN. TO 4'-0" MAX.

SECTION A

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

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

EMBEDMENT 3'-0" MIN. TO 4'-0" MAX.

TOP OF ROADWAY

2'-0"

GRADE SEPARATION 3'-0" MIN. TO 4'-0" MAX.

SECTION A

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

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

EMBEDMENT 8" MIN. TO 14" MAX.

TOP OF ROADWAY

3'-0"

GRADE SEPARATION 4" MIN. TO 7" MAX.

SECTION A

6'-0" BARRIER FOR USE WITH A GREATER THAN 7" (IN) TO 10" (IN) MAX. GRADE SEPARATION (SEE NOTE 3)

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

EMBEDMENT 7" MIN. TO 10" MAX.

TOP OF ROADWAY

3'-0"

GRADE SEPARATION 7" MIN. TO 10" MAX.
HIGH-PERFORMANCE SINGLE SLOPE BARRIER - 3' - 6" MIN. REVEAL
3" (IN) MIN. EMBEDMENT

SECTION A
4' - 0" BARRIER SHOWN LEVEL

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

SECTION C
4' - 6" BARRIER FOR USE WITH A
GREATER THAN 3' (IN) TO 6' (IN) MAX.
GRADE SEPARATION
(SEE NOTE 3)
This page left blank intentionally.
1. The Vertical Back barrier is used only in the configurations shown in Standard Plans C-85.10 and C-85.11, and when placed against a retaining wall.

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

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

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

NOTE: STEEL WELDED WIRE REINFORCEMENT DeFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 6-10.3
DUAL-FACED TRANSITION SECTION LENGTH VARIES PER BARRIER TYPE

VERTICAL BACK LENGTH VARIES PER BARRIER TYPE AND TAPER RATE

SEE CONTRACT FOR TAPER RATE CONCRETE CAP

PLAN (CAST-IN-PLACE SHOWN)

SINGLE-SLOPE CONCRETE BARRIER DUAL-FACED

SLOPE TO DRAIN VARIES 0 to 5' - 0"

COMMERCIAL CONCRETE

3/8" PREMOLDED JOINT FILLER (TYP.)

3/4" CHAMFER (TYP.)

SINGLE-SLOPE CONCRETE BARRIER: DUAL-FACED

SINGLE-SLOPE CONCRETE BARRIER: VERTICAL BACK

SELECT BORROW - INCLUDE HAUL

STEEL WELDED WIRE FABRIC - COMPLY WITH STANDARD SPEC 9-07.7

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

1 1/2" CLEARANCE ON ALL SURFACES

DUAL-FACED TRANSITION SECTION

SELECT BORROW INCL. HAUL

STEEL WELDED WIRE FABRIC

3/4" CHAMFER (TYP.)

SINGLE-SLOPE CONCRETE BARRIER: DUAL-FACED

SINGLE-SLOPE CONCRETE BARRIER: VERTICAL BACK

SELECT BORROW - INCLUDE HAUL

DUAL-FACED TRANSITION SECTION

DUAL-FACED DUAL-FACED DUAL-FACED

CONCRETE CAP

CONCRETE CAP

CONCRETE CAP

VERTICAL BACK

SELECTION B

SECTION B

SELECT BORROW INCL. HAUL

STEEL WELDED WIRE FABRIC

3/4" CHAMFER (TYP.)

SINGLE-SLOPE CONCRETE BARRIER: DUAL-FACED

SINGLE-SLOPE CONCRETE BARRIER: VERTICAL BACK

SELECT BORROW - INCLUDE HAUL

DUAL-FACED DUAL-FACED DUAL-FACED

CONCRETE CAP

CONCRETE CAP

CONCRETE CAP

VERTICAL BACK

SECTION A

SELECT BORROW - INCLUDE HAUL

STEEL WELDED WIRE FABRIC

3/4" CHAMFER (TYP.)

SINGLE-SLOPE CONCRETE BARRIER: DUAL-FACED

SINGLE-SLOPE CONCRETE BARRIER: VERTICAL BACK

SELECT BORROW - INCLUDE HAUL

DUAL-FACED DUAL-FACED DUAL-FACED

CONCRETE CAP

CONCRETE CAP

CONCRETE CAP

VERTICAL BACK

ISOMETRIC VIEW (CAST-IN-PLACE SHOWN)

NOTES

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

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

1. Existing barrier in front of bridge piers following this plan placement may remain in place for preservation (P1, P2, and P3) projects. Contact the HQ Bridge traffic barrier specialist before using this barrier placement plan for projects involving new or reconstructed bridges.

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

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

**NOTICE:**

This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file. A copy may be obtained upon request.
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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
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

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

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NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.
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DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

DEPRESSED CURB AND GUTTER SECTION
AT CURB RAMPS AND DRIVEWAY ENTRANCES

NOTE

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

CEMENT CONCRETE PEDESTRIAN CURB

Michael S Fleming
CEMENT CONCRETE CURBS
STANDARD PLAN F-10.12-04
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Date: 2020-09-24 07:57:43.075012
Washington State Department of Transportation
1. The intent of this design is to facilitate the compaction of Hot Mix Asphalt pavement adjacent to a drainage structure. The centerline of the drainage structure may differ from the centerline of the frame and grate.

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.

Curb Placement

SECTION A

SECTION B

ROUNDABOUT SPLITTER ISLAND NOISING CURB

SECTION C

DETAIL

(SEE CONTRACT PLANS FOR R)

PARTIAL PLAN

Curb 1

ROUNDABOUT TRUCK APRON CEMENT CONCRETE CURB & GUTTER

ROLLED CURB

Curb 2

(OUTSIDE, RIGHT SIDE OR SPLITTER ISLAND)

ROUNDABOUT CONCRETE CURB AND GUTTER

ROLLED CURB

Curb 3

ROUNDABOUT CENTRAL ISLAND CEMENT CONCRETE CURB

ROLLED CURB

SPLITTER ISLAND
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 distance 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 curbs are not used under Type 1 beam guardrail on roadways with a posted speed greater than 50 mph.

6. For extruded curb placement at Beam Guardrail Type 31, see Standard Plan C-20.10.

7. For extruded curb details, see Standard Plan F-10.42.
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
**Cement Concrete Sidewalk**

**Standard Plan F-30.10-04**

Sheet 1 of 1 Sheet

**Note:**

1. Gratings, Access Covers, Junction Boxes, Cable Vaults, Pull Boxes and other appurtenances within the sidewalk must have slip resistant surfaces, be flush with surface, and match grade of the sidewalk.

**With Raised Edge**

**Adjacent to Curb**

- 2" x 1" min. (See Contract)
- 1" x 1" (Typ.)
- 1/2" (Typ.)

**Finished Grade 1" (Typ.) Below Top of Concrete Surface**

**Curb Not Included in Bid Item - See Standard Plan F-10.12**

**Three 1/8" (Typ.) Premolded Joint Filler**

**Monolithic Cement Concrete Curb and Sidewalk**

**Curb Face Detail**

**Extend Sidewalk Transverse Expansion Joints To Include Curb (Full Depth)**

**Broomed Finish (Typ.)**

**Cement Concrete Curb Curb and Gutters Shown Not Included in Bid Item See Standard Plan F-10.12**

**Isometric View Joint and Finish Detail**

**Michael S. Fleming**

**Digitally signed by Michael S. Fleming**

**Date: 2020.09.25**

**16:43:50 -07'00'**

**Washington State Department of Transportation**
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NOTES

1. This plan is to be used where pedestrian crossing in one direction is not permitted.
2. At marked crosswalks, the connection between the Landing and the roadway must be contained within the width of the crosswalk markings.
3. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
4. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing or in the Depressed Curb and Gutter where the Landing connects to the roadway.
7. The Bid Item "Cement Concrete Curb Ramp Type __" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
8. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the curb ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.
10. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

LEGEND

- **S**LOPE IN EITHER DIRECTION
  - 1.5 OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
  - 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.)

- **C**EMENT CONCRETE CURB RAMP
- **T**YPE SINGLE DIRECTION A
- **P**AY LIMIT

- **C**EMENT CONCRETE CURB RAMP
- **T**YPE SINGLE DIRECTION B
- **P**AY LIMIT

**NOTE**

- **A**1ST STANDARD PLAN F-30.10
- **B**URGER STRIP ~ SEE CONTRACT PLANS
- **C**ROSSWALK ~ SEE CONTRACT PLANS
- **D**ETECTABLE WARNING SURFACE ~ SEE STANDARD PLAN F-45.10
- **E**XANSION JOINT ~ SEE CONTRACT PLANS
- **F**ACE OF CURB ~ SEE CONTRACT PLANS
- **G**RADE BREAK ~ SEE NOTE 8
- **H**istory of the Washington State Department of Transportation

**S**TANDARD PLAN **F-40.16-03**

**APPROVED FOR PUBLICATION**

**STATE DESIGN ENGINEER**

Washington State Department of Transportation
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’s, using basic wind speed of 115 mph, and 50 year design life.

3. All non-steel stressors 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 6.02.3(20).

PART | MATERIAL SPECIFICATION
--- | ---
PLATES AND BARS | ASTM A25 OR ASTM 572
PIPES | ASTM A53 GRADE B TYPE E OR S, OR EQUIVALENT HBS ASTM A500 ROUND GRADE B
RESIN BONDED ANCHORS | ASTM F1564 GRADE 56 GALV.
NUTS | ASTM A563 GRADE A
WASHERS | ASTM F436 TYPE 1
EPOXY RESIN | STD. SPEC. SECT. 9-26.1 (TYPE IV)

PIECE SIZE | X | Y | Z | W
--- | --- | --- | --- | ---
4" STD. | < 160 FT | < 2" - 6" | 
4" X-S | < 220 FT | < 7" - 6" |
6" STD. | < 260 FT | < 3" - 6" |

AREA CALCULATIONS

\[ X_1 \times Y_1 = 4' \times 4' = 16 \text{ FT}^2 \]
\[ X_2 \times Y_2 = 2.5' \times 2.5' = 6.25 \text{ FT}^2 \]
\[ \text{TOTAL AREA} = 16' + 6.25' = 22.3' \text{ FT}^2 \]

X Y Z CALCULATIONS

\[ X_1 \times Y_1 \times Z_1 = 4' \times 4' \times 12.6' = 203.2 \text{ FT}^3 \]
\[ X_2 \times Y_2 \times Z_2 = 2.5' \times 2.5' \times 8.25' = 51.56 \text{ FT}^3 \]
\[ \Sigma (XYZ) = 203.2 + 51.56 = 254.8 \text{ FT}^3 \]
\[ 254.8 \text{ FT}^3 < 260 \text{ FT} \text{ THEREFORE USE 5" STD. PIPE} \]
MAILBOX SUPPORT
TYPE 2

STANDARD PLAN H-70.20-01

MAILBOX SUPPORT TYPE 1
(WOOD POST SHOWN)

FOR DETAILS,
SEE STANDARD PLAN I-70.10

MAILBOX SUPPORT TYPE 2

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

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

MAILBOX PLACEMENT SECTIONS

MAILBOX SUPPORTS TYPE 2

SPACING DETAIL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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GENERAL NOTES

1. Each pad mounted cabinet shall be attached to the foundation with four 1/2" in. x 10" (in.) x 2" (in.) x 4" (in.) anchor bolts (see Anchor Bolt Detail this Sheet). Bolts, washers, and nuts shall be hot-dip galvanized in accordance with AASHTO M232 and meet the requirements of Standard Specification 9-06-5(1). Stainless steel epoxy anchors may be used as an alternative and shall be 1/2" (in.) diameter x 5" (in.) or 3/8" (in.) diameter x 8" (in.). Epoxy anchors shall use Type 304 stainless steel hardware: ASTM F653 all threaded rod, ASTM A240 washers, and ASTM F594 nuts. Anchor bolts shall extend 1 1/2" (in.) min. to 2" (in.) max. above the concrete pad.

2. All reinforcing steel shall be embedded 2" (in.) below the surface of concrete.

3. A 1/2" (in.) bead of silicone is required between each cabinet and the concrete foundation.

4. Concrete shall be Class 3000, in accordance with Standard Specification 8-20.3(4). All concrete corners shall have a 1" (in.) chamfer, unless abutting sidewalk, where it shall be square and separated from the sidewalk with joint filler.

5. 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.

6. Foundations require additional level clear space to achieve a minimum of 4 feet of level clear space between the face of any cabinet or cabinet riser and the edge of the level clear space. Clear space beyond the edge of the concrete pad shall be made up of crushed surfacing meeting the requirements of Standard Specification 9-03.9(l). Special design may be required where slopes are 3:1 or steeper. As an alternative, the concrete pad may be extended out to provide the required clear space.

7. Verify overall pad and concrete riser dimensions with the Engineer prior to placing concrete.

8. Not all Type 33x and 33XD cabinets have a police panel and/or a generator transfer switch (STS) panel. See Contract for specific cabinet requirements.
NOTES - SINGLE STRUT MOUNT CABINET (SHEET 2 OF 6)

A1. Drive ground rods before placing concrete. Ground rods shall be a minimum of 6 feet apart. See Standard Plan J-90.06 for additional details.

A2. Welded Wire Fabric (WWF) shall be 4.0 (in) x 4.0 (in) - WW4.0xWW4.0 - meeting the requirements of Standard Specification 9-07.7. As an alternative, a grid of #3 rebar may be used, with bars spaced at 1'-0" centers laterally and longitudinally.

A3. Install conduit couplings on all conduits. Couplers shall be installed with the top of the coupler flush with the top of concrete. For PVC conduits, the conduit segment above the coupler shall not be glued to the coupler.

A4. Vertical steel supports shall be two continuous 1 5/8" (in) x 1 5/8" (in) 12-gage slotted steel channels installed back-to-back (3 pans required) - see Strut Mount Support Details sheet for connection details. As an alternative, continuous 1 5/8" (in) x 3 1/4" (in) 12-gage slotted steel channel may be used in place of each channel pair. Channels shall be embeded a minimum of 12" (in) into the concrete foundation. Supports shall be evenly spaced, with the center support centered in the concrete riser, and the outer supports tied to the riser rebar hoop.

A5. Horizontal steel supports shall be continuous 1 5/8" (in) x 1 5/8" (in) 12-gage slotted steel channels (two required).

A6. Cabinet height shall be determined by the required height of the utility meter - verify height with serving utility (typically 5 to 6 feet).

A7. Serving utility may require meter socket to be installed on the outside of the cabinet. Utility feeder conduit shall still terminate in the utility section of the cabinet unless otherwise required by the utility.

A8. Additional gravel pad not shown. Gravel pad shall extend two feet in front of the concrete pad for the full width of the concrete pad. If the utility meter socket is installed on the outside of the service cabinet, gravel pad shall also extend three feet from the utility side of the cabinet pad. Final gravel area shall be a rectangle.

KEY NOTES - SHEET 2 OF 6

A1. Ground rod - See Note A1, this sheet.
A2. Ground rod well (Ground Hole) - 12" diameter concrete
A3. Service ground electrode conductors.
A5. Utility entrance conduit. Conduit shall terminate in the utility section of the service cabinet.
A6. Conduits to field equipment. Conduits shall terminate in the customer section of the service cabinet.
A7. Conduit couplers - See Note A3, this sheet.
A8. Vertical support steel channel - See Note A4, this sheet.
A9. Horizontal support steel channel - See Note A5, this sheet.
KEY NOTES - SHEET 3 OF 6

6. Ground rod – See Note B1, this sheet.

7. Ground rod well (Ground tile) - 12" diameter concrete

8. Service ground electrode conductors.


10. Utility entrance (service cabinet) or input power (transformer cabinet) conduit. Conduit shall terminate in the utility or high-voltage section of the cabinet (as applicable).

11. Conduits to field equipment. Conduits shall terminate in the customer section (service cabinet) or low-voltage (transformer cabinet) of the cabinet.

12. Condult couplers – See Note B4, this sheet.

13. 4" (in) diam. x 1/2" (in) deep sump. Slope foundation within cabinet footprint toward sump.

14. 3/8" (in) diam. polyethylene or copper tubing for drain. Tubing shall be straight but slope downward a minimum of 1" (in).

NOTES - SINGLE PAD MOUNT SERVICE OR TRANSFORMER CABINET (SHEET 3 OF 6)

B1. Drive ground rods before placing concrete. Ground rods shall be a minimum of 6 feet apart. See Standard Plan J-40.05 for additional details.

B2. Welded wire fabric (WWF) shall be 4.0 (in) x 4.0 (in) - W4.0 x W4.0 – meeting the requirements of Standard Specification 9-07. As an alternative, a grid of #3 nabor may be used, with bars spaced at 1-0" centers laterally and longitudinally.

B3. Omit concrete riser and bar #3 for Type D and Type E service cabinets.

B4. Install conduit couplings on all conduits. Couplings shall be installed with the top of the coupler flush with the top of the coupler. For PVC conduit, the conduit segment above the coupler shall not be glued to the coupler.

B5. Conduits shall extend a minimum of 2" (in) and a maximum of 3" (in) into the cabinet, as measured from the concrete surface to the top of the electrical elbow or outer bushing (RMC).

B6. Serving utility may require meter socket to be installed on the outside of the cabinet. Utility feeder conduit shall still terminate in the utility section of the cabinet unless otherwise required by the utility.

B7. Additional gravel pad not shown. Gravel pad shall extend two feet from the front of the concrete pad for the full width of the concrete pad. If the utility meter socket is installed on the outside of the service cabinet, gravel pad shall also extend three feet from the side of the cabinet pad where the meter is installed. Final gravel area shall be a rectangle.

B8. See Standard Plan J-10.14 for additional details when service or transformer cabinet is installed in fence line.

FOUNDATION SIZE REFERENCE TABLE

<table>
<thead>
<tr>
<th>CABINETS</th>
<th>PAD WIDTH (X)</th>
<th>PAD DEPTH (Y)</th>
<th>RISER WIDTH (A)</th>
<th>RISER DEPTH (B)</th>
<th>HOOP (1) WIDTH (in)</th>
<th>HOOP (1) DEPTH (in)</th>
<th>HOOP (2) WIDTH (in)</th>
<th>HOOP (2) DEPTH (in)</th>
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</thead>
<tbody>
<tr>
<td>TYPE D</td>
<td>6&quot; - 6&quot;</td>
<td>3&quot; - 8&quot;</td>
<td>N/A</td>
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<tr>
<td>TYPE E</td>
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<td>3&quot; - 8&quot;</td>
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<td>N/A</td>
<td>N/A</td>
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<tr>
<td>TRANSFORMER CABS</td>
<td>PAD WIDTH (X)</td>
<td>PAD DEPTH (Y)</td>
<td>RISER WIDTH (A)</td>
<td>RISER DEPTH (B)</td>
<td>HOOP (1) WIDTH (in)</td>
<td>HOOP (1) DEPTH (in)</td>
<td>HOOP (2) WIDTH (in)</td>
<td>HOOP (2) DEPTH (in)</td>
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<tr>
<td>XFMRL-S</td>
<td>6&quot; - 2&quot;</td>
<td>4&quot; - 11&quot;</td>
<td>2&quot; - 2&quot;</td>
<td>1&quot; - 11&quot;</td>
<td>1&quot; - 10&quot;</td>
<td>1&quot; - 7&quot;</td>
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<td>XFMRL-L</td>
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<td>5&quot; - 8&quot;</td>
<td>2&quot; - 10&quot;</td>
<td>2&quot; - 8&quot;</td>
<td>2&quot; - 6&quot;</td>
<td>2&quot; - 4&quot;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

REINFORCING STEEL BENDING DIAGRAM

<table>
<thead>
<tr>
<th>BAR</th>
<th>ALL DIMENSIONS ARE OUT TO OUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BENDS</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>BA</td>
</tr>
</tbody>
</table>

NOTE: BAR 3 DIMENSIONS ARE ALWAYS FOUR INCHES SMALLER THAN THEIR ASSOCIATED CONCRETE RISER DIMENSIONS.
NOTES - TYPE A (NARROW) AND TYPE B (WIDE) MULTI-CABINET FOUNDATION PAD (SHEETS 5 AND 6 OF 6)

D1. Drive ground rods before placing concrete. Ground rods shall be a minimum of 6 feet apart. See Standard Plan J-60.05 for additional details.

D2. Welded Wire Fabric (WWF) shall be 4.0 (in.) x 4.0 (in.) = 16.0 x 16.0 = meeting the requirements of Standard Specification 5-07.7. As an alternative, a grid of #3 rebar may be used, with bars spaced at 1'-0" centers laterally and longitudinally.

D3. See Sheet 3 for reinforcing steel bending diagrams.

D4. Concrete riser shall not include Type D or Type E Service Cabinets.

D5. Install conduit couplings on all conduits. Couplings shall be installed with the top of the coupler flush with the top of concrete. For PVC conduits, the conduit segment above the coupler shall not be glued to the coupler.

D6. Conduits shall extend a minimum of 2'-0" (in.) and a maximum of 3'-6" (in.) into the cabinet, as measured from the concrete surface to the top of the end bell (PVC) or ground bushing (RMC).

D7. Serving utility may require meter socket to be installed on the outside of the cabinet. Utility feeder conduit shall still terminate in the utility section of the cabinet unless otherwise required by the utility.

D8. Additional gravel pad not shown. Gravel pad shall extend two feet in front of the concrete pad for the full width of the concrete pad. If the utility meter socket is installed on the outside of the service cabinet, gravel pad shall also extend three feet from the side of the cabinet pad where the meter is installed. Final gravel area shall be a rectangle.

D9. Cabinet wells shall be provided for all Type 33x, Type 33xD, Type 342/LX, and NEMA P44 Cabinets, See Notes C3 on sheet 4 for Cabinet Well dimensions.

D10. At least one Generator Tie-Down Anchor shall be provided for each multi-cabinet pad foundation. A second Anchor shall be provided if there is a second cabinet with a Generator Transfer Switch (GTS). If a service or transformer cabinet is present, install one Anchor at either of the locations shown, closest to the cabinet with the GTS. If there is no service or transformer cabinet, install Anchors only at the ends of the cabinet rear.

KEY NOTES - SHEET 6 OF 6

(01) Ground rod – See Note D1, this sheet,

(02) Ground rod well (Ground site) - 12" diameter concrete

(03) Service ground electrode conductors,

(04) Welded wire fabric – See Notes D2, this sheet,

(05) Utility entrance (service cabinet) or input power (transformer cabinet) conduit. Conduit shall terminate in the utility or high voltage section of the cabinet (as applicable).

(06) Conduits to field equipment. Conduits shall terminate in the customer section (service cabinet) or low-voltage (transformer cabinet) of the cabinet.

(07) Conduit couplers – See Note D5, this sheet,

(08) Cabinet Well – See Note D9, this sheet,

(09) 3/8" (in.) diam. polyethylene or copper tubing for drain. Tubing shall be straight, but slope downward a minimum of 1" (in.)

(10) Generator Tie-Down Anchor – See Note D10, this sheet,

(11) Riser lip shall be 1" (in.) from the base edge of the largest cabinet to the face of the concrete riser. Smaller cabinets shall be positioned so that the front riser lip is 1" (in.) wide.

(12) For a Type A (Narrow) Pad, cabinet spacing shall be as follows:
   a. 12' (in.) between cabinets where at least one cabinet has a police panel or GTS door.
   b. 6' (in.) between cabinets where no police panel or GTS door is present.
**CABINET CLEARANCE REFERENCE TABLE**

<table>
<thead>
<tr>
<th>SERVICE CABINETS</th>
<th>LEFT SIDE</th>
<th>RIGHT SIDE</th>
<th>TRANSFORMER CABINETS</th>
<th>LEFT SIDE</th>
<th>RIGHT SIDE</th>
<th>SIGNAL AND ITS CABINETS</th>
<th>LEFT SIDE</th>
<th>RIGHT SIDE</th>
<th>FOUNDATION PAD DIMENSIONS X, Y, A, AND B SHOULD BE PROVIDED IN THE CONTRACT PLANS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE B MOD.</td>
<td>1' - 10&quot;</td>
<td>1' - 6&quot;</td>
<td>XFMR-L (UP TO 12.5 KVA)</td>
<td>2' - 0&quot;</td>
<td>5'</td>
<td>TYPE 33x</td>
<td>2' - 0&quot;</td>
<td>2' - 0&quot;</td>
<td>X: 28' - 6&quot;  Y: 26' - 6&quot;  A: 16' - 6&quot;  B: 20' - 6&quot;</td>
</tr>
<tr>
<td>TYPE D</td>
<td>2' - 0&quot;</td>
<td>6'</td>
<td>XFMR-S (12.6 TO 37.5 KVA)</td>
<td>3' - 8&quot;</td>
<td>6'</td>
<td>TYPE 343LX</td>
<td>3' - 0&quot;</td>
<td>3' - 0&quot;</td>
<td></td>
</tr>
<tr>
<td>TYPE E</td>
<td>2' - 0&quot;</td>
<td>2' - 4&quot;</td>
<td></td>
<td></td>
<td></td>
<td>NEMA P44</td>
<td>3' - 6&quot;</td>
<td>3' - 6&quot;</td>
<td></td>
</tr>
</tbody>
</table>

6" FOR NEMA P44 CABINETS WITHOUT A REAR DOOR

**FOR THE EXAMPLE PAD SHOWN HERE:**
- SPACE BETWEEN TYPE E CABINET AND SPACE BETWEEN TRANSFORMER CUBICLE AND TYPE B MOD. CABINET IS 10' - 0"
- SPACE BETWEEN TRANSFORMER CUBICLE AND A 33x CABINET IS 14' - 0"
- SPACE BETWEEN A 33x AND A 33xD CABINET IS 2' - 0"
- OVERALL PAD WIDTH (X): 28' - 6"
- OVERALL PAD DEPTH (Y): 26' - 6"
- OVERALL RISER WIDTH (A): 16' - 6"
- OVERALL RISER DEPTH (B): 20' - 6"

**KEY NOTES - SHEET 6 OF 6**

- (E1) Ground rod ~ See Note D1, Sheet 5 of 6.
- (E2) Ground rod well (Ground stake) - 12" diameter concrete
- (E3) Service ground electrode conductors.
- (E4) Welded wire fabric ~ See Note D2, Sheet 5 of 6.
- (E5) Utility entrance (service cabinet) or input power (transformer cabinet) conduit. Conduit shall terminate in the utility or high voltage section of the cabinet (as applicable).
- (E6) Conduits to field equipment. Conduits shall terminate in the customer section (service cabinet) or low voltage (transformer cabinet) of the cabinet.
- (E7) Conduit couplers ~ See Note D5, Sheet 5 of 6.
- (E8) 4" (in) diam. x 1/2" (in) deep sump. Slope foundation within cabinet footprint toward sump.
- (E9) Cabinet Well ~ See Note D5, Sheet 5 of 6.
- (E10) 3/8" (in) diam. polyethylene or copper tubing for drain. Tubing shall be straight, but slope downward a minimum of 1" (in).
- (E11) Generator Tie-Down Anchor ~ See Note D10, Sheet 5 of 6.
- (E12) Riser lip shall be 1 1/2" (in) from the base edge of the largest cabinet to the face of the concrete riser. Smaller cabinets shall be positioned so that the front riser lip is 1" (in) wide.

For a Type B (Wide) Pad, spacing between the cabinets shall match the widest dimension of the two adjacent cabinets. For Type D and Type E Service Cabinets, the clearance is to the face of the adjacent concrete riser (when present). See left and right clearance table this sheet.

**CABINET ORIENTATION CONDUIT LAYOUT AND FOUNDATION DETAIL**

**STANDARD PLAN J-10.10-04**

**SHEET 6 OF 6 SHEETS**

Date: 2020.09.16 10:10:28

Washington State Department of Transportation

**APPROVED FOR PUBLICATION**

[Signature]

Aug 31, 2020 1:07 AM
NOTES

1. Drive ground rods before placing concrete. Ground rods shall be a minimum of 6 feet apart. See Standard Plan J-69.05 for additional details.

2. Welded wire fabric (WWF) shall be 4.0 x 4.0 - W4.0 x W4.0 - meeting the requirements of Standard Specification, Section 9-07.7. As an alternative, a grid of #3 rebar may be used, with bars spaced at 1'-0" centers laterally and longitudinally.

3. Install conduit couplings on all conduits. Couplers shall be installed with the top of the coupler flush with the top of the concrete. For PVC conduits, the conduit segment above the coupler shall not be glued to the coupler.

4. Horizontal steel supports shall be continuous 1 5/8" (in.) x 1 5/8" (in.) 12-gage slotted steel channels (two required).

5. Cabinet height shall be determined by the required height of the utility meter - verify height with serving utility (typically 5 to 6 feet).

6. Serving utility may require meter socket to be installed on the outside of the cabinet. Utility feeder conduct shall still terminate in the utility section of the cabinet unless otherwise required by the utility.

7. Additional gravel pad not shown. Gravel pad shall extend two feet in front of the concrete pad for the full width of the concrete pad. If the utility meter socket is installed on the outside of the service cabinet, gravel pad shall also extend three feet from the utility side of the cabinet pad. Final gravel area shall be a rectangle.

KEY NOTES

1. Ground rod ~ See Note 1
2. Ground rod well (Ground Ile) ~ 12" diameter concrete
3. Service ground electrode conduct.
5. Utility entrance conduit. Conduit shall terminate in the utility section of the service cabinet.
6. Conduits to field equipment. Conduits shall terminate in the customer section of the service cabinet.
7. Conduit couplers ~ See Note 3.
8. 6 x 8 x 10 ft long treated timber post

SERVICE CABINET INSTALLATION - WOOD POST

STANDARD PLAN J-10.12-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Roark, Steve

Washington State Department of Transportation

Jackson, Tim

24-3039-38 AM
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NOTES
1. Metering arrangements may vary with different serving utilities. The Contractor shall verify the requirements of the utility prior to installing the service equipment.
2. All service pole conduits shall be secured to the pole with two-hole conduit straps spaced at 5' (ft) maximum centers. See Standard Plans J-59.13 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 ALTERNATE STANDOFF BRACKET DETAIL.
3. No equipment shall be installed on the half of the pole facing the roadway with the exception of the meter socket. Meter may only be installed facing the roadway if required by the utility.
4. Where required by the serving utility, a service disconnect switch or breaker shall be installed above the meter socket in a separate rain-tight enclosure.
5. See Standard Plan J-60.05 for grounding details.
6. Photovoltaic Control Enclosure shall be fabricated from either:
   a. 5/8" (in) expanded steel mesh with welded seams and mounting flanges, hot-dip galvanized after fabrication, 30-μm
   b. Type 5052 - H32 aluminum, with 5/8" (in) x 5/8" (in) openings equivalent to 5/8" (in) expanded steel mesh.
   Enclosure shall be removable from the outside of the junction box.
7. The photovoltaic control unit shall be centered in the photovoltaic control enclosure to permit 360 degree rotation of the photovoltaic control unit without removal of the photovoltaic control unit or the photovoltaic control enclosure.
8. All nuts, bolts, screws, and washers used for mounting the photovoltaic control enclosure, conduit body covers, and junction box cover shall be ASTM F593 or A193 Type 304 or Type 316 stainless steel.
9. Galvanized steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.
10. Install conduit couplings on all conduits.
11. Conduit shall enter the cabinet behind the dead front, but clear of the lighting contactor(s).
12. Pole burial depth shall meet the requirements of Standard Specification Section 8-20.3(13)A.
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NOTES
2. Cabinet shall be rated NEMA 3R.
3. Dimensions shown are minimum and shall be adjusted to accommodate various sizes of equipment installed. A 1% tolerance is allowed for all dimensions.
4. Door shall be pad-lockable and gasketed.
5. Hinges shall have stainless steel or brass pins. See Standard Plan J-10.20 for door hinge details.
6. 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 brass pin or socket in place. See Standard Plan J-10.23 for alternate door hinge details.
7. Equipment identified by Key Numbers 2, 3, 4, 5, 6, and 7 shall have an appropriately engraved name plate attached with screws or rivets. The name plate for Key Number 4 shall read as follows: "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF - AUTOMATIC."
   See Test Switch Label Detail.
8. All buswork shall be high grade copper and shall have a minimum rating of 250 amps. All breakers shall slot on to the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
9. All internal wires shall be identified with "TO - FROM" coded tape labeled with the code letters and/or numbers shown on the Schedules. Approved PVC or polyethylene wire marking sleeves shall be used.
10. See Contract for Breaker and Contactors Schedule.
11. Busbars shall be sized to accommodate up to #4 AWG wires.
KEY
1. METER BASE PER SERVING UTILITY REQUIREMENTS - SEE STANDARD PLAN J-10.35.
2. MAIN BREAKER (DPST – SIZE PER BREAKER SCHEDULE).
3. PHOTOCILL CONTROL BREAKER (SPST – 15 AMP – 120/240 VOLT).
5. PHOTOCILL CONTROL UNIT – SEE STANDARD SPECIFICATION 9-23.1(2).
6. BRANCH BREAKER (DPST – SIZE PER BREAKER SCHEDULE).
8. CONTACTOR – SEE BREAKER SCHEDULE.
11. BI-LATED NEUTRAL BUSES – 14 LUG CLOVER.
12. MOUNTING HOLE – SEE STANDARD PLAN J-10.20 FOR MOUNTING DETAILS.
13. 1½" NPT (Diameter threaded hole) – DRILL BEFORE CALWINING.
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 TINNED COPPER – SEE STANDARD PLAN J-10.20 FOR CABINET MAIN JUMPER ASSEMBLY DETAILS.
16. METAL WIRING DIAGRAM HOLDER.
17. REMOVABLE SUB PANEL FOR EQUIPMENT.
18. SCREENED VENTS – TWO REQUIRED (ONE EACH SIDE) – LOUVERED PLATES.
20. DRY TRANSFORMER (480V/208V) – 5 KVA – COPPER,Bussed AND COPPER WOUND.
21. 16-CIRCUIT PANEL BOARD – MINIMUM SIZE WITH BACK FED MAIN BREAKER.
22. LABEL CABINET WITH BUSWORK RATING.
23. 6-CIRCUIT PANEL BOARD – MINIMUM SIZE.
24. UTILITY DISCONNECT SWITCH ENCLOSURE WITH COVER – OMIT IF UTILITY DOES NOT REQUIRE THE DISCONNECT SWITCH.
25. ARC FLASH AND SHOCK HAZARD LABEL – SEE DETAIL.
26. CONNECTION TO GROUNDING ELECTRODE – SEE STANDARD PLAN J-60.05.
27. BOLT IN TYPE 2 SURGE PROTECTION DEVICE – 2 POLE 20 KA.

WARNING
ARC FLASH AND SHOCK HAZARD LABEL DETAIL

SECTION 3

NOTES
2. Cabinet shall be rated NEMA 3R and shall include two non-light vents.
3. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed. A 1% tolerance is allowed for all dimensions.
4. Door shall be lockable and gasketed.
5. Hinges shall have stainless steel or brass pins. See Standard Plan J-10.23 for door hinge details.
6. 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 soldier in place. See Standard Plan J-10.20 for alternate door hinge details.
7. Equipment identified by Key Numbers 3, 4, 4, 5, 7, 8, 9 and 10 should have an appropriately engraved phenolic name plate attached with screws or rivets. The name plate for Key Number 4 shall read as follows: "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF - AUTOMATIC." See Test Switch Label Detail.
8. All buswork shall be high grade copper and shall have a minimum rating of 250 amps. All breakers shall be rated to the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
9. All internal wires shall be identified with "TO - FROM" coded tags identified with the code letters and/or numbers shown on the Schedule. Approved PVC or polyvinyl wiring marking sleeves shall be used.
10. See Contract for Breaker and Contact Schedule.
11. Buss bars shall be sized to accommodate up to #4 AWG wires.

SERVICE CABINET TYPE C
(0 - 60 AMP TYPE 240/480 VOLT SINGLE PHASE)
STANDARD PLAN J-10.18-01
SHEET 1 OF 1 SHEET

Approved for Publication
Date: 2020.02.15
Time: 10:30 - 07:00
Approved by:

Washington State Department of Transportation

CR: FLINT

DRAWN BY:

WIRING DIAGRAM
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NOTES
2. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.
3. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed. A 1% tolerance is allowed for all dimensions.
4. Doors shall be pad-lockable and gasketed. Customer side door shall include a Best CX 6-pin Construction core lock.
5. Hinges shall have stainless steel or brass pins - see door hinge details. When using alternate door hinge, remove pin prior to welding hinge to cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with brass pin and solder in place.
6. Equipment identified by Key Numbers '14, 16, 17, 18, 19, 20, 21, 22, and 25 shall have an appropriately engraved phenolic name plate attached with screws or rivets, The name plate for Key Number 21 (Test Switch) only shall read as follows: "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF - AUTOMATIC." See service cabinet detail.
7. All buswork shall be high-grade copper and shall have a minimum rating of 250 amps. All breakers shall bolt on to buswork. Jumping of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
8. All nuts, bolts, and washers used for mounting the photocell enclosure shall be stainless steel.
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 polyolefin wire marking sleeves shall be used.
11. See Contract for Breaker and Contactor Schedule.
12. Bus barriers shall be sized to accommodate up to #4 AWG wires.
13. The meter base portion of this service was designed to meet metering portion of EUSERC Drawing 309 requirements.
14. 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 a partial diagram of the box and the front of the safety box to be less than 1/8" (11) shown in the left side diagram. Safety Sockets Box Mounting Details. The Contractor shall verify the serving Utility's requirements prior to fabrication and installation of the service equipment.
15. Verify the meter setback position with the utility and adjust the meter socket backplate to the required position. For cabinets with separate metering, remove the meter socket or install shunts in the meter socket.

KEY
1. Meter Socket/Base Panel per Utility Requirements - May require meter to be installed on the outside of the cabinet instead of inside the utility side of the cabinet.
2. Utility side door - hinged front facing door with 4" (102 mm) minimum polished wire glass window.
3. Customer side door with best BX 6-pin lock core.
4. Photocell enclosure - see photocell mounting detail. Enclosure shall be fabricated from either:
   A. 1/16" (1.6 mm) expanded steel mesh welded to welded seams and mounting flanges - hot-dip galvanized after fabrication.
   B. Type 3032 - 3032 aluminum with 1/8" (9 mm) x 1/8" (9 mm) openings equivalent to 1/8" (9 mm) expanded steel mesh.
5. Photovoltic control - see standard specification, section 9-29.12.
6. 1/4" (6.4 mm) diameter drain hole - drill before galvanizing.
7. Mounting hole - see service cabinet mounting details.
8. Hinged dead front with 1/8" turn fasteners or slide latches - dead front panel bolts shall not extend into vertical limits of the breaker array(s).
9. Arc flash and shock hazard label - see detail.
10. Cabinet buswork rating label.
11. Metal wiring diagram holder.
NOTES

2. Cabinet shall be rated NEMA 3R and shall include two rain-light vents.
3. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed. A 1% tolerance is allowed for all dimensions.
4. Doors shall be pad-lockable and gasketed. Customer side door shall include a Best CX 6-in Construction core lock.
5. Hinges shall have stainless steel or brass pins.
6. Equipment identified by Key Numbers 14, 16, 17, 18, 19, 20, 21, 22, 23, and 28 shall have an appropriately engraved phenolic name plate attached with screws or rivets. The name plate for Key Number 21 (Test Switch only) shall read as follows:
   "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF" - AUTOMATIC.
   See service cabinet detail.
7. All buswork shall be high grade copper and shall have a minimum rating of 250 amps. All breakers shall be solid to the buswork. Jumping of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
8. All nuts, bolts, and washers used for mounting the photocell enclosure shall be stainless steel.
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 "10 - FQMF" coded tags tied with the code letters and/or numbers shown on the Schedules, Approved PVC or polyethylene wiring sleeves shall be used.
11. Key Items 23, 24, and 25 shall be connected to the cabinet main bonding jumper assembly by appropriately sized wires.
13. Bus bars shall be sized to accommodate up to #4 AWG wires.
14. The meter base portion of this service was designed to meet metering portion of EUSEC Drawing 309 requirements.
15. 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 height of 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 size requirements prior to fabrication and installation of the service equipment.
16. Verify the meter setback position with the utility and adjust the meter socket backplate to the required position. For cabinets with separate metering, remove the meter socket or install shunts in the meter socket.
NOTES
2. Cabinet shall be rated NEMA 3R and shall include two rain-proof vents.
3. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed. A 1% tolerance is allowed for all dimensions.
4. Doors shall be pad-lockable and gasketed. Customer section doors shall include Best CX from Construction Core locks.
5. Hinges shall have stainless steel or brass pins.
6. Equipment identified by Key Numbers 14, 15, 17, 18, 19, 20, 21, 22, 23, and 28 shall have an appropriately engraved phenolic name plate attached with screws or rivets. The name plate for Key Number 21 (Test Switch Only) shall read as follows: "PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF - AUTOMATIC."
7. See service cabinet detail.
8. All buswork shall be at least 2 "high and shall have a minimum rating of 250 amps. All breakers shall be bolted on, the buswork. Jumpers of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
9. All nuts, bolts, and washers used for mounting the photocell enclosure shall be stainless steel.
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 wire runs shall be identified with "TO - FROM" coded tags labeled with the code letter and/or numbers shown on the Breaker Schedule. Approved PVC or polyethylene wire marking sleeves shall be used.

NOTES (CONTINUED)
12. Key Items 23, 24, and 25 shall be connected to the cabinet main bonding jumper assembly by approximately sized wire.
14. Buss bars shall be sized to accommodate up to #4 AWG wires.
15. 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-acetate box to be less than the 11" (in) shown in the Left Side - Safety Socket Box Mounting Detail. The Conveyor shall verify the Utility's requirements prior to fabrication and installation of the service equipment.
16. Verify meter setback position with the utility and adjust the meter socket backplate to the required position. For cabinets with separate metering, remove the meter socket or install shunts in the meter socket.
17. The requirement for a disconnect switch ahead of the meter varies with different serving Utilities. Verify with the serving Utility that a disconnect switch is required before installing the disconnect switch.

WARNING
Arc Flash and Shock Hazard
Appropriate PPE Required

PHOTOCELL ENCLOSURE MOUNTING DETAIL
METER SOCKET BASE PANEL FOR UTILITY REQUIREMENTS
- UTILITY MAY REQUIRE METER TO BE INSTALLED ON THE OUTSIDE OF THE CABINET INSTEAD OF INSIDE THE UTILITY SECTION OF THE CABINET
- CUSTOMER SECTION DOOR WITH BEST CX 6 PIN LOCK CORE
- LIDDED FRONT FACING DOOR WITH Caster PLATES
- EXPANDED STEEL MESH WITH WELDED SEAMS
- RUBBER WASHERS - APPLY SILICONE SEALER PRIOR TO INSTALLATION
- METAL WASHERS
- NUT
- SERVICE CABLE
- FLANGE
- MACHINE BOLT
- 1/4" X 1/2" X 1/2" X 1/2"

18. 2" X 1/2" X 1/2" X 1/2" X 1/2"

SERVICE CABINET DETAIL

SERVICE CABINET INTERIOR

WARNING
Arc Flash and Shock Hazard
Appropriate PPE Required

SERVICE CABINET TYPE E
480 VOLT SINGLE PHASE
STANDARD PLAN J-10.22-01
SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Date: 2023-02-14

Washington State Department of Transportation

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Sheet 1 of 2
1. Cabinet construction shall meet the requirements of Standard Specification 9-29.25. Aluminum cabinets shall have mill finish.
2. Buswork 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 cluch 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 S?? ???." 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.

NOTES:

BREAKER PANEL DETAIL

TRANSFORMER CABINET DETAILS

TRANSFORMER CABINET HOUSING

ELEVATION VIEW

SIDE VIEW

PLAN VIEW

SECTION A

KEY

1. TRANSFORMER
2. PRIMARY MAIN BREAKER – DPST
3. SECONDARY MAIN BREAKER AND 6 CIRCUIT BREAKER PANEL – SEE BREAKER PANEL DETAIL
4. SECONDARY MAIN BREAKER – DPST; ONE POLE UNUSED FOR 120V ONLY SECONDARY
5. SECONDARY BREAKER(S) - DPST OR DPST (DPST BREAKERS USE TWO POSITIONS)
6. RECEPTACLE BREAKER – SPST 20 AMP
7. ISOLATED NEUTRAL BUS – 12 LUG TINNED COPPER
8. GROUND BUS – 12 LUG COPPER
9. RECEPTACLE (GROUNDED) – GFCI 20 AMP
10. ENGRAVED PHENOLIC LABEL PLATE (SEE NOTE 4)
11. AVAILABLE FAULT CURRENT LABEL (SEE NOTE 10)
12. UPPER SECTION HINGED DEAD FRONT – ONLY BREAKERS AND RECEPTACLE FRONT ACCESSIBLE WHEN CLOSED
13. LOWER SECTION HINGED DEAD FRONT – ONLY MAIN BREAKER ACCESSIBLE WHEN CLOSED
14. ENCLOSED LOW VOLTAGE WIREWAY
15. SUPPLEMENTAL GROUND – CONNECT GROUND BUS TO FOUNDATION REBAR
16. LOW VOLTAGE POWER CONDUIT(S) TO LOADS
17. GROUND ELECTRODE CONDUIT – SEE STANDARD PLAN 240.05; SHEET 3 (SUPPLEMENTAL GROUND)
18. HIGH VOLTAGE INPUT POWER CONDUIT
19. SCREENED VENT LOUVERS – MINIMUM 2 REQUIRED (1 EACH SIDE)
20. HIGH VOLTAGE INPUT CONDUIT RESERVE AREA

KEY CONT.

1. LOW VOLTAGE AND GROUND CONDUIT RESERVE AREA
2. CABINET BONDING JUMPER AND LUG
3. GROUND ELECTRODE – SEE STANDARD PLAN J-60.05, SHEET 3
4. TRANSMFORMER HOUSING (480V/240V - 240V/120V)

STANDARD PLAN J-10.25-00

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

10/10/2017 3:11 PM

TUCKER LINDSTROM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

480V OR 240V INPUT - 240V/120V OUTPUT

480V OR 240V INPUT - 120V OUTPUT

WIRING SCHEMATICS
EDGE OF SHOULDER

SLIP BASE

SLOPE ROUNDING

VARIIES WITH OFFSET DISTANCE (6.0 MIN)

PILL MATERIAL

NOT STEEPER THAN 3H:1V SLOPE

CASE A

SLOPES 3H:1V THRU 2H:1V (MAX)

SECTION VIEW

DITCH SECTIONS

STEEL LIGHT STANDARD

FOUNDATION

SECTION VIEW

CASE B

SLOPES FLATTER THAN 2H:1V

PROVIDE 3.0' MIN. LEVEL GRADE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

CASE C

FORE SLOPES 4H:1V OR FLATTER

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE D

FORE SLOPES STEEPER THAN 4H:1V (2H:1V MAX.)

STEEL LIGHT STANDARD FOUNDATION

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STANDARD PLAN J-38.22-00

SHEET 2 OF 2 SHEETS

STEEL LIGHT STANDARD PLACEMENT (SLIP BASE)

STANDARD PLAN J-38.22-00

ELEVATION AUGUST 9, 2007

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STANDARD PLAN J-38.22-00

SHEET 2 OF 2 SHEETS

STEEL LIGHT STANDARD PLACEMENT (SLIP BASE)

STANDARD PLAN J-38.22-00

ELEVATION AUGUST 9, 2007

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
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MONOTUBE BEAM

MONOTUBE BEAM SIGN MOUNTING DETAILS
(Skewed sign detail)

FOR DETAILS NOT SHOWN SEE STANDARD PLAN G-90.20

STIFFENER PLATE DETAIL

STEEL SQUARE BAR

ROUND OR MULTI-SIDED SIGNAL BRIDGE

SIGN MOUNTING NOTES
2. Hot dip galvanize all non-stainless parts.
3. For sign lighting details, see Standard Plans J-75.40 (for Monotube) and J-75.45 (for Round or Multi-sided) structures.
4. Each sign shall be supported by a minimum of two support structures.
5. This details conceptual sign support and bracing. Engineer of Record shall design and analyze sign support in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signal - Latest edition.

STANDARD PLAN J-75.41-01

SHEET 4 OF 4 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Joseph B. Strauss Jan 29, 2000 3:04 PM

STANDARD BRIDGE ELECTRICAL DETAILS

ROUND OR MULTI-SIDED SIGNAL BRIDGE

SIGN MOUNTING DETAILS FOR LARGE SIGN
(FOR SIGNS - 4' (FT) x 12' (FT) OR LESS)

ROUND OR MULTI-SIDED SIGNAL BRIDGE

SIGN MOUNTING DETAILS FOR SMALL SIGN
(5' (FT) OR LESS)

PLAN VIEW

PLAN VIEW

ELEVATION VIEW

ELEVATION VIEW

ISOMETRIC VIEW

ISOMETRIC VIEW
NOTES

1. Equipment shall meet the requirements of and be constructed in accordance with the California Department of Transportation (CalTrans) Transportation Electrical Equipment Specifications (TEES) as currently published, including all errata, with modifications as shown here and described in Standard Specification section S-29.13(10).

2. The Generator Transfer Switch shall be wired into the Service Panel Assembly as shown.


4. Output File #1 LX shall include a Red Monitor Program Board and OL Monitor Cable terminal. The Red Monitor Program Board shall use the general layout and be labeled as shown here.

5. Output File #2 LX shall only be provided when specified in the Contract.

6. Bus Bars shall be capable of being used without installing lugs on field wires.

7. The Detector Termination and Interface Panel shall be located on the input Panel side of the cabinet and above the controller as shown for accessibility. To accommodate Installation, Input Panel #1 may be expanded to 21 inches in width, with clear area maintained as shown, or a separate mounting panel may be installed and bolted to both the cabinet rack and Input Panel #1.

8. A 20-conductor cable, 36 inches in length, shall be installed between the Red Interface Connectors on the Red Monitor Program Board and the front of the installed Conflict Monitor. Terminate the cable with compatible 2-row, 20-pin IDC connectors.

9. Jumpers may be oriented horizontally or vertically.

10. The Red Monitor Program Board shall have the label shown printed on the back of Output File #1 LX, directly above the cutout for the board.
NOTES
1. Upper and lower channel identification labels shall match the detector channels shown in the Contract Plans.
2. Connectors D73P, D73P, D45S, and D4AP are Type DD50 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 Terminations Interface Panel terminals not shown due to variations in arrangement and numbering between manufacturers.
4. Connectors D73P and D4AP will 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 D73P and D4AP shall be designed such that they can be connected directly, bypassing the Detector Test Panel.
6. The Detector Terminations 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.

DD50 D-SUB CONNECTOR PINS
A plug (male) connector shown – MIRROR FOR SOCKET (FEMALE) CONNECTOR – SEE NOTE 2
CONNECTOR PIN ASSIGNMENTS (SEE NOTE 3)

CONNECTOR D73P

CONNECTOR D45S

CONNECTOR D4AP

PIN TABLE EXAMPLES:
JHF: Input File J, Slot 1, Terminal F
D74: Detector #14
IBU - IN: Detector Test Panel Position 9.
Upper Channel, Detector Connections
C1 - 8: C1 Connector, Pin 8
NA: Not Applicable
NC: Not Connected

TYPE 332 SIGNAL CABINET
DETECTOR TEST PANEL
STANDARD PLAN J-80.15-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION

Washington State Department of Transportation

Novel, Moffsie
Jan 14, 2018 8:15 AM
1. Equipment shall meet the requirements of and be constructed in accordance with the California Department of Transportation (CalTrans) Transportation Electrical Equipment Specifications (TEES) as currently published, including all errata, with modifications as shown here and described in Standard Specification Section 5-29.13(10) Pre-Terminated Fiber-optic Patch Panel field installed separately.

2. The following Input File Terminal Blocks shall be wired in parallel:
   - 115 to J15
   - 115 to J16

3. Power Distribution Assembly (PDA) #3LX shall be modified as follows:
   a. The C6P connector shall be included and wired as referenced in TEES Drawing A-6-15, Note 9.
   b. A second Model 430 Transfer Relay (TR2) shall be installed on the rear of the PDA and wired as shown.
   c. The following terminals shall be wired together as follows:
      - From To Function
      - T2-8 T4-5 TR1 Output to Field Green 2
      - T2-6 MU-3 Energizes TR1 and TR2 when MU is normal
      - T1-1, T1-2, T1-4 SR-3 Field Output - Sign On
      - T1-3, T1-4 SR-4 Field Output - Sign Off
   
4. Input Panel #1D shall meet the requirements of Input Panel #1 in the TEES, with the modifications shown here. Do Not include ground bus bars between terminal blocks TB2 through TB5. Relabel the C5 connector as C4P. The C4 connector cable shall be 4 feet in length.

5. Service Panel #1D shall meet the requirements of Service Panel #1 in the TEES, with the modifications shown here. The model 204 flasher shall include a socket and retaining strap, providing a snug fit and allowing the flasher to be removed, without tools, by pulling upwards.

6. Bus Bars shall be capable of being used without installing lugs on field wires.

7. The Sign Switch shall be a 3-position, stationary type toggle switch with a 10 amp contact rating.

8. The Police Control Switch shall be a 2-position, stationary type toggle switch with a 10 amp contact rating.

NOTE: Dimensions not shown shall be in accordance with the TEES.

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**Type 334 Ramp Meter/Data Station Cabinet Standard Plan J-81.10-01**

Sheet 1 of 3 sheets

Approved for publication
Date: 2020.09.16
Time: 10:21:36 - 07:00

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, 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 screenprint directly onto the panel.

D5. The Sign Relay socket and connectors P16, P28, and CSP shall be installed on the back of the panel. Connectors P16 and P28 are Type D770 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 amperes continuous duty. The relay shall operate from ground output from the controller, and draw less than 75 milliamps when energized AC wiring between the relay and the PDA shall be #14 AWG.

D7. See Standard Specification Section 9-28.13(f) for additional requirements.

SIGN RELAY DETAIL

(SEE NOTE 09)

SIGN FLASHER DETAIL

(SEE NOTE 05)

POLICE CONTROL (PC) SWITCH DETAIL

(SEE NOTE 09)
### C1 Connector Pin Assignments

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### C4, C6, and C8 Connector Pin Assignments

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### Display Panel Inputs Functional Block Diagram

- **Connector P1P**
- **Display Panel**
- **Connector P2P**

**Note:** Connectors P1P and P2P shall be mounted to the back of the display panel and shall be secured using a spring latch (male) type connection.

### P1 and P2 Connector Pin Assignments

#### Connector P1P

<table>
<thead>
<tr>
<th>Pin Connect</th>
<th>Function</th>
<th>Pin Connect</th>
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#### Connector P2P

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</tbody>
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### Pin Table Examples:
- **Connector P1P to DET-1:** Input File 1, Slot 1, Terminal F
- **Connector P2P to DET-2:** Input Terminal

### Type 334 Ramp Meter/Data Station Cabinet

- **J-1F:** Input File 1, Slot 1, Terminal F
- **P5:** Display Panel
- **DET-7:** Input Terminal

- **C1:** 1 Connector Pin 68

- **Location:** Flint

**Approval:**
- **Date:** September 3, 2010
- **Time:** 9:43 AM
- **Department:** Department of Transportation
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(1/2) feet offset may be used. A 1(1/2) lateral offset may be used in business, commercial or residential areas.

3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.

<table>
<thead>
<tr>
<th>Height V</th>
<th>To Bottom of Sign [When Required]</th>
<th>To Bottom of Supplemental Plaque [When Required]</th>
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</thead>
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<tr>
<td>RURAL</td>
<td>6' Minimum</td>
<td>4' Minimum</td>
</tr>
<tr>
<td>URBAN</td>
<td>7' Minimum</td>
<td>6' Minimum</td>
</tr>
</tbody>
</table>
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.

WARNING LIGHT ATTACHMENT

- Drill three 1/2" dia. holes through barricade support angle.
- Use attachment detail A.

ATTACHMENT DETAIL A

- Drill two 1/2" dia. holes through barricade support angle.
- Use attachment detail B.

ATTACHMENT DETAIL B

- Attache 3/4" x 1 1/2" x 1/8" steel angle on top of bolt.
- Use top of barricade.
- Use detail C.

DETAIL C

- Use notes 1 and 3.
- Use Type 3 barricade.
- Use Type 3 barricade.
- Use notes as required.
- Use top of barricade.
- Use detail C.

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 9, 2007

NOTE 1: ALL FASTENERS MAY BE ZINC PLATED, GALVANIZED OR STAINLESS STEEL. ALL STEEL ANGLE AND TUBULAR STEEL SHALL BE HOT-ROLLED, HIGH CARBON STEEL, PAINTED OR GALVANIZED.

NOTE 2: 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.

NOTE 3: WHEN SANDBAGS ARE USED IN FREEZING WEATHER, UREA FERTILIZER SHALL BE MIXED WITH THE SAND IN A QUANTITY TO PREVENT THE SAND FROM FREEZING.

NOTE 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.

NOTE 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.

NOTE 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.
NOTES
1. The intended use of this plan is for the temporary installation of the Type 2 Concrete Barrier on cement concrete pavement, bridge decks, or hot mix asphalt pavement, and Type F Concrete Barrier on bridge decks.
2. 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 barrier barrier.
3. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.
4. Use sheets to properly fit the Type 1 Anchors to the barrier and roadway surfaces.
5. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification, Section 6.02.3(20).
6. 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.
7. After removing the Type 3 Anchors, close the pin holes and fill them with sealant according to Standard Specification, Section 9-04.2.

TYPE 1 ANCHOR
TEMPORARY INSTALLATION OF PRECAST CONCRETE BARRIER TYPE 2 ON CEMENT CONCRETE PAVEMENT OR BRIDGE DECK, AND TEMPORARY INSTALLATION OF PRECAST CONCRETE BARRIER TYPE F (STANDARD PLAN C-05.10) ON BRIDGE DECK.

TYPE 3 ANCHOR
TEMPORARY INSTALLATION OF PRECAST CONCRETE BARRIER TYPE 2 ON HOT MIX ASPHALT PAVEMENT.
NOTES

1. The intended use of this plan is for the temporary installation of Type F Narrow Base concrete barrier (see Standard Plan C-60.10) or Type 2 Narrow Base concrete 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, Section 6.02.3(20).

TRAFFIC SIDE

PROTECTED WORK AREA OR EDGE OF DECK

SECTION VIEW

TYPE 2 ANCHOR: CLASS 1 & 2 ATTACHMENT LOCATIONS

ATTACHMENT "A" DETAIL

ATTACHMENT "B" DETAIL
OLARE SCREEN TYPE 1
DESIGN B
STANDARD PLAN L-40.15-01
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Peaco Ralston, RI 08/19/11
Washington State Department of Transportation
NOTES
1. Where shown on the Plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.
2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
TWO-LANE TAPERED ON-CONNECTION

1/2 MILE MINIMUM

500' - 1000' APPROX ONLY - SPACE EVENLY

YELLOW EDGE LINE
LANE LINE

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 roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

TWO-LANE TAPERED OFF-CONNECTION

1/2 MILE MINIMUM

APPROX. 30'
SEE CONTRACT
COLLECTOR-DISTRIBUTOR ROAD
ON-CONNECTION

LEGEND

C.D.R = COLLECTOR DISTRIBUTOR RAMP LANE WIDTH
C.D.L = COLLECTOR DISTRIBUTOR LANE WIDTH
R = RAMP LANE WIDTH
L = LANE WIDTH

NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown herein. See the Standard Plan 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.
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 = Lane Width. See Contract for specified lane widths.

\[<^\text{2L} \text{ (SL) Traffic Arrow} \]

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<td>20 MPH</td>
<td>20'</td>
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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 39-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND

\[ L = \text{Lane Width. See Contract for specified lane widths.} \]

\[ \angle \text{ Type 2L (SL) Traffic Arrow} \]

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<td>21</td>
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<tr>
<td>20 MPH</td>
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</table>

\[ RADIUS = RADIUS \]

\[ \text{OF MARKING} \]

OPTIONAL MARKED DECELERATION TAPER
(FOR LIMITED USE IN URBAN AREAS)
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.

5. Centerline striping on four-lane undivided highways shall be a double centerline.

6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

**LEGEND**

- **L** = Lane Width. See Contract for specified lane widths.
- **L T** = Left-Turn Lane width. See Contract
- **<^T^->** = Type 2L (SL) Traffic Arrow

Can be reduced to a minimum of 50' to increase storage capacity.
RIGHT TURN CHANNELIZATION

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

OPTIONAL DOTTED EXTENSION LINE

CENTERLINE STRIPE (SEE NOTE)

WHITE EDGE LINE

NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double center line.
6. All Traffic Arrows not required are optional, but recommended. Arrows may be added for longer storage lanes, or deleted for shorter storage lanes. See Contract Plans.

LEGEND

L = Lane Width. See Contract for specified lane widths.

= Denotes required traffic arrow. Accompanying ONLY word message optional. See Standard Plan M-00.10 for spacing.

Type 2R (SR) Traffic Arrow

Type 3L (SL) Traffic Arrow

RIGHT TURN CHANNELIZATION

WITH DROP LANE

DOTTED EXTENSION LINE

LEFT LANE LINE

RIGHT LANE LINE

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

CENTERLINE STRIPE (SEE NOTE)

WHITE EDGE LINE

RIGHT TURN CHANNELIZATION

DOUBLE RIGHT TURN CHANNELIZATION

200' MIN. (SEE CONTRACT)

VARES

75' MIN. (SEE CONTRACT)

WIDE DOTTED LANE LINE

DOTTED EXTENSION LINE

SEE CONTRACT

LEFT LANE LINE

RIGHT LANE LINE

DOUBLE CENTERLINE (YELLOW) (NARROW PATTERN)

CENTERLINE STRIPE (SEE NOTE)

WHITE EDGE LINE

LANE LINE

WIDE LANE LINE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Date: 2020.09.25
14.07.04 - 07/00"
When specified in the Contract Plans, the HOV Symbol Marking shall be installed with an offset of 1 foot max. from the lane centerline.
NOTES
1. These details can vary greatly according to the Contract plans.
2. The need for Advance Roundabout Traffic Arrows is based upon created speed of approach roadway.
3. Place Arrows in the circulating lanes as close as possible to the center of the lane to avoid having them in the wheel paths.
4. Local agencies (on non-state route interchanges) may elect to use Yellow Lid Symbol Type 2 (sharks teeth) prior to the Wide Dotted Entry Line. See Standard Plan M-24.40 for details.
5. Check with Region Traffic office regarding RPM and Guiderail placement and uses.

Typical Roundabout Hatching Detail

For Crosswalk layout detail - See Standard Plan M-15.10

Typical Roundabout Marking Detail

Roundabout Circle Marking Detail

With Type 35L Traffic Arrows - See Standard Plan M-24.40

Roundabout Pavement Markings

Standard Plan M-12.10-02

Approved for Publication
Date: 2020.09.25
14:57:53 -0700

Washington State Department of Transportation
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NOTES
1. Dotted Extension Line shall be the same color as the line it is extending.
2. Edge Line shall be white on the right edge of traveled way, and yellow on the left edge of traveled way. (on one-way roadways). Solid Lane Line shall be white.
3. The distance between the lines of the Double Centerline shall be 12" everywhere, except 4" for left-turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-state routes) may specify a 4" distance for all locations. The distance between the lines of the Double Lane Line shall be 4".

LONGITUDINAL MARKING PATTERNS

EDGE LINE & SOLID LANE LINE

YELLOW OR WHITE - SEE NOTE 2

SEE CONTRACT FOR LENGTH

WIDE BROKEN LANE LINE

WHITE

SEE CONTRACT FOR LENGTH

REVERSIBLE LANE LINE

YELLOW

SEE CONTRACT FOR LENGTH

NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE

YELLOW - CENTERLINE, WHITE - LANE LINE

SEE CONTRACT FOR LENGTH

CENTERLINE & LANE LINE

SEE CONTRACT FOR LENGTH

DOUBLE CENTERLINE & DOUBLE LANE LINE

YELLOW - DBL. CENTERLINE, WHITE - DBL. LANE LINE

SEE CONTRACT FOR LENGTH

WIDE EDGE LINE & WIDE SOLID LANE LINE

OPTION TO USE AS CIRCULATORY ON ROUNDABOUT APPLICATIONS

SEE CONTRACT FOR LENGTH

DOUBLE WIDE LANE LINE

WHITE

SEE CONTRACT FOR LENGTH

BARRIER CENTERLINE

YELLOW

SEE CONTRACT FOR LENGTH
Roundabout Specific Lines

- **DOTTED LANE LINE**
- **WIDE DOTTED LANE LINE**
- **DOTTED EXTENSION LINE**
- **WIDE DOTTED EXTENSION LINE**
- **WIDE DOTTED ENTRY LINE**
- **STRONG LANE LINE**
  - Option to use as circulatory on roundabout applications
- **WIDE DOTTED CIRCULATING LANE LINE**

*Yellow or white - see note 1*
GENERAL NOTE
See Standard Plan M-20.10 for pattern and color requirements.