Standard Plans

M 21-01
August 6, 2018
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Washington State Department of Transportation
Engineering and Regional Operations
Development Division, Design Office
PO Box 47329
Olympia, WA 98504-7329

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

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

Contact the Design Standards Team at:

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

Design Standards
Transportation Building
Olympia, WA 98504-7329.

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

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

/s/Jeff Carpenter
Jeff Carpenter
State Design Engineer
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| J-10.17-00                            | Service Cabinet Type B (0 - 60 Amp Type 120/240 Volt Single Phase) | 6/3/15 2 Sheets |
| J-10.18-00                            | Service Cabinet Type C (0 - 60 Amp Type 240/480 Volt Single Phase) | 6/3/15 2 Sheets |
| J-10.20-01                            | Service Cabinet Type B Modified (0 - 200 Amp Type 120/240 Single Phase) | 6/1/16 5 Sheets |
| J-10.21-00                            | Service Cabinet Type D (0 - 200 Amp Type 120/240 Single Phase)   | 6/3/15                   |
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*Effective August 6, 2018*
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LINE STATIONING HUNDRED FOOT INCREMENTS
STANDARD PLAN A-10.10-0
SURVEY STAKES
NOTES

1. The Brass Disc will be furnished by the State.

2. The text in the shaded area (see TOP VIEW) shall be 3/16" high and will be stamped by WSDOT personnel prior to setting the cap. Only the assigned identification letters and numbers are to be placed on the Brass Disc.

3. The hole shall be 32" minimum in depth or 6" below the deepest recorded frost line. All loose material shall be removed from the bottom of the hole so that the concrete is placed on firm undisturbed earth.

4. The top of the concrete shall be troweled smooth and the Brass Disc set in the center with top flush and level. The top of the monument may be recessed or protruding, depending on conditions.

5. The Brass Disc shall be rotated so it can be read while the observer is facing north.

6. When the concrete is set, cover the entire monument with moist earth and leave for three days.

7. To replace a Public Land Survey System (PLSS) corner, consult a licensed Professional Land Surveyor (PLS).

STATION NAME
PLS 12345

1/8" DIAM. PUNCH MARK
OR CHISELED "X"
(TO BE PLACED AT
ACTUAL POINT)

SECTION OF GROOVE
FOR 1/4" LETTERS

SECTION OF GROOVE
FOR 3/16" LETTERS

SECTION VIEW
LEDGE ROCK, CONCRETE,
OR ASPHALT INSTALLATION

INSTALL FERROUS MATERIAL
SEGMENT - I.E., STEEL ROD
OR EQUIVALENT, 8" LONG MIN.

GROUND LINE

SECTION VIEW
GENERAL INSTALLATION

EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES

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2. The text in the shaded area (see TOP VIEW) shall be 3/16" high and will be stamped by WSDOT personnel prior to setting the cap. Only the assigned identification letters and numbers are to be placed on the Brass Disc.

3. The hole shall be 32" minimum in depth or 6" below the deepest recorded frost line. All loose material shall be removed from the bottom of the hole so that the concrete is placed on firm undisturbed earth.

4. The top of the concrete shall be troweled smooth and the Brass Disc set in the center with top flush and level. The top of the monument may be recessed or protruding, depending on conditions.

5. The Brass Disc shall be rotated so it can be read while the observer is facing north.

6. When the concrete is set, cover the entire monument with moist earth and leave for three days.

7. To replace a Public Land Survey System (PLSS) corner, consult a licensed Professional Land Surveyor (PLS).
CONCRETE BASE

PLAN VIEW

RISER RING DIMENSIONS

<table>
<thead>
<tr>
<th>A (SIZE)</th>
<th>1 1/2&quot;</th>
<th>2&quot;</th>
<th>3&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 1/2&quot; DIAM.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 1/2&quot; DIAM.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9&quot; DIAM.</td>
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<td></td>
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</tr>
<tr>
<td>8&quot; DIAM.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 7/8&quot; R.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 1/8&quot; R.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 5/8&quot; R.</td>
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<tr>
<td>3 5/8&quot; R.</td>
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</tr>
<tr>
<td>3 3/8&quot; R.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION

RISER RING

SECTION

COVER

NOTES

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

APPROXIMATE WEIGHTS

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

MONUMENT CASE

STANDARD PLAN A-10.30-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

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

<table>
<thead>
<tr>
<th>SLOPE TREATMENT</th>
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</thead>
<tbody>
<tr>
<td>STANDARD PLAN A-20.10-00</td>
</tr>
<tr>
<td>SHEET 1 OF 1 SHEET</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLASS A</th>
<th>CLASS B</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUND LINE (L: V)</td>
<td>CUT SLOPE (H: V)</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+2 :1</td>
<td>0.5'</td>
</tr>
<tr>
<td>+3 :1</td>
<td>1.0'</td>
</tr>
<tr>
<td>+4 :1</td>
<td>1.0'</td>
</tr>
<tr>
<td>+6 :1</td>
<td>1.2'</td>
</tr>
<tr>
<td>L = LEVEL</td>
<td>2.0'</td>
</tr>
<tr>
<td>-3 :1</td>
<td>3.0'</td>
</tr>
<tr>
<td>-4 :1</td>
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<tr>
<td>-5 :1</td>
<td>3.0'</td>
</tr>
<tr>
<td>-6 :1</td>
<td>3.0'</td>
</tr>
<tr>
<td>2 :1</td>
<td>D</td>
</tr>
<tr>
<td>L = LEVEL</td>
<td>1.5'</td>
</tr>
<tr>
<td>+3 :1</td>
<td>0.5'</td>
</tr>
<tr>
<td>+4 :1</td>
<td>1.0'</td>
</tr>
<tr>
<td>+6 :1</td>
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<tr>
<td>-6 :1</td>
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<td>5 :1</td>
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<tr>
<td>L = LEVEL</td>
<td>1.0'</td>
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<td>+5 :1</td>
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<td>-5 :1</td>
<td>3.0'</td>
</tr>
<tr>
<td>-6 :1</td>
<td>3.0'</td>
</tr>
</tbody>
</table>

SLOPE TREATMENT NOT REQUIRED
CONCRETE SLOPE PROTECTION

STANDARD PLAN A-30.10-00

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

10 GAUGE 6" x 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE
(SEE STD. SPEC. 9407)

BOTTOM EDGE OF SLOPE PROTECTION FOLLOWS BOTTOM OF DITCH

EDGE OF SHOULDER

EFFECTIVE: August 5, 2018 TO September 2, 2019

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON, DISTRICT OF COLUMBIA, DEPARTMENT OF TRANSPORTATION

PLANNING OFFICE A-30

STATE OF WASHINGTON

STATE OF WASHINGTON LICENSED DESIGNER

NOTE: THIS PLAN IS SUBJECT TO CHANGE. THE ORIGINAL, SIGNED BY THE ENGINEER, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON, DISTRICT OF COLUMBIA, DEPARTMENT OF TRANSPORTATION

PLANNING OFFICE A-30

WASHINGTON, DISTRICT OF COLUMBIA, DEPARTMENT OF TRANSPORTATION

WASHINGTON, DISTRICT OF COLUMBIA, DEPARTMENT OF TRANSPORTATION

WASHINGTON, DISTRICT OF COLUMBIA, DEPARTMENT OF TRANSPORTATION

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WASHINGTON, DISTRICT OF COLUMBIA, DEPARTMENT OF TRANSPORTATION

WASHINGTON, DISTRICT OF COLUMBIA, DEPARTMENT OF TRANSPORTATION

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

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

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

All wire rope loops shall include a standard weight thimble.

**NOTES**

- Maximum anchor spacing (A) for debris and impact loads required as per table for a minimum allowable anchor capacity of 20,000 lbs. Systems subjected to snow loads may require narrower maximum spacing.
- Hexagonal mesh must meet minimum requirements of ASTM A975 for gabions.
- U-Section of wire rope clip must be applied to the dead end, and saddle of wire rope clip must be applied to the live end of the rope as shown.
- All wire rope loops shall include a standard weight thimble.
SLOPE PROTECTION ANCHORS

STANDARD PLAN A-30.35-00

EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES

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

GROUND LINE

3/4" DIAM. 6 x 19 IWRC GALVANIZED WIRE ROPE

TYPE 1

DEADMAN

FOR USE IN SOIL

3/4" DIAM. 6 x 19 IWRC GALVANIZED WIRE ROPE

TYPE 2

DEADMAN

FOR USE IN SOIL

3/4" DIAM. 6 x 19 IWRC GALVANIZED WIRE ROPE

TYPE 3

DRILLABLE - GROUTABLE

FOR USE IN ROCK

3/4" DIAM. 6 x 19 IWRC GALVANIZED WIRE ROPE

TYPE 4

3/4" WIRE ROPE

FOR USE IN ROCK OR SOIL

3/4" DIAM. 6 x 19 IWRC GALVANIZED WIRE ROPE

TYPE 5

MECHANICAL ANCHOR

FOR USE IN SOIL

3/4" WIRE ROPE

FOR USE IN ROCK

3/4" DIAM. 6 x 19 IWRC GALVANIZED WIRE ROPE

TYPE 6

DEFORMED STEEL THREADED BAR

FOR USE IN ROCK

3/4" DIAM. 6 x 19 IWRC GALVANIZED WIRE ROPE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

DOWEL BARS SPACED @ 1'-0" ON CENTER, AT TRANSVERSE JOINT

1 1/2" (TYP.)

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

WIRE LEG (TYP.)
0.117" DIAM.
3 PER ASSEMBLY
(WELD TO TOP SPACER BARS)

TOP SPACER BARS

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

DETAIL WIRE LEG DETAILS

"U" SHAPE DETAIL
WIRE LEG DETAILS

TOP SPACER BARS

"V" SHAPE DETAIL
WIRE LEG DETAILS

SECTION A
ELEVATION VIEW
"U" SHAPE ASSEMBLY SHOWN

SECTION B
ELEVATION VIEW
"U" SHAPE ASSEMBLY SHOWN

WIRE LEG (TYP.)
0.117" DIAM.
3 PER ASSEMBLY
(WELD TO BASE)

2/8" MIN.

DOWEL BAR BASKET

PLAN VIEW
"U" SHAPE ASSEMBLY SHOWN

ISOMETRIC VIEW
"U" SHAPE ASSEMBLY SHOWN

BASE

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

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

BOTTOM SPACER BARS

TOP SPACER BARS

DOWEL BAR BASKET PLAN VIEW "U" SHAPE ASSEMBLY SHOWN BASE BOTTOM SPACER BARS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

July 7, 2009

EFFECTIVE: August 5, 2018 TO September 2, 2019

STANDARD PLAN A-40.00-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019

**TYPICAL ISOLATION JOINT GUIDELINES**

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>FEATURE</th>
<th>EDGES, FLANGES OR LIPS IN THE PAVEMENT SECTION</th>
<th>CONTINUOUS VERTICAL FACE THROUGH THE PAVEMENT SECTION</th>
<th>DISTANCE FROM NEAREST TRANSVERSE JOINT</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>B</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>C</td>
<td>CATCH BASIN OR COMBINATION GRATE</td>
<td>USE</td>
<td>—</td>
<td>&gt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>D</td>
<td>GRATE INLET, CATCH BASIN OR CONCRETE INLET</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>E</td>
<td>GRATE INLET, CATCH BASIN OR CONCRETE INLET</td>
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<tr>
<td>F</td>
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<td></td>
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</tr>
<tr>
<td>G</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>H</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>I</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td>—</td>
<td>&lt; 4 FT FROM JOINT</td>
</tr>
<tr>
<td>J</td>
<td>MANHOLE OR CATCH BASIN TYPE 2</td>
<td>USE</td>
<td>—</td>
<td>&gt; 4 FT FROM JOINT</td>
</tr>
</tbody>
</table>

* WITH RECTANGULAR GRATE CAST INTO ADJUSTMENT SECTION

**TYPICAL APPLICATIONS**

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

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

**CONTINUOUS VERTICAL FACE THROUGH THE PAVED SECTION**

---

**PLAN**

**TYPICAL APPLICATIONS**

**SECTION A**

**SECTION B**

---

**PCC PAVEMENT ISOLATION JOINTS**

**STANDARD PLAN A-40.15-00**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: August 5, 2018 TO September 2, 2019**

---

**DRAWN BY:**

**DESIGNED BY:**

**CHECKED BY:**

**APPROVED FOR PUBLICATION**

---

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**July 7, 2009**

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**EFFECTIVE: August 5, 2018 TO September 2, 2019**

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**EFFECTIVE: August 5, 2018 TO September 2, 2019**

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**EFFECTIVE: August 5, 2018 TO September 2, 2019**

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**EFFECTIVE: August 5, 2018 TO September 2, 2019**

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NOTES

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

2. Sawcut shall be as described in Standard Specification Section 6-05.3(8) and sealed in accordance with Standard Specification Section 6-05.3(8).

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

4. For Details 1, 2, 3, and 4, the item “HMA SAWCUT AND SEAL” shall be used for payment. For Details 5 and 6, the item “PAVED PANEL JOINT SEAL” shall be used for payment. For Detail 7, the item “SEALING EXISTING LONGITUDINAL AND TRANSVERSE JOINT” shall be used for payment.
**CONCRETE STRUCTURE, PAVEMENT, AND APPROACH SLAB**

- BUTT JOINT BETWEEN CONCRETE AND ASPHALT
  - See DETAIL 3 OR 4, SHEET 1

**DETAIL 8**

- CONCRETE TO ASPHALT BUTT JOINT
  - PLANNING DETAIL

**DETAIL 9**

- PLANER DAMAGE DETAIL

**DETAIL 10**

- ASPHALT BUTT DETAIL
  - (SHOwing VERTICAL EDGE)

**NOTES FOR DETAIL 12:**

1. Final profile grade shall transition per Standard Plan A-60.30 to the existing profile and use vertical control per Standard Specification Section 5-04.3(3)(c).

2. The length of pavement repair for measurement and payment is the curb distance, measured along the back-of-pavement seat. Placement will be in accordance with Standard Specification Section 5-04.3(8).

3. Payment for final lift HMA is considered incidental to the item Pavement Repair, unless specified otherwise in the plans.

4. Mix design, design & acceptance is commercial HMA, unless specified otherwise in the plans.

5. Additional backfill up to one (1x) cubic yard is considered incidental to the item Pavement Repair.
WIRE ROPE LOOPS
- SEE STANDARD PLAN C-8
EDGE OF SHOULDER
(CURB LINE)
SEE NOTE
OMIT TAPERED BARRIER TOE
BACK OF PAVEMENT SEAT
BRIDGE F-SHAPE TRAFFIC BARRIER

PLAN
WITH TYPE 2 UNRESTRAINED BARRIER

PRECAST CONCRETE BARRIER
TYPE 2 (UNRESTRAINED)
CONCRETE BARRIER TRANSITION TYPE 2
VARIIES - SEE CONTRACT
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8f

WIRE ROPE LOOPS
- SEE STANDARD PLAN C-8
EDGE OF SHOULDER
(CURB LINE)
SEE NOTE
OMIT TAPERED BARRIER TOE
BACK OF PAVEMENT SEAT
BRIDGE F-SHAPE TRAFFIC BARRIER

PLAN
WITH ANCHORED BARRIER

PRECAST CONCRETE BARRIER
TYPE 2 (ANCHORED)
CONCRETE BARRIER TRANSITION TYPE 2
VARIIES - SEE CONTRACT
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8f

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

EDGE OF PAVED EMBANKMENT WIDENING
PRECAST CONCRETE BARRIER
TYPE 2 (UNRESTRAINED)
CONCRETE BARRIER TRANSITION TYPE 2
VARIIES - SEE CONTRACT
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8f

EDGE OF PAVED EMBANKMENT WIDENING
PRECAST CONCRETE BARRIER
TYPE 2 (ANCHORED)
CONCRETE BARRIER TRANSITION TYPE 2
VARIIES - SEE CONTRACT
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8f

EDGE OF PAVED EMBANKMENT WIDENING
SINGLE SLOPE CONCRETE BARRIER
(DUAL FACE)
VARIIES - SEE CONTRACT

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

1 1/4" PVC CONDUIT
SLEEVE
EDGE OF SHOULDER
(CURB LINE)
SEE NOTE
BACK OF PAVEMENT SEAT
BRIDGE TRAFFIC BARRIER
THREE #9 (EPOXY COATED) BARS
- SEE STD. PLAN C-14a
OMIT TAPERED BARRIER TOE

CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

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

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

4. Bars shall meet the requirements of Standard Specification 9-07.5(1) or 9-07.5(2).
NOTES

1. FINAL GRADE TRANSITION: The maximum longitudinal taper slope to transition an increase in roadway grade to the new or existing bridge grade will be at most 1 inch rise to 40 feet run (TV-450H or flatter) (0.2% maximum).

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

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

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

Bijan Khaleghi

Bridge Deck Transition for HMA Overlay
Standard Plan A-60.30-0

SHEET 1 OF 1 SHEET

Approved for Publication

Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

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

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

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

LEGEND

CONCRETE REMOVAL AREA
**NOTES**

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

2. The knockout diameter shall not be greater than 20" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification Section 5-04.3.

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.

---

**PIECE ALLOWANCES**

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
<td>12&quot;</td>
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<tr>
<td>ALL METAL PIPE</td>
<td>15&quot;</td>
</tr>
<tr>
<td>CPSP (STD. SPEC. SECT. 8-05.20)</td>
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<tr>
<td>SOLID WALL PVC (STD. SPEC. SECT. 8-05.12(1))</td>
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<tr>
<td>PROFILE WALL PVC (STD. SPEC. SECT. 8-05.12(2))</td>
<td>15&quot;</td>
</tr>
</tbody>
</table>

*CORRUGATED POLYETHYLENE STORM SEWER PIPE*

---

**CATCH BASIN TYPE 1**

**STANDARD PLAN B-5.20-02**

Sheet 1 of 1 Sheet

**STATE DESIGN ENGINEER**

Washington State Department of Transportation

**HELMAN, JULIE**

Jan 25 2017 2:53 PM

**PRECAST BASE SECTION**

---

**FRAME AND VANED GRATE**

---

**RECTANGULAR ADJUSTMENT SECTION**

---

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

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**ALTERNATIVE PRECAST BASE SECTION**

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**SEE NOTE 1**
PIPE ALLOWANCES

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED OR \newline \NEWLINE \NEWLINE PLAIN CONCRETE</td>
<td>18&quot;</td>
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<tr>
<td>ALL METAL PIPE</td>
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<tr>
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</table>
☆ CORRUGATED POLYETHYLENE \newline \NEWLINE \NEWLINE STORM SEWER PIPE

NOTES

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

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

RECTANGULAR ADJUSTMENT SECTION

FRAME AND VANED GRATE

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

TWO #3 BAR HOOPS

REDUCING SECTION

#3 BAR (TYP.)

#3 BAR EACH CORNER

#3 BAR HOOP

#3 BAR HOOP

#3 BAR (TYP.)

#3 BAR EACH CORNER

#3 BAR EACH WAY

#3 BAR HOOP

#3 BAR HOOP

(SEE NOTE 1)

PRECAST BASE SECTION

ALTERNATIVE PRECAST BASE SECTION

HELMAN, JULIE

Jan 25 2017 2:56 PM

CATCH BASIN TYPE 1L

STANDARD PLAN B-5.40-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

January 25, 2017

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE ENGINEER
NOTES

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

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

3. The maximum depth from the finished grade to the lowest pipe invert shall be 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.
CATCH BASIN FRAME AND VANED GRATE OR MANHOLE RING AND COVER

RECTANGULAR ADJUSTMENT SECTION OR CIRCULAR ADJUSTMENT SECTION

FLAT SLAB TOP

CATCH BASIN DIMENSIONS

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

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<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER</th>
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<td>144&quot;</td>
<td>78&quot;</td>
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</tbody>
</table>

NOTES

1. No steps are required when height is 4' or less.
2. The bottom of the precast catch basin may be sloped to facilitate clearing.
3. The rectangular frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
4. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification Section 9-04.3.
NOTES
1. The pipe supports and the flow restricter shall be constructed of the same material and be anchored at a maximum spacing of 36" (in). Attach the pipe supports to the manhole with 5/8" (in) stainless steel expansion bolts or embed the supports into the manhole wall 2" (in).
2. The vertical riser stem of the flow restricter shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8" (in).
3. The flow restricter shall be fabricated from one of the following materials:
   - 0.060" (in) Corrugated Aluminum Alloy Drain Pipe
   - 0.064" (in) Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.064" (in) Corrugated Aluminumized Steel Drain Pipe
   - 0.060" (in) Aluminum alloy flat sheet, in accordance with ASTM B 209, 5052 H32 or EPS High Density Polyethylene Storm Sewer Pipe
4. The frame and ladder or steps are to be offset so that: the shear gate is visible from the top; the climb-down space is clear of the riser and gate; the frame is clear of the curb.
5. The multi-orifice elbows may be located as shown, or all placed on one side of the riser to assure ladder clearance. The size of the elbows and their placement shall be specified in the Contract.
6. Restrictor plate with orifice as specified in the Contract. The opening is to be cut round and smooth.
7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 26 and ASTM B 275, designation Z032A; or cast iron in accordance with ASTM A 48, Class 30B.
   - The lift handle shall be made of a similar metal to the gate (to prevent galvanic corrosion), it may be of solid rod or hollow tubing, with adjustable hook as required.
   - A neoprene rubber gasket is required between the riser mounting flange and the gate flange.
   - Install the gate so that the level-line mark is level when the gate is closed.
   - The mating surfaces of the lid and the body shall be machined for proper fit.
   - All shear gate bolts shall be stainless steel.
8. The shear gate maximum opening shall be controlled by limited hinge movement, a stop tab, or some other device.
9. Alternative shear gate designs are acceptable if material specifications are met.
NOTES

1. Drain basin to be custom manufactured according to plan details. Risers are needed for basins over 94" (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 70-50-08, 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.
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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</table>

MANHOLE TYPE 1
STANDARD PLAN B-15.20-01

SEPARATE BASE PRECAST
INTEGRAL BASE PRECAST WITH RISER

GRAVEL BACKFILL FOR PIPE ZONE BEDDING

CIRCULAR ADJUSTMENT SECTION (TYP.)
ECCENTRIC CONE SECTION
CHANNEL AND SHELF
REINFORCING STEEL (TYP.)
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
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</table>

MANHOLE TYPE 2

STANDARD PLAN B-15.40-01

SEPARATE BASE PRECAST

INTEGRAL BASE PRECAST WITH RISER (60° and 72° ONLY)
NOTES

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

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>MIN. WALL THICKNESS</th>
<th>MIN. BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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</tbody>
</table>
NOTES

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

2. Seepage port orientation varies among manufacturers.

3. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. Connect inlet pipe to structure using precast hole or core drilled hole.
4. For depths over 16" - 2" use 72" x 8" Alternative Precast Footing.
5. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" (in) minimum and 2" (in) maximum.
CIRCULAR FRAME (RING) – SEE STANDARD PLAN B-30.70

CIRCULAR GRATE – SEE STANDARD PLAN B-30.80

FINISHED SURFACE

ALTERNATIVE FOOTING PRECAST

INTEGRAL BASE PRECAST WITH RISER

CUTAWAY ELEVATION VIEW

NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. For depths over 18' - 2" use 72" x 8" Alternative Precast Footing.
4. When necessary, knockouts on precast cone, drywell base and riser sections shall have a wall thickness of 1 1/2" minimum and 2" maximum.

DรายWELL TYPE 3
(WITH AT-GRADE INLET)

STANDARD PLAN B-20.60-03

EFFECTIVE: August 5, 2018 TO September 2, 2019

INTEGRAL BASE DETAIL
NOTES

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

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

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

4. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the contract. Provide two holes in the frame that are vertically aligned with the grate or cover slot. The frame shall accept the 304 Stainless Steel (S.S.) 1/8" (in) 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved means. Location of bolt-down holes varies by manufacturer. See BOLT-DOWN DETAIL, Standard Plan B-30.10.

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

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

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>MAXIMUM INSIDE DIAMETER (INCHES)</th>
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<tbody>
<tr>
<td>REINFORCED OR PLAIN CONCRETE</td>
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<td>ALL METAL PIPE</td>
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<td>PROFILE WALL PVC (STD. SPEC. SECT. 9-06.12(2))</td>
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* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

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

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

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

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

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

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

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

1. This frame is designed to accommodate 20" (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.A.) 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.

RECTANGULAR FRAME (REVERSIBLE)

STANDARD PLAN B-30.10-03

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

1. Bolt-down capability is required on all frames, graters, 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 graters shall be 20" (In) x 24" (In).

3. Grater alternatives shown for informational purposes. Grater 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.
EFFECTIVE: August 5, 2018 TO September 2, 2019

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

3. Refer to Standard Specification Section 3-05.18 and 9-05.15(2) for additional requirements.

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

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Sheet (S.S.) 5/8" (13.6 mm) x 1/16" (1.6 mm) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification Section 9-05.15 and 9-05.16(2) for additional requirements.

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

RECTANGULAR VANED GRATE

STANDARD PLAN B-30.30-03

SECTIONS A & B

ISOMETRIC

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 3/4" Stainless Steel (S.S.) 5/8" (11 NC x 2" (In) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification Section 5-05.15, and 9-05.15(2) for additional requirements.

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

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in this Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 3/4 stainless steel 5/8" (11 NC x 2" (l)) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

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

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

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

RECESSED ALLEN HEAD CAP SCREW
3/4" Stainless Steel 5/8" (11 NC x 2" (l))

FRAME

GRATE

BOLT-DOWN DETAILS
SEE NOTE 1

This Side Toward Curb

Top

Isometric

Rectangular Herringbone Grate

Standard Plan B-30.50-0
NOTES

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

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 3 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" - 11 NC x 2" (in) allen head cap screw by being tapered, or other approved mechanism. Location of bolt down holes varies by manufacturer.

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

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

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

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

7. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1,5 times the horizontal scale (1/1:5V).

CIRCULAR FRAME (RING) AND COVER

STANDARD PLAN B-30.70-04

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

JULIE HEILMAN
Register Professional Engineer

Hofman, Julie
Feb 20 2018 12:55 PM
NOTES

1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywalls only. See Standard Plans B-20.20 and B-20.60.
3. See Standard Specification Section 5-05.15 for additional requirements.
1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.

2. All exposed concrete shall be finished with a 1/2" radius.

3. The grade line of the top inside of any pipe shall enter no lower than the grade line of the top inside of the outlet pipe.

4. Pipes may enter through the knock-outs on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.


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

BAR LIST

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

BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)
ELEVEN EQUAL SPACES

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

SIDE

GRATE "A"
(Approximate weight 215 lbs)

GRATE "B"
(Approximate weight 215 lbs)

WELDED GRATES FOR GRATE INLET

STANDARD PLAN B-40.20-00

Sheet 1 of 1 Sheet

Effective: August 5, 2018 TO September 2, 2019
NOTES

1. The Contract may specify a rotated inlet installation. Orient the grates in the frame so they intercept flow.

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (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 9-05-16(2) for additional requirements.

4. Frame and Grates shall be Ductile Iron.
SECTION ON DITCH LINE
DIKE INSTALLATION FOR PREFERRED SLOPE

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

PLAN

SECTION A

SECTION B

EFFECTIVE: August 5, 2018 TO September 2, 2019

Hollings, Julie
Apr 26 2017 7:40 AM

DROP INLET TYPE 1

STANDARD PLAN B-45.20-0'

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

DROP INLET TYPE 2
STANDARD PLAN B-45.40-0*

HECKLER, Julie  
July 13, 2017 7:18 AM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

EFFECTIVE: August 5, 2018 TO September 2, 2019

PLAN

SECTION A

SECTION B

GRATE SUPPORT DETAIL

(SIX SUPPORTS REQUIRED)

END

ANCHOR STUD OPTION

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

4" (IN) x 2" (IN) x 1/2" (IN) x 35 1/4" (IN)
STEEL PLATE = TACK WELD TO ANGLE

3/8" (IN) STEEL PLATE = "T" WELD TO ANGLE

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

TOP

SIDE

ISOMETRIC

(SHOWN WITH TYPE 2 GRATE)
GRATES FOR DROP INLET

TYPE 1

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

OPTIONAL 1" MAX. VENT HOLES
ON BOTTOM FOR GALVANIZING

5 1/4"

34 1/2"

TRIANGLE GS

SECTION A

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

GRIND TOP AND BOTTOM
FLUSH AFTER WELDING

TYPE 2

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

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

SECTION B

OPTIONAL 1" MAX. VENT HOLES
ON BOTTOM FOR GALVANIZING

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

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

GRIND TOP AND BOTTOM
FLUSH AFTER WELDING

SECTION C

TYPE 3

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

4 3/4"

3 1/2"

3 1/2"

OPTIONAL 1" MAX. VENT HOLES
ON BOTTOM FOR GALVANIZING

TYPE 3...

STANDARD PLAN B-50.20-00

GRATINGS FOR DROP INLET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

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.

PIPE ZONE BEDDING AND BACKFILL
STANDARD PLAN B-55.20-02
SHEET 1 OF 1 SHEET

CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS

<table>
<thead>
<tr>
<th>PIPE</th>
<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCULAR PIPE (DIAMETER)</td>
<td>UP TO 48&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>METAL PIPE ARCH (SPAN)</td>
<td>48&quot; AND LARGER</td>
<td>DIAMETER/2 OR 36&quot; WHICHEVER IS LESS</td>
</tr>
</tbody>
</table>
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 × 6 W1.4 × W1.4 (10 Gage) Steel Welded Wire Fabric or one wrap for any of the following sizes:
   - 6 × 6 W2.1 × W2.1 (8 Gage)
   - 6 × 6 W2.9 × W2.9 (6 Gage)
   - 4 × 4 W2.9 × W2.9 (6 Gage)
   - 4 × 4 W4.0 × W4.0 (4 Gage)
   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.
### Coupling Band Dimension Table

<table>
<thead>
<tr>
<th>Band Type</th>
<th>Corrugation Pitch x Depth</th>
<th>Pipe Diam. Min. W</th>
<th>Gasket Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>2 2/3 x 1/2 OR 3 x 1 REFORMED TO 2 2/3 x 1/2</td>
<td>12 ~ 64 12</td>
<td>SLEEVE</td>
</tr>
<tr>
<td>F</td>
<td>2 2/3 x 1/2 OR 3 x 1 REFORMED TO 2 2/3 x 1/2</td>
<td>12 ~ 64 10 1/2</td>
<td>SLEEVE OR O-RING</td>
</tr>
<tr>
<td>K</td>
<td>2 2/3 x 1/2</td>
<td>54 ~ 64 24</td>
<td>SLEEVE</td>
</tr>
<tr>
<td></td>
<td>3 x 1</td>
<td>54 ~ 144 24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>3 x 1 REFORMED TO 2 2/3 x 1/2</td>
<td>36 ~ 60 12</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>2 2/3 x 1/2</td>
<td>12 ~ 64 10 1/2</td>
</tr>
<tr>
<td></td>
<td>K</td>
<td>2 2/3 x 1/2</td>
<td>54 ~ 64 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 x 1</td>
<td>54 ~ 96 24</td>
</tr>
</tbody>
</table>

* Pipe Arch Only

---

![Diagram of Type D Annular Corrugated Band](image1)

![Diagram of Type D Band Angle Connector Detail](image2)

![Diagram of Type F Semi-Corrugated Band](image3)

![Diagram of Type F Band Angle Connector Detail](image4)

![Diagram of Type F Bar & Strap Connector Detail](image5)

![Diagram of Type K Flat Band or Dimple Band](image6)

![Diagram of Type K Band Angle Connector Detail](image7)

![Diagram of Type K Double Bar & Strap Connector Detail](image8)
NOTES

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

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

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

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

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

**ANIMAL UNDERPASS**

**STANDARD PLAN B-65.20-01**

**SIDE VIEW - PLACEMENT**

**ALLOWABLE HEIGHTS OF COVER**

**SECTION**

**HEIGHT OF CORNER PLATE**

**INVERT TREATMENT**

**HEIGHT OF CORNER PLATE**

**INVERT TREATMENT**

**LENGTH IN A MULTIPLE OF 2'**

**METE PARALLEL TO EMBANKMENT SLOPE**

**DRAWN BY: BILL BERRIS**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE: August 5, 2018 TO September 2, 2019**

**4/26/12**
**NOTES**
Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.

**HEADWALL - BOTH ENDS**
INVERT TREATMENT
- SEE STD. SPEC. 7-93(4)

**SIDE VIEW - PLACEMENT**
LENGTH IN A MULTIPLE OF 2'

---

### Section Invert Treatment Dimensions

<table>
<thead>
<tr>
<th>ANGLES (DEGREES)</th>
<th>RADI (INCHES)</th>
<th>A (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>AS</td>
<td>AC</td>
</tr>
<tr>
<td>12' - 2' 11'-0''</td>
<td>52</td>
<td>42</td>
</tr>
<tr>
<td>12'-11' 11'-3'</td>
<td>52</td>
<td>41</td>
</tr>
<tr>
<td>13'-2' 11'-1''</td>
<td>52</td>
<td>43</td>
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<td>13'-10' 12'-3'</td>
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<td>14'-1' 12'-10'</td>
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<tr>
<td>14'-6' 13'-6'</td>
<td>56</td>
<td>38</td>
</tr>
<tr>
<td>14'-10' 14'-0'</td>
<td>55</td>
<td>41</td>
</tr>
<tr>
<td>15'-6' 14'-4'</td>
<td>55</td>
<td>40</td>
</tr>
<tr>
<td>15'-9' 15'-1'</td>
<td>56</td>
<td>41</td>
</tr>
<tr>
<td>16'-4' 15'-5'</td>
<td>57</td>
<td>39</td>
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<tr>
<td>16'-9' 16'-1'</td>
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</tr>
<tr>
<td>16'-1' 16'-3'</td>
<td>59</td>
<td>40</td>
</tr>
<tr>
<td>17'-3' 17'-0'</td>
<td>57</td>
<td>38</td>
</tr>
<tr>
<td>18'-4' 16'-11'</td>
<td>55</td>
<td>42</td>
</tr>
<tr>
<td>18'-2' 17'-2'</td>
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<td>18'-6' 17'-7'</td>
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<td>46</td>
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<tr>
<td>20'-6' 17'-10'</td>
<td>53</td>
<td>46</td>
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</tbody>
</table>

**Allowable Heights of Cover**

<table>
<thead>
<tr>
<th>CORRUGATED METAL THICKNESS</th>
<th>12 GAGE</th>
<th>10 GAGE</th>
<th>8 GAGE</th>
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<tbody>
<tr>
<td>MIN.</td>
<td>MAX.</td>
<td>MIN.</td>
<td>MAX.</td>
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<tr>
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<td>14'</td>
<td>3'</td>
<td>20'</td>
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</tr>
<tr>
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<td>12'</td>
<td>4'</td>
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<td>4'</td>
<td>17'</td>
</tr>
<tr>
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<td>11'</td>
<td>4'</td>
<td>17'</td>
</tr>
<tr>
<td>4'</td>
<td>10'</td>
<td>4'</td>
<td>16'</td>
</tr>
<tr>
<td>4'</td>
<td>10'</td>
<td>4'</td>
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<tr>
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<td>10'</td>
<td>4'</td>
<td>16'</td>
</tr>
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**Equipment Underpass**

**Standard Plan B-65.40-00**

**Sheet 1 of 1 Sheet**

**Effective: August 5, 2018 TO September 2, 2019**
THERMOPLASTIC PIPE

CONCRETE PIPE

METAL PIPE

END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))

NOTES

1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4H:1V. When slopes are between 4H:1V and 6H:1V, shape the slope in the vicinity of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.

2. Field cutting of culvert ends is permitted when approved by the Engineer. All field-cut culvert pipe shall be treated with treatment as shown in the Standard Specifications or General Special Provisions.

FOR CULVERTS 30" DIAMETER OR LESS

END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))

4H:1V OR STEEPER

4" MAX.

4H:1V OR STEEPER

4" MAX.

4H:1V OR STEEPER

4" MAX.

EXPRES JULY 1 2007

BEVELED END SECTIONS

STANDARD PLAN B-70.20-00

EFFECTIVE: AUGUST 5, 2018 TO SEPTEMBER 2, 2019

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EFFECTIVE: August 5, 2018 TO September 2, 2019

**DESIGN A**

**TYPE 1**
Connection to metal pipe

**TYPE 2**
Connection to metal or corr. HDPE pipe (Use with concrete or HDPE pipe)

**TYPE 3**
Connection to metal pipe (Only for HDPE)

**DESIGN B**
Connection to concrete or HDPE pipe

**DESIGN C**
Connection to metal or concrete pipe

**SPECIAL TAPERED SLEEVE DETAIL**
For use with concrete or HDPE pipe

---

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

Form 1/2" (N) x 2 3/8" (N) corrugations so maintain inside diameter of sleeve finished ends to be same diameter as corrugated steel pipe diameter.

---

Connector section joined to pipe with threaded rod and connector lug (see notes).

End section

---

Pipe payment to this point

---

Concrete pipe

---

Expanded lug

---

Pivot bolt

---

Less than 3/8" diam. = 7/32"

---

3/8" diam. and over = 13/32"

---

4" minimum lap after expansion

---

Pipe payment to this point

---

Smooth galvanized steel, aluminum, or aluminized steel pipe

---

Mastic where required

---

Alternate view for female end

---

Pipe payment to this point

---

Nominal diameter 1-1/4"

---

Nominal diameter before corrugating

---

Flared end sections

---

STANDARD PLAN B-70.60-0

Sheets 2 of 2 sheets

Approved for publication

Cooper, Jeff

Jan 25 2017 3:39 PM

State design engineer

Washington State Department of Transportation
1. The variable dimension indicated for the height of step for step mitered pipes shall conform to the manufacturer's recommendations unless specified differently on the plans or in the Special Provisions.

2. Reinforcing steel shall have 1 1/2" (in) min. clear cover to all concrete surfaces.

3. Headwalls for concrete culvert pipe may omit anchor bolt attachment.

4. When steel pipe safety bars are used, headwall thickness shall be increased to 8" (in).

---

**Structural Plate Pipe Arches and Underpasses**

**Step Mitered Pipe**

**Pipes and Structural Plate Pipes**

---

**Headwalls for Culvert Pipe and Underpass**

**Standard Plan B-75.20-02**

**Section A**

See standard specification section 5-06.5(1)
STEEL PLATE - SEE DETAIL

FIELD CUT CULVERT TO MATCH BLOCKOUT IN HEADWALL

TOP VIEW

CULVERT IS PERPENDICULAR TO ROADWAY

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

CULVERT DIAM. | NUMBER OF BARS REQUIRED
---|---
UP TO 36" | NONE
42" - 60" | 1
66" - 90" | 2
96" - 120" | 3

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

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

3. Bevel culvert pipe to match side slope.

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

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

HEADWALL - SEE NOTE 5

STEEL PLATE DETAIL

CUT AND WELD

3/4" DIAM. x 16" THREADED ROD CENTERED THROUGH PIPE, SECURED WITH NUTS. OR 3/4" x 8" ANCHOR STUDS WELDED TO PIPE. SPACING SHALL BE 6" FROM TOP AND 8" FROM BOTTOM OF CONCRETE (TYP.)

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

SLOPE TO MATCH SIDE SLOPE

HEADWALL - COMMERCIAL CONCRETE

CULVERT PIPE OR PIPE ARCH - SEE NOTE 3

SAFETY BAR - SEE NOTE 2

STEEL PLATE - SEE DETAIL

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

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

EXPRES JULY 1, 2008

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. D = Inside Diameter of Culvert Pipe, or Pipe Arch Span Width, 36" maximum.
2. The distance between the safety bars, and between the top bar and the culvert crown, shall be equal spaces of no more than 24". The distance may vary ±1" between bars to facilitate placement.
3. Slope shall match Side Slope; 6H:1V preferred, not steeper than 4H:1V.

TYPE 2 SAFETY BARS FOR CULVERT PIPE OR PIPE ARCH (ON CROSS ROAD)
STANDARD PLAN B-75.60-00

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

**NOTES**

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

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

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

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

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

---

**METAL END SECTIONS FOR CIRCULAR PIPES**

<table>
<thead>
<tr>
<th>PIPE Diam. (Inches)</th>
<th>Minimum Thickness</th>
<th>Dimensions (Inches)</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>Overall Width L</td>
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<tr>
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<tr>
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**METAL END SECTIONS FOR ARCHED PIPES**

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<thead>
<tr>
<th>Equivalent Diam. (Inches)</th>
<th>Pipe Arch Dimensions</th>
<th>Minimum Thickness</th>
<th>Dimensions (Inches)</th>
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<td>Overall Width L</td>
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<td>SLOPE 4:1</td>
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<tr>
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<td>170</td>
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</table>

* SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"
WHEN REQUIRED:

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

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

### Metal End Sections for Circular Pipes

<table>
<thead>
<tr>
<th>PIPE DIAM. (INCHES)</th>
<th>MINIMUM THICKNESS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Dimensions (INCHES)</td>
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<td>OVERALL LENGTH</td>
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### Metal End Sections for Arched Pipes

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<tr>
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<th>PIPE ARCH DIMENSIONS</th>
<th>MINIMUM THICKNESS</th>
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<td>SPAN (IN.)</td>
<td>RISE (IN.)</td>
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<tr>
<td>60</td>
<td>0.109</td>
<td>16</td>
</tr>
</tbody>
</table>

**Notes:**

- Sheet rolled snugly edge against steel rod of W/3/8" x 3/4" over all width; same end to edge bolts.
- Flatten end, then bend outside 4" to match end section sides.
- Top view connector detail.
- Reinforced edge (see section).
- Safety bar (type).
- Reinforced edge — when required; same gage as end section, 6" less than overall width, centered, 2" lap, fasten with 3/8" x 5/4" galv. bolts on 12" max. ctrs.

**Connectors:**

- Standard plan with Type 4 Safety bars (on cross road).
- Metal end sections.

**End Section Notes:**

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

**Length:**

- Multiple panels. Seams shall be lapped 1/2" and joined with 3/8" x 5/4" galv. bolts on 12" max. ctrs.

**General Notes:**

- Safety bar end treatment detail.
- Reinforced edge (see section).
- Safety bar (type).
NOTES

1. Install sewer saddles with gaskets and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gaskets for new sewer installations.

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

FOR SANITARY SEWER USE

SIDE SEWER CONNECTION
STANDARD PLAN B-85.20-00

EFFECTIVE: August 5, 2018 TO September 2, 2019
All pipe, except ductile iron pipe, shall be concrete encased.

For sanitary sewer use.

Ductile iron drop connection.

Concrete encased drop connection.

TYPICAL MANHOLE FOUNDATION CONSTRUCTION

MORTAR DAM OR PLUG AS REQUIRED BY ENGINEER

COMMERCIAL CONCRETE BLOCK - POURED IN PLACE

TYPICAL MANHOLE

FLEXIBLE JOINT

BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER

SECTION A

SECTION B

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

1. Steel tie rods to be heavily coated with asphalt after installation.
2. Restrained joints may be substituted for tie rods.
3. Surface of ground within 36" of hydrant shall be smooth.
NOTES
1. Coat the pipe threads with asphalt after assembly.
2. All piping shall be galvanized steel.
3. Valve and piping to valve shall be 2" unless otherwise noted in the Contract.
4. Locate blowoff outlet near property corner if possible.
NOTES
1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.
2. Locate at the high point of the main, tap top of main.
TWO TIE RODS WITH TURNBUCKLES

TIE ROD DIAM.

EMBEDMENT

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

DIMENSION TABLE

<table>
<thead>
<tr>
<th>PIPE DIAM.</th>
<th>TEST PRESSURE (PSI)</th>
<th>BEND ANGLE</th>
<th>CONCRETE VOLUME (Ft³)</th>
<th>CUBE SIZE (Ft)</th>
<th>TIE ROD DIAM.</th>
<th>TIE ROD EMBEDMENT</th>
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</table>

BLOCKING FOR 11.25° OR 22.5° VERTICAL BENDS

BLOCKING FOR 45° VERTICAL BENDS

CONCRETE THRUST BLOCK FOR CONVEX VERTICAL BENDS
STANDARD PLAN B-90.50-00
NOTES

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

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

NOTES

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

2. Rail Washers, also called "Snow Load Rail Washers", are not required on new installation, except as called for in Note 1. Unnecessary Rail washers need not be removed from existing installations, except those on posts 2 through 6 of a BCT installation shall be removed.

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

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

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

6. Holes shall be located on approaching traffic side of web.
NOTES

1. Type 10 post shall be 6 x 8 timber, OR either W6 x 9, or W6 x 8.5 steel. Type 11 post shall be 10 x 10 timber or W6 x 15. For additional details see Standard Plan C-1b.

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

3. Spacing may vary depending on application. See Standard Specification Section 9-16.3(1) for rail element requirements.
NOTES

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

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

3. W5×8.5 or W6×9 steel posts and timber blocks are alternates for 6×8 timber posts and blocks. W6×15 steel posts and timber blocks are alternates for 10×10 timber posts and blocks.

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

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

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

EFFECTIVE: August 5, 2018 TO September 2, 2019
THREE BEAM GUARDRAIL REDUCER SECTION

**Type A**

Left section shown, right section reversed.

- **Splice bolt slots** $rac{3}{8}'' 	imes 1rac{1}{8}''$ (TYP)
- **Post bolt slots** $rac{3}{4}'' 	imes 2rac{1}{2}''$ (TYP)
- **Cap plate**

**THREE BEAM GUARDRAIL REDUCER SECTION**

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

1. CASE 9C: Thrie Beam Guardrail is used when the distance from the end of the Bullnose Terminal to the beginning of the transition of the Bridge Rail is less than 100 feet.
SLOTTED THRIE BEAM RAIL ELEMENT #1
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)

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

SLOTTED THRIE BEAM RAIL ELEMENT #3
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
NOTES
1. Rail section and W8 x 18 steel post shall be fabricated to receive 5/8” hex head bolts as shown.
2. All bolts shall be high strength 5/8” hex head bolts with anchor rail washers.

BEAM GUARDRAIL ANCHOR
TYPE 2
STANDARD PLAN C-6a
SHEET 1 OF 1 SHEET

COMMERICAL CONCRETE

ELEVATION

ISOMETRIC

SECTION B

ONE 1 3/4" x 5 1/4" x 0.188" WASHHER WITH TWO 1/16" HOLES

1/2" ANCHOR PLATE
NOTES

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

2. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. 8-06.56(4), with thin slab female inserts or resin bonded anchors. See the Contract Plans.

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

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

BEAM GUARDRAIL END SECTIONS

STANDARD PLAN C-7

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
NOTES
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. 5-66.54), with thin slab female inserts or resin bonded anchors. See the Contract Plans.

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

DESIGN C (THRIE BEAM)

DESIGN D (THRIE BEAM)

DESIGN F (THRIE BEAM)
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES

1. Refer to Standard Plan C-19 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 blocks) to achieve the actual 12" (in) offset. See Standard Specification Section 9-16.3(2). Wood blocks shall be secured to the posts with anti-rotation nails. If combination blocks are used, the adjacent blocks shall be toenailed with two 16d galvanized nails to prevent block rotation.

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

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

SLOPE EMBANKMENT TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>W (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2H: 1V OR FLATTER</td>
<td>2.5' MIN.</td>
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<tr>
<td>STEEPER THAN 2H: 1V</td>
<td>BUT NOT</td>
</tr>
<tr>
<td>STEEPER THAN 1H: 1V</td>
<td>4.0' MIN.</td>
</tr>
</tbody>
</table>

BEAM GUARDRAIL TYPE 31

STANDARD PLAN C-20.10-04

Sheet 1 of 1 Sheet

Approved for Publication

Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

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

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

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

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

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

7. Holes shall be located on approaching traffic side of web.
NOTES
1. For component details, see Standard Plan C-23.60.
2. For terminal type and details, see Contract Plans and applicable drawings.
3. The slope from the edge of the shoulder into the face of the guardrail cannot exceed 10° : 1\(\sqrt{2}\) when the face of the guardrail is less than 12' - 0" from the edge of the shoulder.
4. For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10; see Standard Plan C-23.60.
5. Where a crashworthy terminal is required, use a Beam Guardrail Type 31 Non-Flared Terminal; see Standard Plan C-22.40.
6. Timber or steel post. Steel post shown.
NOTES

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

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

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

4. Timber or steel post. Steel post shown.

---

**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>RATE (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>15 : 1</td>
</tr>
<tr>
<td>60</td>
<td>14 : 1</td>
</tr>
<tr>
<td>55</td>
<td>12 : 1</td>
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<tr>
<td>50</td>
<td>11 : 1</td>
</tr>
<tr>
<td>45</td>
<td>10 : 1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>9 : 1</td>
</tr>
</tbody>
</table>
CASE 10A-31 (TRAILING END)

CASE 10B-31 (TRAILING END)

CASE 10C-31 (TRAILING END)

NOTES
1. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H:1V when the guardrail is within 12'-0" from the edge of the shoulder.
2. For details, see Standard Plan C-23.60.
3. For details, see Standard Plan C-22.40.
4. Timber or steel post. Steel post shown.
NOTES

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

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

3. Beam Guardrail Anchor Type 10 (W-Beam) or Type 10 (Thin Beam) required. For details, see Standard Plan C-22.40.

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

5. Timber or steel post. Steel post shown.
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES:

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

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

1. See Contract for transition and connection type.

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

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

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

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

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

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

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

3. Determine the height of the W-Beam at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (B) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (B) 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 $g = (Elevation_g - D \times 0.1) + 31$

4. Timber or steel post. Steel post shown.

FLARE RATE TABLE

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

BEAM GUARDRAIL TYPE 31 - BURIED TERMINAL TYPE 2
STANDARD PLAN C-22.16-06

FIELD BEND
FLARE RATE - SEE TABLE
ANGLE POINT (SEE NOTE 2)
BOTTOM OF DITCH
EDGE OF PAVED (OR UN-PAVED) SHOULDER
8' MIN. (SEE NOTE 2)
LOCATION OF POSTS & BLOCKS (TYPE)
(G) GUARDRAIL EMBEDMENT POINT
BEAM GUARDRAIL ANCHOR TYPE 2 - SEE STANDARD PLAN C-6a
MINIMUM TOP OF CUT
D 4'-0' MIN. GUARDRAIL EMBR. POINT
OFFSET DISTANCE
V 1'-0' MIN. COVER
H NOT STEEPER THAN 41H : 1V
NOT FLATTER THAN 3H : 1V
V W = 8.5 OR W6 = 8 STEEL POST ONLY (WITHOUT BLOCK)
W6 = 8.5 OR W6 = 8 STEEL POST ONLY (WITHOUT BLOCK)
LOCATION OF POSTS & BLOCKS (TYPE)
(WITHIN NOTE 4)
GUARDRAIL EMBEDMENT POINT
BEAM GUARDRAIL ANCHOR TYPE 2 - SEE STANDARD PLAN C-6a
MINIMUM TOP OF CUT
BEAM GUARDRAIL TYPE 31 - PAY LIMIT
PAY LIMIT
W-BEAM RUB RAIL
6'-0' LONG (TYP.)
(WITHIN NOTE 1) (TYP.)
BEAM GUARDRAIL TYPE 2 - BURIED TERMINAL TYPE 2
TERMINAL LENGTH VARIES
BOTTOM OF DITCH
W-BEAM RUB RAIL
6'-0' LONG (TYP.)
W-BEAM RUB RAIL
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 Two (TL-2) and may be used in applications with posted speeds of 45 mph or less.

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

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

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

6. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While this terminal does not require an offset at the end, a flare is recommended. For the MSKT-SP-MGS (TL-2), a maximum flare of 25 : 1 or flatter over the length of the terminal is allowed with a maximum offset of 24" (in) over 50' (ft).

For the SOFTSTOP (TL-2) a maximum flare of 38.29 : 1 or flatter is allowed over the system length of 36' - 3 1/2" with a maximum offset of 12" (in) at the anchor post.

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

8. These terminals are supplied with steel posts only. They can be used with guardrail runs composed of steel or wood guardrail posts.
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 Plan C-7 and C-7a.

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

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

6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification, Section 5-16.3(2).

7. Posts shall match those of the connecting run: timber or steel.

8. Anchor plate may be constructed from 1/4" (in) plates welded to equal strength and dimensions as shown.

9. Eight 5/8" (in) x 1/2" (in) machine bolts with hex nut and washer. Place washer on face side of rail.

ELEVATION VIEW
W-BEAM

ELEVATION VIEW
THREE BEAM

ISOMETRIC VIEW
NOTES
1. See Standard Plans C-1b, C-1d, C-20.10, and C-25.20 for rail elements
   and thrie beam block details.
2. When a transition is required on the trailing end of the bridge, use a mirror
   image of this plan.

Type 22
Approach End (shown - see note 2)
Thrie beam installed A' face of bridge rail
NOTES


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

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

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

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

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


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

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

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

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

3. Accommodating the wider blockout (12” in width) used with Type 31 guardrail will require widening the embankment by 4” (in) or narrowing the shoulder by 4” (in).

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

5. All posts for any standard barrier run shall be of the same type; timber or steel.
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES

1. Wire rope loops shall be 3'-8" long, except for the top loop of the Barrier Terminal, which shall be 2'-6" long.

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

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

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

CONCRETE BARRIER
TYPE 2
STANDARD PLAN C-8

SECTION B

END VIEW A

ISOMETRIC VIEWS

SEE NOTE 2
WIRE ROPE LOOP DETAIL

EFFECTIVE: August 5, 2018 TO September 2, 2019

TOP VIEW

SIDE VIEW

SEE NOTE 1

SEE NOTE 3

PLATE WASHER
1/8" THICK

2" MIN.
2 1/2" MAX.

3/4" FOR CONNECTING PIN
3/8" FOR DRIFT PIN

1/2" DIA. PIN WITH ROUNDED BOTTOM EDGES

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

BARRIER TERMINAL

CONCRETE BARRIER
TYPE 2

STANDARD PLAN C-8

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

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

3. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
EFFECTIVE: August 5, 2018 TO September 2, 2019

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

REINFORCING STEEL BENDING DIAGRAM
SEE STD. SPEC. 6-47.1(2) FOR BENDING DIAMETERS

<table>
<thead>
<tr>
<th>DIMENSION TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BARRIER HEIGHT</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>3-4&quot;-6&quot;</td>
</tr>
<tr>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>4'-6&quot;</td>
</tr>
</tbody>
</table>

EFFECTIVE: August 5, 2018 TO September 2, 2019

SINGLE-SLOPE CONCRETE BARRIER (PRECAST)
STANDARD PLAN C-70.10-01

NOTE:
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) Premolded Joint Filler between segments; fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.
2. TEMPORARY INSTALLATION requirement: Place a Rebar Grid in the Connection Blockout between barrier segments.
3. Installation on a horizontal curve with a radius less than 2,000' (ft) requires a modified end design.
4. For Barrier with a 2'-10" reveal, see Sheet 2. For High-Performance Barrier with a 3'-6" reveal, see Sheet 3.
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; Install 3/8" (in) Premolded Joint Filler between segments; fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.

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

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

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

5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 6" and a minimum embedment of 3' (in).
NOTES
1. PERMANENT INSTALLATION requirements: Embed barrier 3" (in) minimum; install 3/8" (in) Premolded Joint Filler between segments; fill the Connection Blockout with grout, centering the Rebar Grid in the blockout before adding grout.
2. TEMPORARY INSTALLATION requirement: Place a Rebar Grid in the Connection Blockout between barrier segments.
3. See Standard Plan C-70.10 for REBAR GRID DETAIL and BARRIER CONNECTION DETAIL.
4. The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3’ - 5” and a minimum embedment of 3” (in).
NOTES

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

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

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

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

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. The Terminal is used only on the trailing end of a barrier, unless otherwise shown in the Contract.
2. See Standard Plan C-80.10, Sheet 1, for EXPANSION JOINT and DUMMY JOINT details.
3. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the H/P row in the DIMENSION TABLE, with a minimum height above roadway of 3'-6" and a minimum embedment of 3" (in).

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

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

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

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
September 20, 2019
Washington State Department of Transportation

REINFORCING STEEL BENDING DIAGRAM

1. Field bend as required in transition.
2. All bends are 2° radius.
STANDARD PLAN C-85.10-00
SINGLE-SLOPE CONCRETE BARRIER PLACEMENT
(SPLIT)

NOTES
1. Use the barrier type, precast or cast-in-place, as specified in the Contract.
2. For Single-Slope Concrete Barrier details, see Standard Plan series C-79’s (precast) or C-80’s (cast-in-place).
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. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-70.10.
2. See the Contract Plans for conduit placement.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3" - 5" min. stack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
4. Install Conduit Coupling flush with top of foundation. Do not glue PVC stubout.
5. This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 16' (ft) max. lengthdouble mast arms.
6. Concrete shall be Class 4000.
7. This spread footing is designed for an allowable soil bearing pressure of 2500 psf or better.
NOTES
1. When connecting between Cast-In-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.
2. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3'-0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
3. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.
4. Concrete shall be Class 4000, unless otherwise noted.
NOTES:
1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.
2. All concrete shall be class 4000.
3. This barrier transition section is designed for an allowable soil bearing pressure of 2500 psf or better.
NOTES
1. See Standard Specification B-21.3(9) for construction requirements.
2. Use a template to locate and secure the bolts during foundation installation.
3. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.
4. Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
5. Install Conduit Coupling flush with top of Barrier. Do not glue PVC stubout.
EFFECTIVE: August 5, 2018 TO September 2, 2019

1. For W-Beam Type 31 shoulder application, see Standard Plan C-2010.

2. See Contract Plans for Barrier location.
NOTES

1. From the End of Landform, use the Design Layout Line to determine the location of the downstream (with traffic) Cable Barrier Terminal.

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

LEGEND

- Design Layout Line

- Edge of Traveled Way

- High Tension Cable Barrier

- Edge of Paved Shoulder

- Downstream Cable Barrier Terminal

- Lateral Deflection Distance (Typ.) - See Contract Plans

- Begin Length of Need Point

- Direction of Traffic

- Existing Bridge Pier

- Existing Redirectional Landform

- Section A

PLAN VIEW
### NOTES

1. Wall to be designated Noise Barrier Type 2A, 2B, 2C or 2D. The Contract specifies actual wall designations.

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

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

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

### WIND EXPOSURE & VELOCITY

<table>
<thead>
<tr>
<th>NOISE BARRIER TYPE</th>
<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td>B1</td>
<td>80</td>
</tr>
<tr>
<td>2B</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>2C</td>
<td>B2</td>
<td>80</td>
</tr>
<tr>
<td>2D</td>
<td>B2</td>
<td>90</td>
</tr>
</tbody>
</table>

### CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

- **EFFECTIVE: August 5, 2018 TO September 2, 2019**

---

**Typical Section**

- Construction Joint Width
- Roughened Surface

**Standard Plan D-2.04-00**

- Sheet 1 of 2 sheets

**Approval for Publication**

- 11/07/2019

**Washington State Department of Transportation**

---
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

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

SHEET 2 OF 2 SHEETS

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES

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

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

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

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

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

12/31/19
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

JOINT AND CORNER DETAIL

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

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

**NOTES**

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

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

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

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

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

---

**CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION**

**NOISE BARRIER WALL TYPE 4**

**STANDARD PLAN D-208-00**

**ELEVATION**

**TYPICAL SECTION**

---

**SECTION A**

**SHAFT DIAM**

**WALL & SHAFT**

**RIGHT-OF-WAY**

**SEE CONTRACT**

---

**SOIL TYPE**

**WIND EXPOSURE & VELOCITY**

**NOISE BARRIER TYPE**

**WIND VELOCITY (MPH)**

---

**EXPRESS AUGUST 23, 2006**

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**HAROLD KITAGAWA 11-10-05**

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**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

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**APPENDIX TO SHEET 1 OF 2 SHEETS**

---

**D-208-00**

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**EFFECTIVE: August 5, 2018 TO September 2, 2019**
PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

SHAF T LENGTH FOR PAYMENT

ANGLE POINT

CONCRETE SHAFT

SHAFT REINFORCEMENT

W 3.5 SPIRAL @ 6" PITCH

DETAIL "B"

SPACING @ 12"  THREE SPACES @ 8"

#4 STIRRUP

1/2" NOISE SEALER (TYP.)

3/4" CHAMFER (TYP.)

1/2" NOISE SEALER (TYP.)

REINFORCED PER LISTED WALL HEIGHT REINFORCEMENT TABLE

EFFECTIVE: August 5, 2018 TO September 2, 2019

CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL TYPE 4

STANDARD PLAN D-2.08-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EXPIRES AUGUST 23, 2026

REINFORCED PER LISTED WALL HEIGHT REINFORCEMENT TABLE

CORNER PANEL

BAR "D"

JOINT AND CORNER DETAIL
### Typical Section

- **W1**
  - #4 @ 18"
- **W2**
  - #4 @ 3 3/4" X 1-1/2" G-R-A
- **W3**
  - #4 @ 3 3/4" X 2 3/8"

### Footing Width Transition Detail

**For locations without footing step**

- **W1**
  - 7" - 0" MIN. FOR #4 "A" BAR
- **W2**
  - 5" - 0" MIN. FOR #4 "B" BAR

### Construction Joint

- **Type A**
  - Construction joint with roughened surface
  - Height may vary if required to provide a smooth profile consistent with roadway profile

### Right-of-Way Wall

- **See Contract**

### Reinforcing Steel

- Bar "D" - Centers on wall

### Surface Treatment

- As required

### Alternate Sides

- #4 @ 18" or #4 @ 3 3/4"

### Optional

- #4 @ three equal spaces

### Ground Line

- Final

### Bending Diagram

1. **Case 1:** 7'- 0" FOR #3 OR 
   - #4 BAR @ 3' OR 
   - 7'- 0" @ #4 BAR

2. **Case 2:** BAR "B" & "C"

### Notes

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

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

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

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

EFFECTIVE: August 5, 2018 TO September 2, 2019
1. Wall to be designated Noise Barrier Wall Type 7SSA, 7SSB, 7SSC or 7SSD. The Contract specifies actual wall designations.

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

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

4. The Contract specifies actual foundation requirements D1 or D2.
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

PRECAST CONCRETE WALL
ON SPREAD FOOTING

NOISE BARRIER WALL
TYPE 9

STANDARD PLAN D-2.32-00

APPROVED FOR PUBLICATION

WASHINGTON State Department of Transportation
FOOTING WIDTH TRANSITION DETAIL

For locations without footing step

BAR "A" (TYP.)

1" CLR. (TYP.)

T-0 MIN. (TYP.)

1/2" NOISE SEALER (TYP.)

1/2" DUCTS

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

FOOTING

W

PRECAST CONCRETE WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL

TYPE 10

STANDARD PLAN D-2.34-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
EPOXY BONDING AGENT BETWEEN PLASTER AND BASE PLATE FOR ROD "A" THREADED BAR OPTION

EDGE OF PANEL - SURFACE TREATMENT NOT SHOWN

BLOCKOUT IN PANEL - TO BE FILLED WITH GROUT TYPE 2 AFTER SETTING PANEL (TYP.)

VERTICAL GROUT OPTION

SHAFT TO PANEL CONNECTION DETAIL

EITHER OPTION ACCEPTABLE TO GROUT BLOCKOUTS, ANCHOR BOLTS AND BASE PLATE TO THE LIMITS SHOWN

ASTM A563 NUT WITH ASTM F436 WASHER (TYP.) - SET THE ELEVATION OF THE LEVELING NUTS BEFORE SETTING THE PANEL

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

ROD "A" (TYP.) - SEE TABLE FOR DIAMETER

BASE PLATE T x 1-5/8" x 1-5/8"

ASTM A36 (GALVANIZED) (EMBEDDED WITH GROUT TYPE 2)

ROD "A" - DEFORMED REINF. BAR

BENDING DIAGRAM

VARES WITH ANGLE

1/2" - 2 3/4"  1/2" - 2 1/2"

BAR "C"

VARES TO MATCH ANGLE

1" - 0.787"

BAR "E"

HOLE DIAM. = BOLT DIAM. + 1/8" (SEE TABLE)

SECTION (TYP.)

BASE PLATE DETAIL

SHAFT AND PILASTER

SECTION (TYP.)

BASE PLATE DETAIL

SHAFT AND PILASTER

SHALLOW BOLT HEAD OPTION

ASTM A570 OR 80 AS ALLOWED PER TABLE, FOR HEIGHTS "H" ≤ 18" IN WESTERN WASHINGTON AND "H" ≤ 20" IN EASTERN WASHINGTON

BENDING DIAGRAM

VARYING AT ANCHOR ROD BLOCKOUT

VARYING TO MATCH ANGLE

1/2" - 2 3/4"

1/2" - 2 1/2"

BAR "C"

BAR "E"

1/2" - 2 3/4"

1/2" - 2 1/2"

PANEL LENGTH

BAR "F"

SECTION (TYP.)

BASE PLATE DETAIL

SHAFT AND PILASTER

SECTION (TYP.)

BASE PLATE DETAIL

SHAFT AND PILASTER

SHALLOW BOLT HEAD OPTION

ASTM A570 OR 80 AS ALLOWED PER TABLE, FOR HEIGHTS "H" ≤ 18" IN WESTERN WASHINGTON AND "H" ≤ 20" IN EASTERN WASHINGTON

BENDING DIAGRAM

VARYING AT ANCHOR ROD BLOCKOUT

VARYING TO MATCH ANGLE

1/2" - 2 3/4"

1/2" - 2 1/2"

BAR "C"

BAR "E"

1/2" - 2 3/4"

1/2" - 2 1/2"

PANEL LENGTH

BAR "F"

SECTION (TYP.)

BASE PLATE DETAIL

SHAFT AND PILASTER

SECTION (TYP.)

BASE PLATE DETAIL

SHAFT AND PILASTER

SHALLOW BOLT HEAD OPTION

ASTM A570 OR 80 AS ALLOWED PER TABLE, FOR HEIGHTS "H" ≤ 18" IN WESTERN WASHINGTON AND "H" ≤ 20" IN EASTERN WASHINGTON

BENDING DIAGRAM

VARYING AT ANCHOR ROD BLOCKOUT

VARYING TO MATCH ANGLE

1/2" - 2 3/4"

1/2" - 2 1/2"

BAR "C"

BAR "E"

1/2" - 2 3/4"

1/2" - 2 1/2"

PANEL LENGTH

BAR "F"
ANGLE POINT CANTILEVERED

END PANEL OPTIONS

ANGLE POINT ~ ON SHAFT
ANGLE 2.5° TO 60°

STANDARD PANEL ANGLE TOLERANCE

END PANEL OPTIONS

ELEVATION VIEW
STEP DETAIL

PLAN VIEW
SHEAR-KEY DETAIL

SEE DETAIL A

DETAIL A

NOISE BARRIER WALL
TYPE 11

STANDARD PLAN D-2.36-03

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019
effective: August 5, 2018 to September 2, 2019

Notes:

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

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

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

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

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

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

Effects: August 5, 2018 to September 2, 2019
**NOTES**

1. Wall to be designated Noise Barrier Wall Type 135SA, 135SB, 135SC or 135SD. The Contract specifies actual wall designations.

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

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

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

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

6. The Contract specifies actual foundation requirements D1 or D2.
**BENDING DIAGRAM**

- PANEL LENGTH MINUS 8'
- PANEL LENGTH MINUS 1' - 9''
- VARY TO MATCH ANGLE
- VARY WITH ANGLE

**REBAR GRID DETAIL**

- PANEL LENGTH - 12' - 0'' MAX. (TYP.)
- END PANEL OPTIONS

**NOISE BARRIER WALL TYPE 14**

**STANDARD PLAN D-2.46-0**

- END OF PANEL
- #6 BAR (TYP.)
- TACK WELD (TYP.)

**SECTION D**

- TOE HEIGHT MAY VARY - 2'' MIN. TO 6'' MAX.
- R = 2''
- BAR "D" (TYP.)
- BAR "K" #4 (TYP.)
- SURFACE TREATMENT

**FINAL GROUND LINE**

- R = 2''
- BAR "G" #4

**Bar"C"**

- 1' - 0.788 A
- VARI TO MATCH ANGLE
- 2.3/8''
- 1' - 8.5/8''
- 4.7/8''

**END OF PANEL**

- PANELL LENGTH - 12'-0'' MAX. (TYP.)
- PANEL LENGTH - 12'-0'' MAX. (TYP.)

**END PANEL OPTIONS**

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

**STANDARD PANEL ANGLE TOLERANCE**

- 15/8'' ± 2 1/2'' MAX.
- 1/2'' NOISE SEAL

**FILL CONNECTION BLOCKOUT WITH GROUT**

- 10 1/2''

**STANDARD PANEL ANGLE TOLERANCE**

- 180° ± 2 1/2'' MAX.
- 1/2'' NOISE SEAL
EFFECTIVE: August 5, 2018 TO September 2, 2019

### Notes:

1. Wall to be designated Noise Barrier Wall Type 16A, 16B, 16C or 16D. The Contract specifies actual wall designations.

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

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

4. All masonry is to be specially inspected.

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

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

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

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

9. The Contract specifies actual foundation requirements D1 or D2.
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

8" CMU

10" CMU

PLAN VIEW

TYPICAL EXPANSION JOINT

#5 (TYP.)

SASH BLOCK RECESSES

8" OR 10" CMU

#5 (TYP.)

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

TYPICAL EXPANSION JOINT AT WIDTH STEP

#5 (TYP.)

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

BOND BEAM DETAIL

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

FLUSH OR 3" MAX

9" OR 9-1/2" CMU

TYPICAL BOTH SIDES OF WALL

MASONRY WALL ON TRENCH FOOTING

NOISE BARRIER WALL

TYPE 16

STANDARD PLAN D-2.60-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EXPRESS AUGUST 21, 2008

EXPIRES AUGUST 21, 2008

FINAL DESIGN DRAWING

NO. 11.10.05

DATE

DATE

EFFECTIVE: August 5, 2018 TO September 2, 2019
Cells with vertical reinforcing and bond beams shall be filled with grout.

Expansion joint filler placed in sash block recesses.

8" or 10" CMU

Detail A

Typical expansion joint

Typical both sides of wall

Bond beam detail

3" CLR. (TYP.)

1" - 0" MIN. (TYP.)

Bar "A" (TYP.)

Noise barrier wall type 17

Standard plan D-2.62-00

Sheet 2 of 2 sheets

Approved for publication

Washington State Department of Transportation

Expires August 23, 2002

Effective: August 5, 2018 TO September 2, 2019
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

8" OR 10" CMU

PLAN VIEW

TYPICAL EXPANSION JOINT

TRAFFIC SIDE

EXPANSION JOINT AT WIDTH STEP

8" CMU

10" CMU

PLAN VIEW

TYPICAL EXPANSION JOINT

TRAFFIC SIDE

TRAFFIC SIDE

SEE DETAIL A

BOND BEAM DETAIL

#5 (TYP.)

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

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

DETAIL A

TYPICAL BOTH SIDES OF WALL

BACKER ROD

1/2" JOINT

POLYURETHANE SEALANT

MASONRY WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL TYPE 18

STANDARD PLAN D-2.64-01

FOOTING WIDTH TRANSITION DETAIL

( FOR LOCATIONS WITHOUT FOOTING STEP)

NOTE: TRANSVERSE BARS NOT SHOWN

BAR "A" (TYP.)

3'-0" CLR. (TYP.)

3'-0" MIN. (TYP.)

WALL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

12/31/08

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019
**BOND BEAM DETAIL**

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

**EXPANSION JOINT**

Filler placed in sash block recesses.

**PLAN VIEW**

Typical expansion joint at width step.

**SECTION A**

Detailed view of expansion joint at width step.

**DETAIL B**

Typical both sides of wall.

**NOISE BARRIER WALL TYPE 19**

Standard Plan D-2.66-00

**STEP DETAIL**

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

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

Depth of concrete shaft for reinforcement.

**NOTE**

Bar 1/2" at equal spacing or total number see reinforcement schedule.
SECTION D
TYPICAL EXPANSION JOINT

TRAFFIC SIDE
EXPANSION JOINT FILLED WITH NOISE SEALER
1 - #5 FULL HEIGHT BAR "C"
1/8" CLEARANCE TO FACE WALL

#6 x 5'-0" WITH GREASED OR TAPED END, PENETRATING PIPE SLEEVE 8" MIN.
BACKER ROD WITH POLYURETHANE SEALANT - BOTH WALL FACES
2 - #4 FULL HEIGHT (TYP.) BAR "C"

3/4" DIAM. x 1'-0" SCH 40 PIPE WITH #6 x 10" GRADE 40 WELDED TAIL, AS SHOWN LAPPED WITH AND SPACED PER BAR "C"

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

SECTION B

TRAFFIC SIDE
CAP ABOVE

0'-45'

CAP ABOVE

6" MIN.

0'-45'

RW SIDE

 ANGLE POINT PLAN

SECTION C

HORIZONTAL DOWEL - PROVIDE SAME NUMBER AND SIZE AS BAR "B" LAP 2'-0" MIN.
FILL PLASTER W CONCRETE

TRAFFIC SIDE
1 - #5 FULL HEIGHT

#2 5@ 4" PITCH

1 1/2" CLAR.

135° HOOK (TYP.)

c PLASTER & SHAFT

BAR "A"

PILASTER REINFORCEMENT

SECTION A

MASONRY WALL ON SHAFT FOUNDATION

NOTE

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

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

6" CMU

4" COMPACTED LEVEL CRUSHED GRAVEL BASE

SECTION C

NOISE BARRIER WALL
TYPE 20
STANDARD PLAN D-2.68-00
SHEET 2 OF 2 SHEETS

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

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

NOISE BARRIER WALL
ACCESS DOOR TYPE 1
STANDARD PLAN D-2.80-00
1. All rebar shall have a minimum 1 1/2" cover.
EXPANSION JOINT

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

ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

46" DOOR OPENING

BAR "X" (TYP.)

3" (TYP.)

BAR "K" (TYP.)

#5 x 6 - 3" (TYP.)

4 1/2" (TYP.)

#5 x 6 - 8" (TYP.)

ANCHOR PIN (TYP.)

#6 - 11" O" (TYP.)

4" CONCRETE SLAB

CONCRETE SLAB DETAIL

FOR CAST-IN-PLACE WALL W/ TRAFFIC BARRIER

DOOR DETAIL

(SEE NOTE 2)

BAR "A" (TYP.)

#6 x 11 - 2" (TYP.)

BAR "F"

BAR "G"

BAR "C"

BAR "F"

TOP OF ROADWAY

FINISHED GRADE

BAR "B"

BAR "A"

EXPANSION JOINT

EFFECTIVE: August 5, 2018 TO September 2, 2019
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.36 for wall reinforcement not shown.
NOTES
1. All rebar shall have a minimum 1 1/2" cover.

CONCRETE SLAB  5' X 6' - 8" (TYP.)  BAR "X" (TYP.)

48" DOOR OPENING  2'-0"  4'-6"  5'-0"  12'-0"  12'-0"

TOP VIEW

DOOR - SEE DETAIL

TOP OF TRAFFIC BARRIER

FINISHED GRADE LINE

FRONT VIEW

BAR "A"

DOOR FRAME  (SEE NOTE 2)

FINISHED GRADE

SECTION A

SECTION B

SECTION C

CONCRETE SLAB

TOP OF ROADWAY

TOP OF ROADWAY

TOP OF ROADWAY

TOP OF ROADWAY

CONCRETE SLAB

ISOMETRIC CUTAWAY VIEW

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 4

STANDARD PLAN D-2.86-00

SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EXPRESS AUGUST 22, 2006
FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 4
STANDARD PLAN D-2.86-00

DRAWN BY: ADAM O'ROURKE

CONCRETE SLAB DETAIL

GROUND LINE

WALL

CONCRETE SLAB

EXPANSION JOINT

DOOR DETAIL
(SEE NOTE 2)

BENDING DIAGRAM

BAR "A" (TYP.)

VARIES

BAR "D"

#4 BAR

BAR "E"

BAR "B"

CONCRETE SLAB NOT SHOWN

EXPIRES AUGUST 23, 2006

STANDARD PLAN D-2.86-00
SHEET 2 OF 2 SHEETS
APPROVED FOR PUBLICATION
11/10/05

Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.68 for wall reinforcement not shown.

NOTES

CONCRETE SLAB DETAIL

SOLID GROUT CAP

FOR MASONRY WALL
(SHAFT FOUNDATION SHOWN)

NOISE BARRIER WALL
ACCESS DOOR TYPE 5

STANDARD PLAN D-2.88-00

APPENDIX FOR PUBLICATION

EXPIRES AUGUST 25, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DESIGN BY: ADAM DOCTOR

EFFECTIVE: August 5, 2018 TO September 2, 2019
1/2" x 9" ANCHOR PIN

WELD ANCHOR PIN TO HINGE REINFORCEMENT PLATE (TYP.)

HINGE & ANCHOR PIN REINFORCEMENT PLATE (TYP.) - (CHANNEL WIDTH) x 1/2" x 1/4". WELDED TO FRAME

GROUND LINE

NOTE

All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.

NOISE BARRIER WALL
ACCESS DOOR & FRAME

STANDARD PLAN D-2.92-00

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. For the values of "L," see Sheet 3, and for the values of "Sv" see Sheet 2.
2. For Geosynthetic Wall Construction Sequence, see Sheet 4.
3. "A_s" is the peak seismic ground acceleration as defined and applied in the AASHTO LRFD Bridge Design Specifications, Articles 3.10.4.1 and 11.6.5.
4. The long-term geosynthetic design strength "T_d" shall be determined in accordance with WSDOT Standard Practice T925. See Qualified Products List (GPL), Appendix "D," for products in which "T_d" has been determined. "H" and "Z" are graphically defined. "Z" is the distance from the top of the wall to a geosynthetic layer, and is used to determine "T_d" for that layer.
5. "L," the geosynthetic reinforcement length behind the wall face, is graphically defined. The maximum factored bearing stress acts in the vertical direction at the base of the wall. The load factors used are as specified in the AASHTO LRFD Bridge Design Specifications for each specified limit state.
6. Fascia or facing type shall be selected from Standard Plans D-3.10 or D-3.11 and called out in the Contract Plans. Region is to coordinate with the Geotechnical Services and Bridge & Structures offices.

KEY NOTES
- Geotextile for underground drainage class A, moderate survivability (only needed if a geogrid is used for geosynthetic reinforcement)
- "H" is the distance from the bottom of the wall to a geosynthetic layer, and is used to determine "T_d" for that layer.
- "Z" is the distance from the top of the wall to a geosynthetic layer, and is used to determine "T_d" for that layer.

PERMANENT GEOSYNTHETIC WALL
STANDARD PLAN D-3.09-00
EFFECTIVE: August 5, 2018 TO September 2, 2019

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OFFICIAL MICROFICHE
1750 12th Street, Sacramento, CA 95814

2018-05-05

APPROXIMATE FINAL BATTER FOR FACE OF GEOSYNTHETIC LAYERS
FINISHED GRADE AFTER CONSTRUCTION OF WALL FACING
GEOTEXTILE FOR UNDERGROUND DRAINAGE CLASS A, MODERATE SURVIVABILITY (ONLY NEEDED IF A GEOGRID IS USED FOR GEOSYNTHETIC REINFORCEMENT)
"H" IS THE DISTANCE FROM THE BOTTOM OF THE WALL TO A GEOSYNTHETIC LAYER, AND IS USED TO DETERMINE "T_d" FOR THAT LAYER.
"Z" IS THE DISTANCE FROM THE TOP OF THE WALL TO A GEOSYNTHETIC LAYER, AND IS USED TO DETERMINE "T_d" FOR THAT LAYER.
<table>
<thead>
<tr>
<th>WALL GEOMETRY AND REINFORCEMENT LAYER LOCATION</th>
<th>LONG-TERM GEOSYNTHETIC REINFORCEMENT STRENGTH REQUIRED, $T_d$ (lbs/ft)*</th>
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</thead>
<tbody>
<tr>
<td>TOTAL WALL HEIGHT, $H$ (ft)</td>
<td>GEOSYNTHETIC WALL TYPE 1</td>
</tr>
<tr>
<td>UP TO 5</td>
<td></td>
</tr>
<tr>
<td>0 to 10</td>
<td>0.5</td>
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<tr>
<td>1.25</td>
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<td>5 &lt; $H$ ≤ 10</td>
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<td>10 &lt; $H$ ≤ 15</td>
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<td>25 &lt; $H$ ≤ 30</td>
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<td>30 &lt; $H$ ≤ 35</td>
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NOTE: See Note 4, sheet 1.
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<th>WALL TYPE</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
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<td>WALL TYPE 1</td>
<td>1100</td>
<td>1200</td>
<td>1300</td>
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<tr>
<td>WALL TYPE 3</td>
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<td>2200</td>
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<tr>
<td>WALL TYPE 4</td>
<td>2500</td>
<td>2600</td>
<td>2700</td>
<td>2800</td>
</tr>
</tbody>
</table>

**Note:** See General Note 5, sheet 1.
1. SET FORM ON COMPLETED LIFT.

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

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

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

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

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

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

NOTES:

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

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

CAST-IN-PLACE PERMANENT GEOSYNTHETIC WALL FASCIA AND FACING
STANDARD PLAN D-3.10-01

TYPICAL SECTION
PERMANENT GEOSYNTHETIC RETAINING WALL
WITH CAST-IN-PLACE CONCRETE FACING

KEY NOTES:
1. "W" ROWS OF #4 @ 1'-6" O.C. DOWEL REINFORCEMENT PLACE BETWEEN GEOSYNTHETIC LAYERS AT 2'-0" HORIZONTAL SPACING. SEE TABLE. VERTICAL SPACING BETWEEN ROWS TO BE EQUAL. AS MULTIPLES OF "W" ALLOW, ROWS MAY BE STAGGERED. SEE STD. PLAN D-3.08 FOR "S".
2. INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES AND FINISH.
3. CONSTRUCTION JOINT WITH ROUGHENED SURFACE.
4. 2" ID PVC PIPE FOR DEEP HOLE IN WALL FACING - PLACE BETWEEN GEOSYNTHETIC LAYERS APPROX. 6' DEEP AT 12'-0" HORIZONTAL SPACING. LENGTH TO EXTEND TO OUTER SURFACE OF SPECIFIED WALL. DEEP HOLES SHALL BE KEPT CLEAN & FREE CONCRETE. SEE STANDARD PLAN D-3.08, FOR DETAILS NOT SHOWN.
5. VERTICAL CONSTRUCTION JOINTS IN FASCIA @ 20'-0" O.C. WITH 1/2" PREMOLDED JOINT FILLER. (SEE STANDARD PLAN D-10.46, SPLIT ELEVATION)
6. VERTICAL CONSTRUCTION JOINTS IN FOOTING @ 12'-0" O.C. MAX. SEE STANDARD PLAN D-10.46, ELEVATION. IF THE FOOTING IS STEPPED, PROVIDE 2'-0" NON-CONTACT LAP SPACES FOR THE #4 BARS AT EACH STEP.
7. COORDINATE WALL FINISH AND CONFIGURATION WITH STATE BRIDGE AND STRUCTURES ARCHITECT PER WSDOT DESIGN MANUAL 720-040.
8. THE #4 BARS AND INTERIOR #4 BARS SHALL BE USED ONLY IF THE FACE IS VERTICAL.

TYPICAL SECTION
PERMANENT GEOSYNTHETIC RETAINING WALL
WITH SHOTCRETE FACING

Approximate Final Battier for Face of Geosynthetic Layers

For the Values of "X", SEE STANDARD PLAN D-3.08, SHEET 1.
Fill Material Specified Elsewhere in Contract

For Walls Without Traffic Barrier, OR Where the Traffic Barrier is at Grade, Use the Details Shown Above the Match Joint Line on This Sheet
For Walls With Single Slope Traffic Barrier, Use the Details Above the Match Joint Line on Standard Plan D-3.15
For Walls With F-Shape Traffic Barrier Use the Details Above the Match Joint Line on Standard Plan D-3.16

Shotcrete Detail

Typical Section
Permanent Geosynthetic Retaining Wall
With Cast-in-Place Concrete Fascia
NOTE

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

REINFORCING STEEL BENDING DIAGRAM

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

ALL DIMENSIONS ARE OUT TO OUT

\( \theta = \text{EPOXY COATED} \)

EXPANSION JOINT DETAIL

FOR CAST-IN-PLACE TO PRECAST BARRIER CONNECTION

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

1/2" (IN) PREMOLDED JOINT FILLER IN EXPANSION JOINT

EXPANSION JOINT DETAIL

FOR DETAILS NOT SHOWN – SEE TYPICAL SECTION

STANDARD PLAN D-3.15 OR D-3.16

PERMANENT GEOSYNTHETIC WALL EXPANSION JOINT DETAILS

STANDARD PLAN D-3.17-02

APPROVED FOR PUBLICATION

Carpenter, Jeff
May 9, 2016 12:04 PM

Washington State Department of Transportation
CONDITION A

CONDITION B

ALTERNATE DETAIL

TYPICAL FOR CONSTRUCTION WITH SHORING

NOTES

1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.
TYPICAL GABION CROSS-CONNECTING WIRE PLACEMENT, END CELLS

CROSS-CONNECT WIRE PLACEMENT, INTERIOR CELLS OF FRONT GABIONS

FASTENING ADJACENT BASKETS

SINGLE LOOP LACING DETAIL

Three vertical and two horizontal wires encompassed
Six independent wires encompassed

STANDARD PLAN D-6

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

EFFECTIVE: August 5, 2018 TO September 2, 2019
VERTICAL FACE WALL DESIGN WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

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

SHEET 1 OF 2 SHEETS

NOTES

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

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

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

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

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

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


TYPICAL SECTION

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

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<th>WALL HEIGHT (ft)</th>
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<td></td>
<td>11</td>
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OFFSET = SET TOP OF WALL BACK:
H ≤ 20" Offset = 1/2"
H ≥ 27" Offset = H/6 - 2

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 6" MIN. FROM THE TOP OF THE WALL.
**WALL HT** | **DIMENSIONS** | **FOOTING REINFORCEMENT** | **STEM REINFORCEMENT** | **MATERIAL QUANTITY** | **MAXIMUM SOIL PRESSURE (PSF)**
---|---|---|---|---|---
5' | 6'-0" 3'-0" 1'-0" 1'-4" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
6' | 6'-0" 3'-0" 1'-1" 1'-10" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
7' | 7'-0" 3'-0" 1'-1" 1'-10" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
8' | 7'-0" 3'-0" 1'-1" 1'-10" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
9' | 8'-0" 3'-0" 1'-1" 1'-10" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
10' | 9'-0" 3'-0" 1'-1" 1'-10" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
11' | 10'-0" 3'-0" 1'-1" 1'-11" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
12' | 11'-0" 3'-0" 1'-1" 1'-11" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
13' | 12'-0" 3'-0" 1'-2" 1'-11" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
14' | 13'-0" 3'-0" 1'-2" 1'-11" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
15' | 14'-0" 3'-0" 1'-2" 1'-11" 2'-7" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
16' | 15'-0" 4'-0" 2'-5" 2'-10" 3'-0" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
17' | 16'-0" 4'-0" 2'-5" 2'-10" 3'-0" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
18' | 17'-0" 4'-0" 2'-5" 2'-10" 3'-0" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
19' | 18'-0" 4'-0" 2'-5" 2'-10" 3'-0" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER
20' | 19'-0" 4'-0" 2'-5" 2'-10" 3'-0" 2'-0" | #4 1'-8" 6'-6" | | | 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER

**REINFORCEMENT NOTES**
1. **IF TRAFFIC BARRIER IS USED**, ADD 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1. ADD 0.16 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. See STANDARD PLAN D-15-10
2. ADD 16 LB/FT OF REINFORCING STEEL FOR BARRIER ALTERNATE 1 OR 23 LB/FT OF REINFORCING STEEL FOR BARRIER ALTERNATE 2. See STANDARD PLAN D-15-10

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

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

**STANDARD PLAN D-15.10-15**

**APPROVED FOR SUBMIT**

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE:** August 5, 2018 TO September 2, 2019
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<th>D</th>
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**FOOTING REINFORCEMENT**

**STEM REINFORCEMENT**

**MAXIMUM SOIL PRESSURE (PSF)**

**VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE**

**REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 3SW STANDARD PLAN D-10.20-00**

**DRAWN BY:** BILL BERGER

**APPROVED FOR PUBLICATION**

**EFFECTIVE:** August 5, 2018 TO September 2, 2019

**STANDARD PLAN D-1**

| BAR | MIN. SPICE | BAR | MIN. SPICE | BAR | MIN. SPICE | BAR | MIN. SPICE | BAR | MIN. SPICE | BAR | MIN. SPICE | BAR | MIN. SPICE |
|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|
| #4  | 2' - 0"     | #5  | 2' - 0"     | #6  | 2' - 0"     | #7  | 2' - 0"     | #8  | 2' - 0"     | #9  | 2' - 0"     | #10 | 2' - 0"     |
| #11 | 3' - 0"     | #12 | 3' - 0"     | #13 | 3' - 0"     | #14 | 3' - 0"     | #15 | 3' - 0"     | #16 | 3' - 0"     | #17 | 3' - 0"     |
| #18 | 3' - 0"     | #19 | 3' - 0"     | #20 | 3' - 0"     | #21 | 3' - 0"     | #22 | 3' - 0"     | #23 | 3' - 0"     | #24 | 3' - 0"     |
| #25 | 3' - 0"     | #26 | 3' - 0"     | #27 | 3' - 0"     | #28 | 3' - 0"     | #29 | 3' - 0"     | #30 | 3' - 0"     | #31 | 3' - 0"     |

**EFFECTIVE:** August 5, 2018 TO September 2, 2019

**EFFECTIVE:** August 5, 2018 TO September 2, 2019
NOTES

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

SLOPING FACE WALL DESIGN
WITH 2:1 BACKSLOPE

REINFORCED CONCRETE
RETAINING WALL
TYPE 4 AND 4SW
STANDARD PLAN D-10.25-00
### FOOTING REINFORCEMENT

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### STEM REINFORCEMENT

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

### REINFORCED CONCRETE RETAINING WALL TYPE 6

**STANDARD PLAN D-10.35-00**

**APPROVED FOR PUBLICATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

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

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

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
SLOPING FACE WALL DESIGN WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

REINFORCED CONCRETE RETAINING WALL
TYPE 8

STANDARD PLAN D-10.45-01

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

TYPICAL SECTION

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

WHEN THE CONTRACT SPECIFIES CABLE FENCE, BACKFILL AND THE CEMENT CONCRETE GUTTER SHALL BE PLACED 8" MIN. FROM THE TOP OF THE WALL.

BAR

LOCATION WALL QTY.
HEIGHT (ft) (ea)

TOP 12" 5
13 ≤ 12" 6
17 ≤ 12" 7
23 ≤ 17" 9
29 ≤ 23" 11

BOTTOM 12" 6
13 ≤ 12" 7
17 ≤ 13" 9
23 ≤ 17" 11
29 ≤ 23" 11

REINFORCED CONCRETE RETAINING WALL

SPLIT ELEVATION VIEW (SHOWING SEPARATE REBAR LAYERS)

CONSTRUCTION JOINTS IN FOOTING AT 12" CENTERS MAX.

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

CONSTRUCTION JOINT WITH ROUGHENED SURFACE

CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.
### Reinforcement Notes

1. **Traffic Barrier is Used:** Add 0.10 CY of Concrete Class 4200 for Barrier Alternate 1; Add 0.15 CY of Concrete Class 4400 for Barrier Alternate 2. See Standard Plan D-15-10.

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

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

<table>
<thead>
<tr>
<th>BAR</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>THICKNESS</th>
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<tr>
<td></td>
<td>42</td>
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<td>20</td>
<td>15</td>
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</table>

### AlTERNATE 1.

<table>
<thead>
<tr>
<th>BAR</th>
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<tr>
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<td>42</td>
<td>34</td>
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<td>15</td>
</tr>
</tbody>
</table>

### Drawn by: Bill Mening

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

*Approval for Education*

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.
2. Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is 3/4".
3. Traffic Barrier Connections between the bridge and the approaching roadway vary and may consist of concrete barrier extensions. Install the Date Numeral on the traffic barrier of the bridge itself.

DATE NUMERALS

Align the numerals parallel to top of traffic barrier.

DATE NUMERAL DETAILS

TOP OF ROADWAY

DATE NUMERALS

DATE NUMERAL PLACEMENT ON BRIDGE TRAFFIC BARRIER

TYPICAL DATE NUMERALS

TYPICAL SECTION VIEW

NUMERAL "1"

PERSPECTIVE VIEW

DATE NUMERAL PLACEMENT ON BRIDGE TRAFFIC BARRIER

DATE NUMERALS - SEE DETAILS

BRIDGE END - SEE NOTE 3

TOP OF ROADWAY

NOTE: MAY VARY

DATE NUMERALS - SEE DETAILS

PERSPECTIVE VIEW

DATE NUMERAL PLACEMENT ON BRIDGE TRAFFIC BARRIER

TYPICAL DATE NUMERALS

DATE NUMERAL DETAIL

TYPICAL SECTION VIEW

DRAWING: Date: 04/10/07

EXPIRES: 08/26/07

APPROVED FOR PUBLICATION

Washington State Department of Transportation

DATE NUMERAL PLACEMENT ON BRIDGE TRAFFIC BARRIER STANDARD PLAN E-1

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

EXECUTIVE:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
On pile trellises, when it exceeds 10 ft, less than 20 ft long, a brace shall be placed on outside piles on both sides of trellis in the third panel, or as required by local conditions. When it exceeds 20 ft, two-story bracing shall be used. Longitudinal struts and cross braces shall be fastened at each end with %4 DIA bolts and helical washers.

On frame trellises, longitudinal bracing shall be placed on outside posts or as required by local conditions in alternate panels. Alternative panels shall be placed on outside piles on both sides of trellis in the third panel, or as required by local conditions. When it exceeds 20 ft, two-story bracing shall be used. Longitudinal struts and cross braces shall be fastened at each end with %4 DIA bolts and helical washers.

The typical section of a single lane bridge is shown in the diagram. The pile or frame trellises are detailed in the plans, with specific bolts and washers used for the connections.

ELEVATION - PILE TRELLISE

DECK FRAMING PLAN - SINGLE LANE

DECK FRAMING PLAN - TWO LANE

HALF SECTION - PILE BENT

TYPICAL SECTION - TWO LANE BRIDGE

HALF SECTION - FRAME BENT

TYPICAL SECTION - SINGLE LANE BRIDGE

PILE OR FRAME DETOUR BRIDGE WITH ASPHALT OVERLAY

USE ONLY FOR TEMPORARY BRIDGES

STANDARD PLAN E-2

Sheet 1 of 2 Sheets

APPROVED FOR PUBLICATION

State Design Engineer

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

5-22-98

Note 7

See Note 7
**NOTES**

1. Dimensions and notation for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be 4" or better and untreated Douglas fir-larch.
3. All piling shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, unfinished.
6. Each deck planks shall be nailed to each stringer with two 3" spikes, number 1 or larger.
7. On 17' spans, stringers shall be S4S SIE. On 15' spans, stringers shall be S4S SIE.

**EFFECTIVE:** August 5, 2018 TO September 2, 2019
**PILE TO PILE-CAP CONNECTIONS**

**PILE CUTOFF WITH STRANDS EXTENDING 0'-0" MINIMUM**

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

**BUILD-UP ON PILE DRIVEN BELOW CUTOFF**

**PILE TO PILE-CAP CONNECTIONS**

**PILE BUNKING AND SHIPPING SUPPORT DIAGRAMS**

**PILE HANDLING DIAGRAMS**

---

**PRECAST PILES, HANDLING NOTES**

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

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

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

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

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

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

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

8. Piles stored on the ground should be bunked on level dunnage at no more than 20' on center, with a maximum overhang of 10'.
FACE OF CURB VARIES 12" TO 24" MATCH ROADWAY SLOPE ROADWAY 11 1/2" 11 1/2"

FACE OF CURB VARIES 10" TO 22" MATCH ROADWAY SLOPE ROADWAY 1/2" R. 1/2" R.

FACE OF CURB VARIES FROM 6" (IN) TO 0" (IN) - MAINTAIN 1:6 SLOPE ON SIDE OF CURB MATCH ROADWAY SLOPE ROADWAY 1/2" R. 1/2" R.

DUAL- FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

DEPRESSED CURB SECTION

Cement Concrete Pedestrian Curb

Cement Concrete Pedestrian Curb

Cement Concrete Pedestrian Curb

Cement Concrete Pedestrian Curb

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE TRAFFIC CURB

MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

NOTE

STATE DESIGN ENGINEER

STATE OF WASHINGTON

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE TRAFFIC CURB

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

2. The centerline of the drainage structure may differ from the centerline of the frame and grate.
EFFECTIVE: August 5, 2018 TO September 2, 2019

SECTION A
CURB PLACEMENT
SEE CONTRACT PLANS FOR TREATMENT (TYP.)

SECTION B
CURB PLACEMENT
SEE CONTRACT PLANS FOR TREATMENT

SECTION C
ROUNDABOUT SPLITTER ISLAND
CURB PLACEMENT
SEE CONTRACT PLANS FOR CONCRETE CURBS

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" 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
- See Contract Plans for Treatment (TYP.)
- Width varies
- Match adjacent pavement thickness but not less than 6 inches.

Legend
- Width varies ~ See Contract Plans.
- Match adjacent pavement thickness but not less than 6 inches.
NOTES

1. The installation of curb in areas with existing guardrail could require the removal and resetting of the guardrail or its components.

2. Extend shoulder pavement to provide a base for the extruded curb.

3. See Contract for exception to distances shown.

4. Type 3 and 6 curbs are not used on roadways with a posted speed greater than 40 mph.

5. Type 3 and 6 are not used under beam guardrail on roadways with a posted speed greater than 50 mph.

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

7. For extruded curb details, see Standard Plan F-10.42.
SPACING OF ANCHOR BARS
(FOR TYPES 4, 5, AND 6)

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

EXTRUDED CURB
STANDARD PLAN F-10.42-00
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019
#3 REBAR – REQUIRED ONLY IN TANGENT BLOCK WHEN LENGTH EXCEEDS 30" (IN) / 1 1/2" (IN) CLR. BOTH END - SEE STANDARD SPECIFICATION 9-07

TYPICAL OF ALL END VIEW

INSIDE CORNER BLOCK

OUTSIDE CORNER BLOCK

18" RADIUS BLOCK

30" RADIUS BLOCK

INSIDE CORNER BLOCK

OUTSIDE CORNER BLOCK

IN_LOCATION

PRECAST SLOPED MOUNTABLE CURB

STANDARD PLAN F-10.62-0

APPROVED FOR PUBLICATION

DATE: April 22, 2014

STATE DESIGN ENGINEER

Washington State Department of Transportation
## Curb Radius Table

<table>
<thead>
<tr>
<th>Curb Radius</th>
<th>Dimension A</th>
<th>Dimension B</th>
<th>Dimension C</th>
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<tbody>
<tr>
<td>3'</td>
<td>12&quot;</td>
<td>2&quot;</td>
<td>8'</td>
</tr>
<tr>
<td>4' TO 5'</td>
<td>12&quot;</td>
<td>1 1/2&quot;</td>
<td>9'</td>
</tr>
<tr>
<td>6'</td>
<td>12&quot;</td>
<td>1&quot;</td>
<td>10'</td>
</tr>
<tr>
<td>7'</td>
<td>12&quot;</td>
<td>7/8&quot;</td>
<td>10 1/4&quot;</td>
</tr>
<tr>
<td>8'</td>
<td>18&quot;</td>
<td>1 1/8&quot;</td>
<td>15 3/4&quot;</td>
</tr>
<tr>
<td>9'</td>
<td>18&quot;</td>
<td>1&quot;</td>
<td>16'</td>
</tr>
<tr>
<td>10'</td>
<td>18&quot;</td>
<td>7/8&quot;</td>
<td>16 1/4&quot;</td>
</tr>
<tr>
<td>11' TO 13'</td>
<td>18&quot;</td>
<td>3/4&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>14' TO 15'</td>
<td>18&quot;</td>
<td>5/8&quot;</td>
<td>16 3/4&quot;</td>
</tr>
<tr>
<td>16' TO 17'</td>
<td>24&quot;</td>
<td>3/4&quot;</td>
<td>22 1/2&quot;</td>
</tr>
<tr>
<td>18' TO 22'</td>
<td>24&quot;</td>
<td>5/8&quot;</td>
<td>22 3/4&quot;</td>
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<td>23' TO 29'</td>
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<td>23&quot;</td>
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<td>30' TO 34'</td>
<td>30&quot;</td>
<td>1/2&quot;</td>
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<td>35' TO 45'</td>
<td>30&quot;</td>
<td>3/8&quot;</td>
<td>29 1/4&quot;</td>
</tr>
<tr>
<td>46' TO 60'</td>
<td>30&quot;</td>
<td>1/4&quot;</td>
<td>29 1/2&quot;</td>
</tr>
<tr>
<td>OVER 60'</td>
<td>USE TANGENT BLOCK, SEE SHEET 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table lists the calculated dimensions for casting blocks suitable for constructing various curb radii. Curved blocks, or blocks with different dimensions, may be acceptable with prior approval of the engineer.
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES

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


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

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

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


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

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

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

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

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


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

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

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

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

1. Notch is only required with multiple post installations.
2. 6x10, 8x10, and 6x12 Timber Sign Posts cannot be made breakaway and do not have holes or notches. These posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.
4. For 6x6 posts and larger, 7" (ft) minimum spacing is required between posts.
5. All materials shall meet the requirements of Standard Specification Section 5-28.

POST INSTALLATION TABLE

<table>
<thead>
<tr>
<th>POST SIZE (NOM.)</th>
<th>DEPTH</th>
<th>HOLE DIAMETER</th>
<th>NOTCH DEPTH (SEE NOTE 1)</th>
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<td>NOT REQD.</td>
<td>NOT REQD.</td>
</tr>
<tr>
<td>4x6</td>
<td>4'-0&quot;</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>6x6</td>
<td>4'-0&quot;</td>
<td>2&quot;</td>
<td>SEE NOTES 3 &amp; 4</td>
</tr>
<tr>
<td>6x8</td>
<td>5'-0&quot;</td>
<td>2&quot;</td>
<td>SEE NOTES 3 &amp; 4</td>
</tr>
<tr>
<td>6x10</td>
<td>6'-0&quot;</td>
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<td>8x10</td>
<td>6'-0&quot;</td>
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<td>SEE NOTE 2</td>
</tr>
<tr>
<td>6x12</td>
<td>7'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
</tbody>
</table>

MINIMUM POST HOLE DIAMETER IS THE WIDEST POST DIMENSION PLUS 6" (IN)

EFFECTIVE: August 5, 2018 TO September 2, 2019

Nisbet, John

TIMBER SIGN SUPPORT

STANDARD PLAN G-22.10-04

Sheet 1 of 3 sheets

APPROVED FOR PUBLICATION 2005.02.07

SUYOD: ENSIGN ENGINEER

Washington State Department of Transportation

Nisbet, John
EXPLODED VIEW

BREAKAWAY SIGN BRACKET ASSEMBLY

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

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

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

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

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

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

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

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

STEEL SIGN SUPPORT TYPE AS INSTALLATION DETAILS
STANDARD PLAN G-24.20-01

EFFECTIVE: August 5, 2018 TO September 2, 2019
ASSEMBLY NOTES
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.

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

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

STEEL SIGN SUPPORT TYPES SB-1A, SB-2A & SB-3A ~ 8" (IN)
ASSEMBLY NOTES

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

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

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

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

EXPLODED VIEW
TYPE SB-1B
SLIP BASE ASSEMBLY

EXPLODED VIEW
TYPE SB-3B
SLIP BASE ASSEMBLY

STEEL SIGN SUPPORT TYPES SB-1B, & SB-3B ~ 8" (IN)
(UNBASE)

Nisbet, John

EFFECTIVE: August 5, 2018 TO September 2, 2019

Nisbet, John

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

STEEL SIGN SUPPORT TYPES SB-1, SB-2, AND SB-3 ~ 10" (IN)

NOTES
1. For "W", Horizontal distance from edge of traveled way to center of nearest post, and "V", Vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20.10.
2. For "X", "Y", "H1", "H2", "H3", and "H4", refer to the Sign Specimen Sheet in the Contract.
3. Top of concrete foundation shall be smooth, dense, and uniform to finished ground line.
4. Field drill posts to accept angle and cold galvanized holes.

ASSEMBLY NOTES
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.
2. Do not tighten any single Slip Plate Bolt to the recommended torque before prelightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 45 ft-lbs on each.
3. Use only Slip Base manufacturer supplied hardware that meets the requirements of Standard Specification Sections 9-06 and 9-28.
ASSEMBLY NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria.

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

3. Use only Slip Base manufacturer supplied hardware that meets the requirements of Standard Specification Sections 9-05 and 9-28.
**NOTES**

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


**KEY NOTES**

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

---

**STEEL SIGN SUPPORT FOUNDATION DETAILS**

**STANDARD PLAN G-25.10-04**

**TYPE PL, TYPE PL-T & TYPE PL-U FOUNDATION**

**TYPE AS & TYPE AP FOUNDATION**

**TYPE TP-A & TYPE TP-B FOUNDATION**

<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>MAX XYZ</th>
<th>FORN DIA</th>
<th>FORN DEPTH</th>
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<tbody>
<tr>
<td>4&quot; X 4&quot;</td>
<td>250</td>
<td>18&quot;</td>
<td>4&quot; - 6&quot;</td>
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<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>MAX XYZ</th>
<th>FORN DIA</th>
<th>FORN DEPTH</th>
</tr>
</thead>
<tbody>
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<td>225</td>
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<td>3&quot; - 6&quot;</td>
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<tr>
<td>3 1/2&quot; O.D.</td>
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<tr>
<td>4&quot; O.D.</td>
<td>275</td>
<td>24&quot;</td>
<td>4&quot; - 6&quot;</td>
</tr>
<tr>
<td>4 1/2&quot; O.D.</td>
<td>300</td>
<td>24&quot;</td>
<td>4&quot; - 6&quot;</td>
</tr>
</tbody>
</table>

**XYZ CALCULATION**

XYZ = \( x + y + z \)

**USED TO DETERMINE POST SIZE SEE FOUNDATION TABLES**
SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

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

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

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

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

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

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

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

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

### SIGN BRACE POST TYPE

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

### NOTE

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

### SIGN BRACE DETAIL

- **A**
- **B**
- **TOP**
- **SIDE**
  - 5/16" (in) Diam. x 1" Long Slot (Typ.)
  - 1/2" (in) Diam. Hole

### NO PASSING ZONE SIGN BRACE DETAIL

- **A**
- **B**
- **TOP**
- **SIDE**
  - 5/16" (in) Diam. x 1" Long Slot (Typ.)
  - 1/2" (in) Diam. Hole

### EFFECTIVE:

- August 5, 2018 TO September 2, 2019

### SIGN BRACING

**STANDARD PLAN G-50.10-02**

**SHEET 2 OF 2 SHEETS**

Nisbet, John

**SIGN BRACER**

**APPROVED FOR PUBLICATION**

- Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019

**NOTES**

1. Vertical and horizontal clearance requirements shall be as shown on the Contract Plans.
2. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom chord, except as otherwise noted. No chord shop splices permitted in first two-thirds of span, except as otherwise noted. A maximum of two splices are permitted in the post. For post or chord shop splice details, see Standard Plan G-70.10.
3. The back-up plates or rings for all full penetration welds shall be welded continuously to the joined pieces. This can be done by either a continuous fillet weld on the back side of the piece, or by a continuous weld in the root of the full penetration weld.
4. All bolt holes shall be drilled, and the diameter shall be 1/16" (in) larger than the nominal bolt diameter, except as noted.
5. The design and analysis of the structures has been done in accordance with AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals Dated 2001, using 30 MPH wind velocity and fatigue category - I.
6. Adjust post alignment in plane normal to roadway centerline by means of leveling nuts located below base plate to maintain upward slope in cantilever arm(s). Tighten anchor nuts above base plate in accordance with Standard Specification Section 6-03,3(3).
7. Variable Message Signs (VMS) exceeding 700 lbs. and/or 200 sq. ft. shall not be installed on cantilever structure.
8. For electrical requirements, see Standard Plan J-75.45.
EFFECTIVE: August 5, 2018 TO September 2, 2019

**DOUBLE CANTILEVER SIGN STRUCTURE**

- **Panel Length**: (4'-3" MAX.) TO BE CONSTANT THROUGHOUT SPAN
- **Vertical Struts at Span End Only**
- **Camber Each Truss**: (0.002 FT/FT) FOR DOUBLE CANTILEVER (TYP.)
- **Vertical Clearance**: (-16" MIN. FROM HIGHER STRUCTURE)
- **Screen - See Detail, Sheet 4**
- **Base Elevation**
- **Hand Hole on Side**: Away from Traffic
- **Bottom of Base Plate**
- **1 1/4" (N) Capped Nipple**
- **SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE**

---

**Perspective**

---

**Signer**:

Zeleden, Richard

Jan 19, 2019 1:28 PM
VALUES OF Z

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

CONCRETE CLASS 6000

CONCRETE CLASS 6000

1. See Standard Specification 8-21.3(9) for construction requirements.
2. Use a template to locate and secure bolts in place during foundation installation.
ANCHOR PLATE DETAIL

2" (IN) DAM. HOLE FOR ANCHOR BOLT (TYP.)

1/2" (IN) PLATE (ASTM A 36)
(NO GALVANIZING REQUIRED)

2" - 6" BOLT CIRCLE

Spiral Bar

MAY BE FIELD BENT (TYP.)

Shop Weld

FIELD WELD OR SHOP WELD

SEE TABLE FOR WELD DIMENSIONS

SPRIRAL WELDED LAP SPICE DETAIL

SPRIRAL LAP SPICE DETAIL

WELDING SHALL MEET THE REQUIREMENTS OF STANDARD SPEC. 6-02.3(2)A(E)
FOR WELD DIMENSIONS – SEE TABLE BELOW

COLUMN AND SHAFT SPIRAL OPTIONS

<table>
<thead>
<tr>
<th>DEFORMED BAR</th>
<th>PLAIN STEEL BAR</th>
<th>COLD DRAWN WIRE</th>
<th>DEFORMED WIRE</th>
<th>WELD DIMENSIONS (INCHES)</th>
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</thead>
<tbody>
<tr>
<td># 4</td>
<td>1/2&quot; Diam.</td>
<td>W20</td>
<td>D20</td>
<td>1/4 1/8 4</td>
</tr>
<tr>
<td># 5</td>
<td>5/8&quot; Diam.</td>
<td>W31</td>
<td>D31</td>
<td>5/16 3/16 6</td>
</tr>
<tr>
<td># 6</td>
<td>3/4&quot; Diam.</td>
<td>W44</td>
<td>D44</td>
<td>3/8 3/16 6</td>
</tr>
</tbody>
</table>

BAR LIST

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>QTY</th>
<th>LENGTH</th>
<th>SIZE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CAP VERTICAL</td>
<td>4</td>
<td>3'-10&quot;</td>
<td>#4</td>
<td>STR.</td>
</tr>
<tr>
<td>2</td>
<td>CAP HOOPS</td>
<td>5</td>
<td>15'-5&quot;</td>
<td>#5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SHAFT VERTICAL</td>
<td>12</td>
<td></td>
<td>#6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SHAFT SPIRAL</td>
<td>1</td>
<td>AS REQUIRED</td>
<td>#4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CAP TOP</td>
<td>4</td>
<td>10'-10&quot;</td>
<td>#6</td>
<td></td>
</tr>
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MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>SHAFT</th>
<th>CONCRETE</th>
<th>CLASS 400P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL OTHER</td>
<td>CONCRETE</td>
<td>CLASS 4000</td>
</tr>
<tr>
<td>STEEL REINF. BAR</td>
<td>AASHTO M 31</td>
<td>GRADE 60</td>
</tr>
<tr>
<td>ANCHOR RODS</td>
<td>ASTM F 1554</td>
<td>GRADE 105</td>
</tr>
<tr>
<td>ANCHOR NUTS</td>
<td>ASTM M 585</td>
<td>GRADE DH</td>
</tr>
<tr>
<td>ANCHOR WASHERS</td>
<td>ASTM F 436</td>
<td></td>
</tr>
<tr>
<td>ANCHORAGE GALVANIZING</td>
<td>AASHTO M 232</td>
<td></td>
</tr>
<tr>
<td>ANCHOR PLATE</td>
<td>ASTM A 36</td>
<td></td>
</tr>
</tbody>
</table>

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1
STANDARD PLAN G-60.20-02

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019
### BAR LIST - TYPES 2 AND 3

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>TOTAL SIGN AREA</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>200 SF OR LESS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QTY.</td>
</tr>
<tr>
<td>①</td>
<td>PEDESTAL HOOP</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>FOUNDATION WALL TIES</td>
<td>6</td>
</tr>
<tr>
<td>③</td>
<td>FOUNDATION VERTICALS</td>
<td>14</td>
</tr>
<tr>
<td>④</td>
<td>PEDESTAL VERTICALS</td>
<td>16</td>
</tr>
<tr>
<td>⑤</td>
<td>FOUNDATION WALL HORIZONALS AT SLOPE</td>
<td>2</td>
</tr>
</tbody>
</table>

### VALUES OF Z

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200 SF OR LESS</td>
<td>200 SF - 400 SF</td>
</tr>
<tr>
<td>TYPE 2</td>
<td>Z</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>9'-0&quot;</td>
<td>11'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>2500 OR GREATER</td>
<td></td>
</tr>
<tr>
<td>TYPE 3</td>
<td>11'-0&quot;</td>
<td>13'-6&quot;</td>
</tr>
<tr>
<td></td>
<td>NOT LESS THAN 1500</td>
<td></td>
</tr>
</tbody>
</table>

### BENDING DIAGRAM

- **130° (TYP.)**
- **3'-2"** SQUARE
- **3'-2"**
- **2'-6"**
- **Z = ANGLED 6"**
- **VARIES**

### MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>CONCRETE CLASS 4000P</th>
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</thead>
<tbody>
<tr>
<td>STEEL REINF. BAR</td>
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<tr>
<td>AASHTO M 31</td>
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<tr>
<td>GRADE 60</td>
</tr>
<tr>
<td>ANCHOR RODS</td>
</tr>
<tr>
<td>ASTM F 1554</td>
</tr>
<tr>
<td>GRADE 105</td>
</tr>
<tr>
<td>ANCHOR NUTS</td>
</tr>
<tr>
<td>ASTM A 563</td>
</tr>
<tr>
<td>GRADE DH</td>
</tr>
<tr>
<td>ANCHOR WASHERS</td>
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<tr>
<td>ASTM F 436</td>
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<tr>
<td>ANCHORAGE DAVANCIENS</td>
</tr>
<tr>
<td>AASHTO M 232</td>
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<tr>
<td>ANCHOR PLATE</td>
</tr>
<tr>
<td>ASTM A 36</td>
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</tbody>
</table>

**CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPES 2 & 3 STANDARD PLAN G-60.30-02**

**APPROVED FOR PUBLICATION:**
June 18, 2015 7:32 AM

**EXPLOSION ENGINEER**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES
1. Horizontal and vertical clearance requirements shall be as shown in Contract Plans.
2. Horizontal diagonals must join chords where vertical diagonals connect (panel points).
3. Interior diagonals shall be placed at panel points, 40 (ft) maximum spacing. Locate symmetrically about centerline of span if possible. An interior diagonal is not required at span ends.
4. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom of chord. No chord shop splices permitted in middle third of span. Maximum of one splice in each end post.
5. For electrical requirements see Standard Plan J-75.45.

EFFECTIVE: August 5, 2018 TO September 2, 2019

MATERIAL SPECIFICATIONS

| PIPE (CHORDS, DIAGONALS, STRUTS AND POSTS) | ASTM A 36 OR ASTM A 53 GRADE B TYPE E OR S, OR A 500 GRADE B |
| PLATES | ASTM A 36 |
| SHAPES | ASTM A 36 ASTM A 992 |
| BOLTS, NUTS, & WASHERS | STD. SPEC. 9-06.53 |
| PIPE, PLATE & SHAPE GALVANIZING | ASHTO M 111 |
| FASTENER GALVANIZING | ASHTO M 232 |

EFFECTIVE: August 5, 2018 TO September 2, 2019

STRUCTURE DIMENSIONS

<table>
<thead>
<tr>
<th>SPAN LENGTH S</th>
<th>DIMENSION D</th>
<th>TOP AND BOTTOM CHORDS</th>
<th>DIAGONALS</th>
<th>END TRUSS POSTS</th>
<th>END TRUSS STRUTS AND DIAGONALS</th>
<th>TOTAL SIGN AREA (MAX.) (SQ. FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>4'-0&quot;</td>
<td>3&quot; x 216</td>
<td>1 1/4&quot; x 140</td>
<td>10&quot; x 279</td>
<td>2 1/2&quot; x 203</td>
<td>384</td>
</tr>
<tr>
<td>61'-90'</td>
<td>6'-0&quot;</td>
<td>4&quot; x 237</td>
<td>2&quot; x 154</td>
<td>10&quot; x 279</td>
<td>2 1/2&quot; x 203</td>
<td>624</td>
</tr>
<tr>
<td>91'-120'</td>
<td>6'-0&quot;</td>
<td>5&quot; x 258</td>
<td>2&quot; x 154</td>
<td>10&quot; x 307</td>
<td>3&quot; x 216</td>
<td>854</td>
</tr>
<tr>
<td>121'-150'</td>
<td>7'-0&quot;</td>
<td>6&quot; x 280</td>
<td>2 1/2&quot; x 203</td>
<td>10&quot; x 306</td>
<td>3 1/2&quot; x .226</td>
<td>1104</td>
</tr>
</tbody>
</table>

Y1 = HEIGHT OF SHALLOWEST SIGN ON STRUCTURE, D = 1'-0" MIN.
Y2 = HEIGHT OF ANY SIGN WITH HEIGHT GREATER THAN Y1.

ELEVATION

PERSPECTIVE

SIGN BRIDGE FOUNDATION = SEE STANDARD PLAN J-70.30
& J-70.30

RICHARD P. ZELDENRUST
HIGHWAY DESIGN ENGINEER

APPROVED FOR PUBLICATION
Cooper, IBF
Jan 18 2015 7:53 AM

Washington State Department of Transportation
EFFECTIVE: August 5, 2018 TO September 2, 2019

DRILLED HOLE IN CHORD AT EACH DIAGONAL AND STRUT SHALL BE 1" (IN) DIAMETER FOR SPANS OVER 60’ (FT) - FOR SPANS 60’ (FT) OR LESS, DIAMETER SHALL BE 3/4" (IN).

ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORD OR POST. FILLET WELD SIZE TO BE DIAGONAL TUBE OR PIPE THICKNESS PLUS 1/8" (IN).

TYPICAL JOINT DETAIL
CHORD SHOWN - END POST SIMILAR

1/4" (IN) BACKING PLATE

3" MIN.

POST

45° FOR CHORDS OVER 1/4" (IN) THICK (SQUARE FOR 1/4" (IN) OR LESS)

END POST OR CHORD SHOP SPlice
NO POST SPLICES PERMITTED IN LOWER THIRD OF HEIGHT NOR CLOSER THAN 3 - 0’ TO BOTTOM OF CHORD. NO CHORD SHOP SPLICES PERMITTED IN MIDDLE THIRD OF SPAN. MAXIMUM OF ONE SPlice IN EACH END POST.

EFFECTIVE: August 5, 2018 TO September 2, 2019

ALTERNATE JOINT DATA

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>d</th>
<th>e</th>
<th>BOLT Q DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>60’ OR LESS</td>
<td>2 1/2</td>
<td>1 1/4</td>
<td>3/4”</td>
</tr>
<tr>
<td>61’ TO 90’</td>
<td>3</td>
<td>1 1/2</td>
<td>7/8”</td>
</tr>
<tr>
<td>91’ TO 120’</td>
<td>3 1/2</td>
<td>7/8”</td>
<td></td>
</tr>
<tr>
<td>121’ TO 150’</td>
<td>3 1/2</td>
<td>1 3/4”</td>
<td>1”</td>
</tr>
</tbody>
</table>

FOR SPAN LENGTHS NOT LISTED, INTERPOLATE VALUES OF

FABRICATE TRUSSES WITH CHORDS CURVED TO PROVIDE CAMBER.
DO NOT CAMBER BY USING SHIMS BETWEEN CHORDS AT SPLICES.

DEAD LOAD CAMBER

SIGN BRIDGE (TRUSS-TYPE)

STANDARD PLAN G-70.10-03

CHORD FIELD SPlice DATA

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>F</th>
<th>T</th>
<th>BOLT K DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
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<td>6”</td>
<td>3/4”</td>
<td>1/2”</td>
</tr>
<tr>
<td>61’ TO 90’</td>
<td>7”</td>
<td>7/8”</td>
<td>5/8”</td>
</tr>
<tr>
<td>91’ TO 120’</td>
<td>8 1/2”</td>
<td>1”</td>
<td>3/4”</td>
</tr>
<tr>
<td>121’ TO 150’</td>
<td>9 1/2”</td>
<td>1 1/4”</td>
<td>7/8”</td>
</tr>
</tbody>
</table>

CHORD FIELD SPlice
(NO CHORD FIELD SPlice PERMITTED IN MIDDLE THIRD OF SPAN LENGTH)

3 1/8” (IN) SHIMS ARE REQUIRED AT THE REMAINING TWO CHORD JOINTS WHEN INTERIOR DIAGONAL IS INSTALLED.

CHORD FIELD SPlice

(SEE NOTE 4)

- NOT SHOWN FOR CLARITY

ALTERNATE JOINT DETAIL

NOT FOR CONNECTIONS BETWEEN VERTICAL DIAGONALS AND CHORDS

3/4” (IN) SLOT IN HORIZONTAL DIAGONAL FOR PLATE 3/8” (IN)

3/4” (IN) FOR SPANS OVER 120’ (FT) OTHERWISE 3/8” (IN)

INTERIOR DIAGONAL WHERE REQUIRED

MIN. 1/4” MAX. 3/4” MAX. 10”

3/4” (IN) GUSSET PLATE

HORIZONTAL DIAGONAL WHEN ALTERNATE JOINT DETAIL IS USED

INTERIOR DIAGONAL WHEN REQUIRED (SEE TRUSS ELEVATION)

3 1/8” (IN) GUSSET PLATE

DIAMETER OF HOLE IN FLANGE 1/16” (IN) LARGER THAN CHORD OUTSIDE DIAMETER

BOLT Q W/ HEX NUT & WASHER (TYP.)
**EFFECTIVE:** August 5, 2018 TO September 2, 2019

**MATERIAL SPECIFICATIONS**

- **CONCRETE**: CLASS 4000
- **STEEL REIN. BAR**: AASHTO M 31 GRADE 60
- **ANCHOR RODS**: ASTM F 1554 GRADE 100
- **ANCHOR NUTS**: AASHTO M 291
- **ANCHOR WASHERS**: AASHTO M 203
- **ANCHORAGE GALEVANCING**: AASHTO R 232
- **ANCHOR PLATE**: ASTM A 36

---

**TABLE**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SPAN LENGTH</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60' OR LESS</td>
<td>61' TO 80'</td>
</tr>
<tr>
<td>DIMENSION - D</td>
<td>4' - 0&quot;</td>
<td>5' - 0&quot;</td>
</tr>
<tr>
<td>BAR SPACES - N</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>SHAFT DEPTH - Z</td>
<td>2</td>
<td>5' - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>7' - 0&quot;</td>
</tr>
<tr>
<td>MIN. # OF 3/4&quot; (TYP.) BOLT CIRCLES</td>
<td>2</td>
<td>1 1/2</td>
</tr>
<tr>
<td>1.0' MIN. GALEVANCING (TYP.)</td>
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<td></td>
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<tr>
<td>2000 OR BETTER</td>
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<td></td>
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<tr>
<td>1500 - 2499</td>
<td></td>
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**BAR LIST**

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>MARK</th>
<th>LOCATION</th>
<th>SPAN LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>60' OR LESS</td>
<td>61' TO 80'</td>
</tr>
<tr>
<td>2 AND 3</td>
<td>①</td>
<td>CAP - TOP</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>②</td>
<td>CAP - SIDES</td>
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<td>CAP - HOOPS</td>
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<td>FND. WALL - VERTICAL</td>
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<tr>
<td></td>
<td>⑨</td>
<td>FND. WALL - HORIZONTAL</td>
<td></td>
</tr>
</tbody>
</table>

**BENDING DIAGRAM**

- (ALL DIMENSIONS ARE OUT TO OUT)
- 2" (IN) RADIUS, UNLESS OTHERWISE NOTED

**Concrete below finished ground line shall be placed directly against undisturbed earth, or alternately, backfill placed around foundation shall be compacted in conformance with Standard Specification 2-09.3(1e), method 1 or 4. All formwork shall be removed.**

**FOUNDATION TYPES 2 & 3**

---

**SIGN BRIDGE (TRUSS-TYPE) FOUNDATION TYPE 2 & 3**

**EFFECTIVE:** August 5, 2018 TO September 2, 2019

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

[Signature]

[Stamp]
NOTES

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

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

3. For VMS mounting, the Contractor may substitute W6 x 12 steel or W8 x 13 steel sections for the Vertical Brace W4 x 13 steel.
NOTES

1. Install Sign Lighting Luminaires (and Brackets) only when required in the Contract.

2. All nuts, bolts, washers, and other hardware shall be stainless steel per Standard Specification Section 9-28.11, except as noted. Galvanize all non-stainless steel parts.

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

![Diagram of Sign Lighting Bracing with Table of Vertical Brace Spacing]

- **ONE SIGN LIGHTING LUMINAIRE BRACE PLACEMENT**
  - Sign Width: A
  - Vertical Brace Spacing: B

- **TWO SIGN LIGHTING LUMINARES BRACE PLACEMENT**
  - Sign Width: A
  - Vertical Brace Spacing: B

- **THREE SIGN LIGHTING LUMINARES BRACE PLACEMENT**
  - Sign Width: A
  - Vertical Brace Spacing: B

*If "B" exceeds the spacing listed on the Vertical Brace Spacing Table, add an additional vertical brace.*
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTEs

1. Refer to Contract Plans for Monotube Bracket element sizes, dimensions, and weld symbols.
5. Hand holes shall be installed at the time of fabrication. Only additional conduits for lighting accommodations to previously non-illuminated structures may be installed in field as long as the proper repairs are made to the structure. For details not shown, see Standard Plan J-75.40.
6. For VMS mounting, the Contractor may substitute W8 x 12 steel or V8 x 13 steel sections for the Vertical Brace W4 x 13 steel.
7. 3’ - 0” max. Vertical Brace and Monotube Beam Bracket spacing for walk-in cabinet Type VMS installation.
9. For all sign lighting bracing details not shown, see Standard Plan G-90.11.

OVERHEAD SIGN MOUNTING (MONOTUBE STRUCTURE)

STANDARD PLAN G-90.20-05

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Washington State Department of Transportation

Richard Zeldentrost P.E.
Licensed Professional Engineer
NOTES
1. U-Bolts, Washers and Nuts shall be stainless steel, except as noted.
4. For VMS mounting, the contractor may substitute W6 x 12 Steel or W8 x 13 Steel sections for the Vertical Brace W4 x 13 Steel.
5. 3' - 0" MAX. Vertical Brace spacing for Walk-In Cabinet Type VMS Installation.
7. For all sign lighting bracing details not shown, See Standard Plan G-90.11.
NOTES

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

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

3. For all sign lighting bracing details not shown, see Standard Plan G-90.11.
EFFECTIVE: August 5, 2018 TO September 2, 2019

MAINTENANCE WALKWAY INSTALLED ON MONOTUBE SIGN BRIDGE

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

NOTES
2. For maintenance walkway, railing, grating, and toe plate details, see Standard Plan G-95-10.
3. Use two tennards through intermediate wire rope support.
4. 3/8'' (in) diameter wire rope with 14 kips min. breaking strength. The wire rope shall be installed with 450 lbs. of tension, and with 5° (in) of take up adjustment available in the turnbuckle.
5. Hardrail f-bu up with VMS door opening is the responsibility of the contractor.

MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE SIGN BRIDGE
STANDARD PLAN G-95.20-03

ELEVATION

PLAN

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
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<tr>
<td>PIPE</td>
<td>ASTM A 36 OR ASTM A 53 GRADE B TYPE E OR S, OR ASTM A 500 GRADE B</td>
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<tr>
<td>PLATES AND SHAPES</td>
<td>ASTM A 36</td>
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<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 500 GRADE B</td>
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<td>GALVANIZING FOR PIPE PLATES, SHAPES AND STEEL GRATING</td>
<td>AASHTO M 111</td>
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<td>HIGH STRENGTH BOLTS, NUTS, &amp; WASHERS:</td>
<td>STD SPEC. 406.62G</td>
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<td>ALL OTHER BOLTS</td>
<td>STD SPEC. 406.62G</td>
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<td>FASTENER GALVANIZING</td>
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<tr>
<td>STEEL GRATING</td>
<td>ASTM A 36</td>
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<tr>
<td>WIRE ROPE</td>
<td>ASTM A 650 W CLASS A WEIGHT ZINC COATED WIRE ROPE</td>
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</table>

VALID ALTERNATIVE MATERIAL: FEDERAL STANDARD MK-410-B TYPE 3 CLASS 3 GALVANIZED.
MAINTENANCE WALKWAY INSTALLED ON TRUSS-TYPE SIGN BRIDGE

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

NOTES
2. For maintenance walkway, railing, grating and top plate details, see Standard Plan G-95.19.
3. Use two tautrope through intermediate wire rope support.
4. 3/8" (in) diameter wire rope with 14 kips min. breaking strength. The wire rope shall be installed with 450 lbs. of tension, and with 6" (in) of take up adjustment available in the turnbuckle.
5. Handrail fit-up with VMS door openings is the responsibility of the contractor.

MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE SIGN BRIDGE

STANDARD PLAN G-95.30-03
MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT

MULCH & COMPOST TO SPECIFIED DEPTH - FEATHER TO BASE OF PLANT

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

MOUND SOIL TO FORM WATERING WELL AT OUTER EDGE OF PLANTING HOLE

MOUND SOIL TO FORM WATERING WELL AT DRIPLINE OF EACH PLANT

UPPERMOST ROOT SHALL BE NO MORE THAN 1" BELOW SOIL SURFACE

See Note

12" Diam.

12" Diam.

3 TIMES

3 TIMES

THE ROOT SPREAD

THE ROOT SPREAD

LOWER WRAPPED (B&B) ROOTBALL INTO HOLE. CUT AWAY ALL WRAPPING MATERIALS FROM ROOTBALL AND REMOVE FROM HOLE, ROUGHEN SOIL AT EDGES OF ROOTBALL TO STIMULATE ROOTS

SPREAD ROOTS OUT

SEE NOTE

SEE NOTE

See Note

EXISTING SOIL

EXISTING SOIL

EXISTING SOIL

EXISTING SOIL

ROOTBALL OF CONTAINER PLANTS

PLANTING HOLE 3 TIMES THE ROOT SPREAD

EMERGENT PLANTING DETAIL

SLOPE PLANTING DETAIL

(INCLUDES ALL PLANTS ON SLOPES)

TUBER OR RHIZOME PLANTING DETAIL

BULB PLANTING DETAIL

SECTION

SHRUB, TREE AND GROUND COVER PLANTING DETAIL

STREET TREE PLANTING AND STAKING DETAIL

(APPLIES TO CONTAINER, BALL AND BURLAPPED, (B&B) DECIDUOUS AND CONIFERS)

NOTE

Backfill with soil removed from hole.

See planting area soil preparation detail or Special Provisions.
CUT DAMAGED END TO LEAVE TWO BUDS EXPOSED

SEE NOTES

FILL VOIDS WITH NATIVE SOIL

EXISTING SOIL

LIVE STAKE INSTALLATION IN RIPRAPP

TYPICAL LIVE STAKE INSTALLATION

SEE NOTES

EXISTING SOIL

NOTES

1. See Plant Material List for size and type of live stake.
2. Do not use axe or sledge for driving stakes.
3. In hard ground use an iron bar or star drill to prepare the holes for the stake.
4. Avoid stripping bark or bruising stakes during installation.
5. Fill void around cutting with soil.
1. All Angle Irons and Steel Straps shall be galvanized in accordance with AASHTO M-232.

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

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

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

5. Water level may vary, depending on season.

6. Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.
OPTICAL READER

WEATHER RESISTANT BATTERY COMPARTMENT

MOISTURE-PROOF (POTTED) INTERNAL DATA LOGGER

REMOVABLE ADJUSTER CAP

"0" CALIBRATION POINT MARKER

"0" CALIBRATION POINT (FUSED ISO GRADE)

BENTONITE PELLETS

WELL SCREEN SLOTS BEGIN (ALL SLOTS 0.01")

WELL SCREEN

NO. 1 SAND OR PEA GRAVEL

WELL SCREEN SLOTS END

END OF PROBE

2" MIN. ANNULUS AROUND WELL SCREEN

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

MARK W. MARKER
CERTIFICATE NO. 005588
9/1/07

AUTOMATED GROUND WATER MONITORING WELL
STANDARD PLAN H-32.10-00
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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

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

FINISHED GRADE

SECTION A

POST

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

1/2" REFLECTIVE TAPE (TYP.)

5/16" DRILLED HOLE

POST

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

ROUND FOOTING

SQUARE FOOTING

PLAN VIEW
NOTES

1. A socket and wedge anchoring system that meets the NCHRP 350 crash test criteria may be substituted in lieu of the anti-twist plate designs shown. Anti-twist plates are not required for wood post installations.

2. The platform design shown on this plan features slots that accommodate several types of mailbox supports; only those slots necessary for assembling the type being installed are required. An adjustable platform may be used in lieu of this design, but it must fit the bracket design shown on this plan. Brackets are required for all single-post installations. Field drilling may be necessary.

3. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners (see ALIGNMENT DETAIL, Sheet 2). Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.

4. Attach a newspaper box to a steel post with two 1 1/8" Muffler Clamps spaced 4" apart. Fields drill 7/16" holes in the newspaper box to fit. Use 2 1/2" x 1/4" lag bolts to attach newspaper boxes to wood posts. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.

5. A Type 2 Support (Standard Plan H-70.20) is required when 2 or more mailboxes are to be installed on one support.
1. The anchoring system shall meet NCHRP 350 crash test criteria. Use a socket and wedge system or the anchoring system supplied by or recommended by the Type 2 Support manufacturer.

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

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

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

5. Attach a newspaper box to a Type 2 Support with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.
MAILBOX SUPPORTS

**TYPE 1**

(WOOD POST SHOWN)

FOR DETAILS, SEE STANDARD PLAN H-70.10

**TYPE 2**

(See Note 5)

**SPACING DETAIL**

ANCHORING SYSTEM - SOCKET AND WEDGE SHOWN

MAILBOX SUPPORT TYPE 1

MAILBOX SUPPORT TYPE 2

FOR MAILBOXES

NEWSPAPER BOX

SNOW GUARD - WHEN REQUIRED, PLACE ON LEADING END OF SUPPORT (SEE DETAIL)
NOTES
1. The insert pipe is 1" nominal diameter, Schedule 40 steel pipe, as indicated; all other pipe shown on this plan is 1 1/4" nominal diameter, Schedule 40 steel pipe. All pipe, couplings, and elbows shall be galvanized in accordance with ASTM A 153.

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

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

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

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

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

7. Attach a newspaper box to the pipe with two 1 3/4" muffler clamps spaced 4" apart. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.
VERTICAL SUPPORT 1 1/4" PIPE

7/16" DIAM. HOLES THROUGH PIPE & CHANNEL (TYP.)

3/8" DIAM. X 2 1/2" HEX HEAD BOLT, NUT & WASHER (TYP.)

U-CHANNEL POST 3 LB/FT

COUPLING

VERTICAL SUPPORT

3'-0" MIN. TO 3'-6" MAX. SHOWN IN THE PLANS

EDGE OF SHOULDER OR TURNOUT

4'-0" MAX.

VERTICAL SUPPORT

DITCH FLOWLINE

5'-0" MIN. TO 3'-9" MAX.

3'-0" MIN. TO 3'-9" MAX.

COMMERICAL CONCRETE

1 1/4" DIAM. X 2 3/4" LONG (THREAD ONE END)

1 1/4" PIPE + 8" LONG (THREAD ONE END)

U-CHANNEL BASE

U-CHANNEL POST 3 LB/FT

PLACEMENT DETAIL

SECTION VIEW

SECTION B

3'-3" O.C. MIN.

3'-3" MIN. TO 3'-8" MAX. SHOWN IN THE PLANS

1 1/4" PIPE X 2 3/4" LONG (THREAD ONE END)

45° ELBOW

4 1/2° GRIND

1 1/4" PIPE

1" NOM. DIAM. SCHED. 40 PIPE

1" NOM. DIAM. SCHED. 40 PIPE

1 1/4" PIPE

1" NOM. DIAM. SCHED. 40 PIPE

1" NOM. DIAM. SCHED. 40 PIPE

1" NOM. DIAM. SCHED. 40 PIPE

1" NOM. DIAM. SCHED. 40 PIPE

PIPE FITTING ANGLES

PIPE BENDING ANGLES

JOINER

ELEVATION VIEW

SECTION 0

MAILBOX SUPPORT

TYPE 3

STANDARD PLAN H-70.30-02

EFFECTIVE: August 5, 2018 TO September 2, 2019
2x2 WOOD POST
FENCING MATERIAL

STAPLE TOP TIE
SELF-LOCKING TIE - NYLON 6/6 (MIN. GRADE), 50% MIN. TENSILE STRENGTH, UV STABILIZED

STEEL T-BAR POST
SELF-LOCKING TIE - NYLON 6/6 (MIN. GRADE), 50% MIN. TENSILE STRENGTH, UV STABILIZED

ENVIRONMENTALLY SENSITIVE AREA BOUNDARY

HIGH DENSITY POLYETHYLENE OR POLYPROPYLENE MESH, AND SHALL BE UV RESISTANT, ORANGE COLOR

2' - 0" MIN.
(DEEPER FOR UNSTABLE SOIL)

TYPICAL SECTION

2x2 WOOD OR STEEL T-BAR POST

NOTE

1. Post shall have sufficient strength and durability to support the fence through the life of the project.

WORK AREA

ISOMETRIC

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

CERIFICATE NO. 000598
8/10/2009

HIGH VISIBILITY FENCE

STANDARD PLAN I-10.10-01

WORK AREA

PROTECTED AREA

ELEVATION

FENCE ON SLOPE

VERTICAL POST

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTE

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

TYPICAL INSTALLATION DETAIL

(STEEL POSTS SHOWN)

POST - SEE STD. SPEC. 8-01.3(9)A
ATTACH IN A MANNER THAT ASSURES FABRIC IS FIRMLY HELD BY THE BACKUP SUPPORT IN A WAY THAT REDUCES THE POTENTIAL FOR FABRIC TEARING

FASTEN GEOTEXTILE TO POST EVERY 6" (IN.) O.C.

SILT-FLOODED NYLON 66 (MIN. GRADE), 120# MIN. TENSILE STRENGTH, UV STABILIZED

NOTE

install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(15).

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

install silt fencing parallel to mapped contour lines.

SILT FENCE

WITH BACKUP SUPPORT

STANDARD PLAN I-30.10-02

SHEET 1 OF 1 SHEET

SPLOCE DETAIL

(STEEL POSTS SHOWN)
NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.

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

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

4. Install silt fencing parallel to mapped contour lines.

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

NOTE

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL SILT FENCE
WITHOUT BACKUP SUPPORT
ISOMETRIC
(STEEL POSTS SHOWN)

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

SILT FENCE

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

CERTIFICATE NO. 000860

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

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

SEE NOTE 1

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

INSTALL BACKUP SUPPORT FOR THE GEOTEXTILE
- SEE STANDARD SPECIFICATION SECTION 8.01.3(9)A

GEOTEXTILE FOR HIGH VISIBILITY SILT FENCE
COLOR - ORANGE - SEE STANDARD SPECIFICATION SECTION 9-33.2(1), TABLE 6

POST
- WOOD OR STEEL
(TYPICAL)

BACKUP SUPPORT
(TYPICAL)

FABRIC
(GEOTEXTILE)
(TYPICAL)

NOTES
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 8-01.3(9)A and 8-01.3(15).
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.
BACKFILLED & COMPACTED NATIVE SOIL

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

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL HIGH VISIBILITY SILT FENCE
WITHOUT BACKUP SUPPORT ISOMETRIC
(STEEL POSTS SHOWN)

GEOTEXTILE FOR HIGH VISIBILITY SILT FENCE COLOR - ORANGE - SEE STANDARD SPECIFICATION SECTION 9-33.2(1), TABLE 6

POST - WOOD OR STEEL (TYPICAL)

FASTEN GEOTEXTILE TO POST EVERY 6" (IN) O.C.

FABRIC (GEOTEXTILE) (TYPICAL)

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

SPlice DETAIL
(WOOD POSTS SHOWN)

NOTES
1. Install the ends of the high visibility silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with Standard Specifications 8-01.3(9) and 8-01.3(15).
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

HIGH VISIBILITY SILT FENCE
STANDARD PLAN I-30.17-00

SHEET 1 OF 1 SHEET

EFFECTIVE: August 5, 2018 TO September 2, 2019

Washington State Department of Transportation

CERTIFICATE NO. 000800
March 11, 2018

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

CANDRA L. SALSBURY

APPROVED FOR PUBLICATION
SHEET 1 OF 1 SHEET

EFFECTIVE: August 5, 2018 TO September 2, 2019
PLACE SAND BAGS AS REQUIRED AROUND CULVERT TO PROVIDE SUPPORT FOR SILT FENCE.

SILT FENCE - SEE STD. PLAN 1-30.10

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

COMPOST BERM - SEE STD. PLAN 1-40.12

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

COMPOST BERM DESIGN

SILT FENCE DESIGN

GEOTEXTILE FOR TEMPORARY SILT FENCE - SEE STD. SPEC. 9-33.2(1), TABLE 6

POST - SEE STD. SPEC. 8-01.3(10(A)

EMBED POSTS INTO SAND BAGS AS REQUIRED

FLOW

EDGE OF GEOTEXTILE

SECTION A

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

Erosion Control at Culvert Ends

Standard Plan 1-30.20-00

Sheet 1 of 1 Sheet

Washington State Department of Transportation

Effective: August 5, 2018 to September 2, 2019
Wattle shall be in accordance with Standard Specification 9-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification 8-01.3(10).

2. Securely knot each end of Wattle. Overlap adjacent Wattle ends 12" behind one another and securely tie together.

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

4. Install Wattle perpendicular to flow along contours.

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

6. Perform maintenance in accordance with Standard Specification 8-01.3(15).

7. Refer to Standard Specification 8-01.3(16) for removal.
NOTES
2. Securely knot each end of Compost Sock. Overlap adjacent Compost Sock ends 12" behind one another and securely tie together.
3. Compost to be dispersed on site as determined by the Engineer, when vegetation covers the surface.
4. If Erosion Control Blanket is specified, place Compost Sock on top of blanket. See Standard Plan I-60.10.
5. Install Compost Sock perpendicular to flow along contours.
6. Remove sediment from the up slope side of the Compost Sock when accumulation has reached 1/2 of the effective height of the Compost Sock.
7. Perform maintenance in accordance with Standard Specification 8-01.3(15).
8. Refer to Standard Specification 8-01.3(16) for removal.

BIODEGRADABLE EROSION CONTROL BLANKET — SEE NOTE 4
COMPOST SOCK — SEE DETAIL

COMPOST SOCK SPACING TABLE

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H : 1V</td>
<td>10 - 0&quot;</td>
</tr>
<tr>
<td>2H : 1V</td>
<td>20 - 0&quot;</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>30 - 0&quot;</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>40 - 0&quot;</td>
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</tbody>
</table>

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

WASHINGTON DEPARTMENT OF TRANSPORTATION

COMPOST SOCK
STANDARD PLAN I-30.40-01

EFFECTIVE: August 5, 2018 TO September 2, 2019
**NOTES**

1. Coir logs shall be installed starting at the bottom of the slope and working uphill.
2. Excavated material shall be spread evenly along the uphill slope and compacted by hand tampering or other methods approved by the Engineer.
3. Overlap Coir log ends by 12" (in) to prevent water from moving between logs.
4. Always install Coir log perpendicular to slope along contour lines. Ends shall angle uphill to prevent flow around the Coir log.
5. Use an adequate number of stakes to ensure logs are secure.
6. Coir logs shall be in accordance with Standard Specification Section 9-14.6(7), and be installed in accordance with Standard Specification Section 8-01.3(6)(A).
7. Perform maintenance in accordance with Standard Specification Section 8-01.3(15).
**GEOTEXTILE FOR TEMPORARY SILT FENCE**

1. Prefabricated units may be used in lieu of the design shown on this plan upon approval of the Engineer.
2. Structure shall be constructed such that geotextile material shall be fastened to posts creating a seamlessness joint.
3. Ensure that ponding height of water does not cause flooding on adjacent roadways or private property.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
NOTES

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

1. Check Dams shall meet the requirements of Standard Specifications 8-01.3(6) and 9-14.5(4).

2. In channels, install the sloped ends of the Check Dam a minimum of 8" higher than the spillway to ensure water flows over the dam and not around it.

3. Perform maintenance in accordance with Standard Specification 8-01.3(15).

4. Remove Check Dams in accordance with Standard Specification 8-01.3(16).

BIODEGRADABLE CHECK DAM

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

NON-BIODEGRADABLE CHECK DAM

NOTES
1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer's recommendations and shall perform in accordance with Standard Specification 8-01.3(6).

2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.

3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.
**NOTES**

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

2. See Standard Specification 8-01.3(3) and 9-14.5(2).

3. Use manufacturer’s requirements. When manufacturer’s requirements are not provided, use installation requirements shown on Standard Plans.

4. Additional staples may be required on slopes greater than 3H : 1V.

**INSTALLATION STEPS:**

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

**EXTEND BLANKET 24 INCHES BEYOND TOE OF SLOPE OR TO EDGE OF VEGETATION - WHICHEVER IS CLOSER.**

**EXTEND BLANKET FAR ENOUGH OVER CREST OF SLOPE TO EFFECTIVELY PREVENT UNDERCUTTING AND TO PROVIDE SECURE ANCHORING FASTENER (TYP.) 18 INCHES MAX. (TYP.)**

**2 ROWS OF STAPLES 4 INCHES APART, STAGGERED, 6 INCHES O.C. PLACED WITHIN 6 INCHES OF BLANKET EDGE.**

**STATE OF WASHINGTON LANDSCAPE ARCHITECT**

**BIODEGRADABLE EROSION CONTROL BLANKET**

**PLACE RTMENT FOR SLOPES STANDARD PLAN 1-60.10-01**

**ISOMETRIC VIEW**

**INSTALLATION STEPS:**

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

1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.
2. Install Check Slots per manufacturer’s recommendations.
3. See Standard Specification 8-01.2(3) and 9-14.5(2).
4. Use manufacturer’s requirements. When manufacturer’s requirements are not provided, use installation requirements shown on Standard Plan.
5. Additional staples may be required for high flow exposure.

**INSTALLATION STEPS:**

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

SECTION A-A

Conduit reserve area

Face of guardrail
Back of curb
Edge of shoulder

Conduit reserve area

Conduit

J-box

Not steeper than 2:1

EFFECTIVE: August 5, 2018 TO September 2, 2019


**CONSTRUCTION NOTES**

Drive ground rods before placing concrete. Move rod(s) and drain tiles with cover(s) as required to achieve full ground penetration. Maintain a 6" (ft) minimum clearance between ground rods and 6" (in) from foundation edge as detailed on Standard Plan J-60.08.

1. GRS conduits penetrating all cabinets shall be terminated with grounding end bushing and bonded to the cabinet grounding bus. All PVC conduits penetrating cabinet shall be terminated with end bushings.

2. Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If PVC conduits are specified, the conduit stub and end bushing shall not be glued to the coupling.

3. 4" (in) diam. x 1/2" (in) deep sump. Slope foundation within cabinet footprint toward sump. Drainpipe shall be HDPE or other polyethylene or copper tubing.

4. The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2" (in) or 9" (in) cabinet footing.

5. Cabinet power supply conduit.

6. Conduits for service grounding electrodes.

7. When distance detailed in Typical Foundation Plan is greater than 6′ (ft), this conduit and conductor shall be deleted.

---

**TABLE**

<table>
<thead>
<tr>
<th>CABINET</th>
<th>TRANSFORMER SIZE</th>
<th>DIAMETER (IN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECHNICAL</td>
<td>TRANSFORMER</td>
<td>12.6 TO 35.0 KVA</td>
</tr>
<tr>
<td>LOCATION</td>
<td>SIZE (W X D) (IN)</td>
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<tr>
<td>TYPE 332</td>
<td>24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>TYPE 333D</td>
<td>48.5&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>NEMA P44</td>
<td>44&quot;</td>
<td>15&quot;</td>
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<tr>
<td>TYPE 333SD</td>
<td>44&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td>TYPE 334</td>
<td>24&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>TRANSFORMER</td>
<td>SIZE (W X D) (IN)</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>UP TO 3 KVA</td>
<td>18&quot; X 12&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>3 TO 12.5 KVA</td>
<td>24&quot; X 12&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>12.6 TO 35.0 KVA</td>
<td>32&quot; X 12&quot;</td>
<td>15&quot;</td>
</tr>
</tbody>
</table>

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**NOTES**

1. The cabinets shown in these details are shown for illustrative purposes only. The Contractor shall verify the plans and substitute those cabinets in place of the cabinets shown in these details. The Contractor shall install each cabinet type in the locations and orientations shown in these details.

2. The Contractor shall install the conduits in the locations shown. Conduits shall extend 2′ (in) min. above the coupling. The grounded end bushing on GRS conduit and the end bushing on PVC conduit shall extend 3′ (in) max. above the coupling. The conduit containing unused utility conductors shall extend into the utility chase.

3. The ground rods, drain tiles, and conduit shall be installed as required by the electrical code and local regulations. All conduit shall be Type 304 stainless steel. Conduits shall extend 1′ 1/2 (in) min. to 2′ (in) max. above the concrete pad, prior to placing concrete.

4. All reinforcing steel shall be embedded 2′ (in) below surface of concrete.

5. Place a 1′ 1/2 (in) bead of silicone between cabinets and foundation.

6. Two ground rods are required for foundations with a service cabinet or transformer cabinet. See Standard Plan J-60.05 for details.

7. Concrete shall be class 3200. See Standard Specification 8-20.2.4.

8. Verify dead front locations from manufacturer prior to placing conduit in foundation.

9. Foundations installed in, or adjacent to, sidewalks shall be constructed with the top flush with the sidewalk surface and grade, not including concrete associated conduits, and #4 rebar installed. Omit chamois where foundation abuts sidewalk.

10. If the slope is 3H:1V or steeper, special considerations may be necessary for reasons of stability. Coordinate with Maintenance and Project Engineer.

11. The grounded end bushing on GRS conduit and the end bushing on PVC conduit shall extend 3′ (in) max. above the concrete pad, prior to placing concrete.

12. The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2" (in) or 9" (in) cabinet footing.

13. Height of cabinet riser shall be adjusted to serve environmental needs. Type D Service cabinet shall have a riser. NEMA P44, Type 333SD, and Type B Modified shall have a 9" (in) riser. All other cabinets shall have a 3 1/2" (in) riser. See Contract for alternative height. Adjust length of conduit and rebar accordingly.

14. Use (1) #4 hoop for a 3 1/2" (in) cabinet footing and (2) #4 hoops for a 9" (in) cabinet footing.

15. The Power Panel location is set by industry standards on all Cabinet Manufacturer.

16. See Standard Plan J-10.20 for additional Foundation Construction and Conduit Routing for Type B Modified Service Cabinet with Controller Cabinet.

17. Verify pad size and location with Project Engineer.

18. Verify pad size and location with Project Engineer.

19. See Standard Plans J-10.21 and J-10.22 for additional details for Type D and Type E Service Cabinets.

20. As an alternate, #3 rebar spaced at 1' - 0" O.C. longitudinally and transversely may be used.
NOTES (CONTINUED)

10. Hinges shall have stainless steel or brass pins.
11. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.
13. The following metering equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key Numbers 2, 3, 4, 6, 7, 8, and 9. Key Number 4 name plate shall read as follows: "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF - AUTOMATIC." See service cabinet detail.
14. Metering arrangements vary with serving utilities. The Contractor shall verify the serving utility’s requirements prior to fabrication and installation of the service equipment.
15. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
16. All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the buswork. "Jumping" of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
17. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.
18. All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the Schedules. Approved PVC or polyethylene wire marking sleeves shall be used.
19. All nuts, bolts, screws, and washers used for mounting the photoelectric control enclosure, conduit body covers, and junction box cover shall be ASTM F693 or A163 Type 304 or Type 316 stainless steel.
20. A 1% tolerance is allowed for all dimensions.
21. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.
22. Install conduit couplings on all conduits.
23. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or solder in place. See Standard Plan J-10.20 for alternate door hinge details.
24. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded steel mesh with welded seams and mounting flanges and shall be hot-dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" (in) x 5/8" (in) expanded steel mesh may be used as an alternative material. See Standard Plan J-10.20 for enclosure mounting details.
25. See Contract for Breaker Schedule.
NOTES (CONTINUED)

2. Hinges shall have stainless steel or brass pins.
3. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.
4. The metering equipment door shall be pad-lockable. Each door shall be gasketed. See Standard Plan J-10.20 for door hinge details. Concealed heavy-duty stainless steel lift-off hinges are allowed as an alternative. Upper left door shall have three hinges, lower left door shall have two hinges, and right door shall have three hinges. All doors shall have a two-position door stop assembly.
5. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key Numbers 2, 3, 4, 6, 7, 8, and 9.

EFFECTIVE: August 5, 2018 TO September 2, 2019

SIDE VIEW

ELEVATION VIEW (NOT SHOWN FOR CLARITY)

TYPE C SERVICE CABINET (60 AMP TYPE 120 15 SERVICE CABINET)

STANDOFFS FOR MOUNTING HINGED DEAD FRONT

WELDED HINGE

BOLT WITH WASHER

(TYP. OF 4 PLACES)

SECTION 3

KEY

1. METER BASE PER SERVING UTILITY REQUIREMENTS - AS A MINIMUM, THE METER BASE SHALL BE SAFETY SOCKET BOX WITH FACTORY-INSTALLED TEST Bypass FACILITY THAT MEETS THE REQUIREMENTS OF NUMBER 304 - METER BASE ENCLOSURE SHALL BE FABRICATED FROM TYPE 304 STAINLESS STEEL.
2. MAIN BREAKER (DSPT - SIZE PER BREAKER SCHEDULE).
3. PHOTOELECTRIC CONTROL BREAKER (DSPT - 15 AMP - 120/240 VOLT).
4. TEST SWITCH (SPOT - SNAP ACTION - POSITIVE CLOSE - 15 AMP - 120/277 VOLT - "1" RATED).
5. PHOTOELECTRIC CONTROL UNIT - SEE STANDARD SPECIFICATION 9-29.11.
6. BRANCH BREAKER (DSPT - SIZE PER BREAKER SCHEDULE).
7. SPARE BREAKER - SEE BREAKER SCHEDULE (DSPT - 20 AMP - 240V480 VOLT).
8. CONTACOR - SEE BREAKER SCHEDULE.
9. RECEP TACLE BREAKER (DSPT - 20 AMP - 120/240 VOLT).
10. RECEP TACLE - GROUNDED (GFCI) - 20 AMP - 125 VOLT.
11. ISOLATED NEUTRAL BUSS - 14 LUG COPPER.
12. MOUNTING HOLE - SEE STANDARD PLAN J-10.20 FOR MOUNTING DETAILS.
13. 1 1/2" (IN) DIAMETER DRAIN HOLE - DRILL BEFORE GALVANIZING.
14. HINGED DEAD FRONT WITH 1/4" TURN FASTENERS OR SLIDE LATCH - DEAD FRONT PANEL BOLTS SHALL NOT EXTEND INTO VERTICAL LIMITS OF THE BREAKER ARRAY.
15. CABINET MAIN BONDDING JUMPER ASSEMBLY - BUS SHALL BE 12 LUG TINNED COPPER - SEE STANDARD PLAN J-10.20 FOR CABINET MAIN BONDING JUMPER ASSEMBLY DETAILS.
16. METAL WIRING DIAGRAM HOLDER.
17. REMOVABLE SUBPANEL FOR EQUIPMENT.
18. SCREENED VENTS - TWO REQUIRED (ONE EACH SIDE) - LOUVERED PLATES.
19. TRANSFORMER BREAKER (DSPT - 15 AMP - 480 VOLT).
20. DRY TRANSFORMER (480/120 VOLT) - 3 KVA - COPPER BUSSING AND COPPER WOUND.
21. 12-CIRCUIT PANEL BOARD - MINIMUM SIZE WITH MAIN BREAKER.
22. CABINET WIRING WITH BUSSWORK RATING.
23. 6-CIRCUIT PANEL BOARD - MINIMUM SIZE.
24. UTILITY DISCONNECT SWITCH ENCLOSURE WITH COVER - OMIT IF UTILITY DOES NOT REQUIRE THE DISCONNECT SWITCH.

SERVICE CABINET TYPE C
(0 - 60 AMP TYPE 240/480 VOLT SINGLE PHASE)

APPROVED FOR PUBLICATION
Matt Schaefer
Jan 3 2018 4:20 PM
OTES (200 AMP TYPE 120/240 1e SERVICE CABINET)


Hinges shall have stainless steel or brass pins.

Cabinets shall be rated NEMA 3R and shall include two rain-tight vents.

Metering equipment door shall be pad-lockable. Each door shall be gasketed. Install Best CX Construction Core on right side door. See Door Hinge Detail.

The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:

Key Numbers 2, 3, 4, 6, 7, 8, 9, & 16
Key Number 4 name plate shall read:

"PHOTOCELL BYPASS TEST ON" and "PHOTOCELL TEST OFF-AUTOMATIC." See Service Cabinet Detail.

Metering arrangements vary with different serving Utilities. The Utility may require meter base mounting in the enclosure, on the side, or on the back of the enclosure. The Utility may require the dimension between the door and the front of the safety socket box to be less than the 11" (in) shown in the LEFT SIDE - SAFETY SOCKET BOX Mounting Detail. The Contractor shall verify the Utility's requirements prior to fabrication and installation of the service equipment.

Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.

All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumpering of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.

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.

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.

1. All nuts, bolts, and washers used for mounting the photocell enclosure shall be stainless steel.

2. A 1% tolerance is allowed for all dimensions.

3. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dipped galvanized steel or stainless steel.

4. The meter base portion of this service was designed to meet metering portion of EUSERC Drawing 309 requirements.

5. When using alternate door hinge:

   Remove hinge pin prior to welding hinge to cabinet and prior to hot dip galvanizing. After galvanizing, replace pin with brass pin and solder in place.

6. Verify the service utility stand-off dimension. Adjust the removable panel to the measurement provided by the Utility Company. After adjustment, cut off all-thread bolts so that no less than two and no more than three full threads extend past the face of the nuts.

7. As an alternate to the bolted or field welded strut mount supports, 1 5/8" (in) x 3 1/4" (in) 12-gage continuous slotted steel channel or factory welded 1 5/8" (in) x 1 5/8" (in) 12-gage back to back continuous slotted steel channel may be used. Three pairs required.

DRAWN BY: COLBY FLETCHER
EFFECTIVE: August 5, 2018 TO September 2, 2019

- **Detail A**: Bronze ground clamp with bronze U-bolt, washers and set screws.
- **Detail B**: 
  - #6 insulated stranded wire.
  - Bronze ground clamp (typ).
  - Conduit.

**Plan View**
- Maintenance pad.
- Service meter base or disconnect switch.
- Service cabinet.
- Type 3 chain link fence (typ).
  - Min. 6" chain link gate.
  - See standard plan L-30.10.

**Elevation View**
- Pad mounted service cabinet within right-of-way fence.
- For conduits not shown, drain tile for grounding, drain tubes, reinforcing steel, etc. omitted for clarity. See Sheet 4 for additional details.

**Side View**
- Service cabinet in vicinity of chain link fence.
- Post mounted service cabinet shown. Pad mounted service cabinet similar.
NOTES
1. Metering Arrangements vary with different serving utilities. The utility may require meter base mounting in the enclosure, or on the side, or on the back of the enclosure. The utility may require the dimension between the door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting detail, see Standard Plan J-3b. The Contractor shall verify the utility’s requirements prior to fabrication of and installing the service equipment.
2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor shall verify the serving utilities requirements prior to fabrication and installing the service equipment.
4. Hinges shall have stainless steel or brass pins.
5. Cabinets shall be rated NEMA 3R and shall include two rain tight vents.
6. Metering equipment doors shall be pad lockable. Each door shall be gasketed. Instil best construction core on bottom left and right doors. See door hinge detail, Standard Plan J-3b. Concealed heavy duty stainless steel lift off hinges are allowed as an alternative. Upper left door shall have 3 hinges, lower left door shall have 2 hinges, and right door shall have 3 hinges. All doors shall have a two position door stop assembly.
7. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key number 2, 3, 4, 7, 8, 9, 16, 21 and 24. Key number 4 name plate shall read: "Photocell Bypass Test On" and "Photocell Test Off-Automatic." See Service Cabinet detail.
8. The dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
9. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumping of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.
10. The photocell unit shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell without removal of the photocell unit or the photocell enclosure.
11. All internal wire runs shall be identified with "To From" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or Polyethylene wire marking sleeves shall be used.
12. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.
13. A 1% tolerance is allowed for all dimensions.
14. See plans for breaker schedule.
15. Install conduit couplings on all conduits. Place couplings flush with top of concrete foundation.
16. Seal cabinet to foundation with a 1/2" bead of silicone. Apply silicone to dry surface only.
17. The meter base portion of this service was designed to meet metering portion of Euseco Drawing 309 requirements.

1. Metering Arrangements vary with different serving utilities. The utility may require meter base mounting in the enclosure, or on the side, or on the back of the enclosure. The utility may require the dimension between the door and the front of the safety socket box to be less than the 11" shown in the left side safety socket box mounting detail, see Standard Plan J-3b. The Contractor shall verify the utility’s requirements prior to fabrication of and installing the service equipment.
2. The requirement for a disconnect switch ahead of the Meter varies with different serving utilities. The Contractor shall verify the serving utilities requirements prior to fabrication and installing the service equipment.
4. Hinges shall have stainless steel or brass pins.
5. Cabinets shall be rated NEMA 3R and shall include two rain tight vents.
6. Metering equipment doors shall be pad lockable. Each door shall be gasketed. Instil best construction core on bottom left and right doors. See door hinge detail, Standard Plan J-3b. Concealed heavy duty stainless steel lift off hinges are allowed as an alternative. Upper left door shall have 3 hinges, lower left door shall have 2 hinges, and right door shall have 3 hinges. All doors shall have a two position door stop assembly.
7. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key number 2, 3, 4, 7, 8, 9, 16, 21 and 24. Key number 4 name plate shall read: "Photocell Bypass Test On" and "Photocell Test Off-Automatic." See Service Cabinet detail.
8. The dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
9. All buswork shall be high grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt onto the buswork. Jumping of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the breaker schedule.
10. The photocell unit shall be centered in the photocell enclosure to permit 360 degree rotation of the photocell without removal of the photocell unit or the photocell enclosure.
11. All internal wire runs shall be identified with "To From" coded tags labeled with the code letters and/or numbers shown on the schedules. Approved PVC or Polyethylene wire marking sleeves shall be used.
12. All nuts, bolts, and washers used for mounting photocell enclosure shall be stainless steel.
13. A 1% tolerance is allowed for all dimensions.
14. See plans for breaker schedule.
15. Install conduit couplings on all conduits. Place couplings flush with top of concrete foundation.
16. Seal cabinet to foundation with a 1/2" bead of silicone. Apply silicone to dry surface only.
17. The meter base portion of this service was designed to meet metering portion of Euseco Drawing 309 requirements.
EFFECTIVE: August 5, 2018 TO September 2, 2019

**KEY**

1. Meter buse per serving utility requirements. As a minimum, the meter base shall be safety socket box with factory installed test bypass facility that meets the requirements of Eusem Drawing 305.
2. Main Breaker (See Breaker Schedule).
4. Switch (SPDT snap action, positive close 15 AMP - 120/277 vol ts* rated).
6. Branch Breaker (see Breaker Schedule).
7. Signal Transformer Breaker (see Breaker Schedule).
8. Contactor (see Breaker Schedule).
11. Neutral Buss, 14 lug copper with stainless steel Allen head screws.
12. Photoelectric Enclosure - enclosure to be fabricated from 5/8" expanded steel mesh with welded seams and mounting flanges. Hot dip galvanized after fabrication. Type 3002 - 322 aluminum with 5/8" x 5/8" openings equivalent to 5/8" expanded steel mesh may be used as alternative material. See Photoelectric Enclosure Mounting Envelope, Standard Plan J-3b.
13. Hinged front door with 4" x 4" min. polished wire glass window.
14. Hinged dead front with 1/4 turn fasteners or slide latch.
15. Cabinet Main Bonding Jumper. Buss shall be 4 lug tinned copper.
18. 4" X 6" min. underground feed - service wire-way (left rear corner).
19. Screened Vents, 2 required, 1 each side, louvered plates.
22. Strip Heater (100 watt nominal), with terminal strip cover.
23. Transformer Breaker (SPST 15 AMP - 480 volt).
24. Dry Transformer (480/120 volt) 3 KVA copper bussed and copper wound.
25. Reserved for meter, current transformer and/or disconnect switch as required by the utility.
26. 24 circuit panel board - minimum size with separate main breaker.
27. Label Cabinet with Buss work rating.
28. 6 Circuit Panel Board - minimum size.
29. Molded Case Switch, rating of switch shall equal or exceed main breaker rating. Provide landing lug rated to accept 350 Kcmil conductors. (Omit if utility requires the disconnect switch to be mounted externally, or if the utility does not require the disconnect switch).
30. Molded case switch standoff bracket. (Omit If utility requires the disconnect switch to be mounted externally, or if the utility does not require the disconnect switch).
31. Molded case switch enclosure with cover. (Omit if utility requires the disconnect switch to be mounted externally, or if the utility does not require the disconnect switch).
NOTES

1. Cabinet construction shall meet the requirements of Standard Specification Section 9-29.13(10). Aluminum cabinets shall have mill finish.

2. Cabinet construction shall conform to the requirements of Chapter 6, Section 2, of the California Department of Transportation (CalTrans) Transportation Electrical Equipment Specifications (TEES) as currently published. All equipment shall be listed. Cabinets shall be shipped in accordance with Standard Specification Section 9-29.13(10).

3. The Housing and Cage numbers refer to the designations shown in the TEES. Cabinet Housing #1 (ALT) and Cage #2 (ALT) are modified versions of Cabinet Housing #2 and Cage #2, respectively, using the shorter vertical dimensions shown. All other dimensions and features are the same.

4. Housing #1B shall always use Cage #1. Housing #2 shall always use Cage #2.

5. Cage mounting points are designated by rack units (U), which are numbered starting from the bottom of the cage.

6. Install the following in PANEL A for the applicable cabinet type:
   - Type 331L and 334L: Cabinets. Do not install PANEL A.
   - Type 332L: Cabinets. Install Generator Transfer Switch.

7. Install the following in PANEL B for the applicable cabinet type:
   - Type 331L Cabinets: Install Generator Transfer Switch when specified in the contract.
   - Type 332L and 334L: Install Police Panel.

8. All cabinet locks shall accept both 6-pin or 7-pin cores, with the exception of the Police Panel. The Police Panel shall use a standard Police Panel lock and keys.

NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TEES
NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TEES
NOTES

1. Cabinet construction shall meet the requirements of Standard Specification Section 9-29.13(10). Aluminum cabinets shall have mild fire-resistant.

2. Cabinet construction shall conform to the requirements of Chapter 6, Section 2, of the Caltrans Transportation Electrical Equipment Specifications (TTES) as currently published, including all addenda, with modifications as described in Standard Specification Section 9-29.13(10).

3. The Housing and Cage numbers refer to the designations shown in the TTES. Cabinet Housing #1X is a double-width version of Cabinet Housing #1 with overall dimensions as shown.

4. Housing #1X shall always use two of Cage #1 - see Standard Plan J-12.15. Housing #3 shall always use two ITS Cages.

5. Cage mounting points are designated by rack units (U), which are numbered starting from the bottom of the cage - see Standard Plan J-12.15.

6. Install the following in PANEL A for the applicable cabinet type:
   - Type 331D and 334D Cabinets: Do not install PANEL A.
   - Type 332D Cabinet: Install Generator Transfer Switches.

7. Install the following in PANEL B for the applicable cabinet type:
   - Type 331D Cabinets: Install Generator Transfer Switch when specified in the contract.
   - Type 332D and 334D Cabinets: Install Police Panel.

8. All cabinet locks shall accept 6-pin or 7-pin cores, with the exception of the Police Panel. The Police Panel shall use a standard Police Panel Lock and Keys.

9. Cage side supports for Cabinet Housing #1X shall be as shown in the TTES for Cabinet Housing #1B. Cage upper and lower center supports shall be as shown here, and installed in the same manner as shown in the TTES for the Cabinet Housing #3 center cage supports.

NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TTES.
TIMBER LUMINAIRE SUPPORT

**KEY**
- GALVANIZED STEEL OR ALUMINUM MAST ARM - CONFIGURATIONS VARY WITH MANUFACTURER
- LUMINAIRE - SEE CONTRACT FOR TYPE AND NUMBER
- MOUNTING HEIGHT - ROADWAY TO LUMINAIRE ELEVATION DIFFERENCE ± 2% - SEE CONTRACT
- MA ST AR M LENGTH - SEE CONTRACT
- 3/8" (IN) GALVANIZED THIMBLE EYE BOLT (SINGLE OR DOUBLE) WITH WASHERS AND NUTS OR EYENUT BONDING JUMPER POLE AND BRACKET CABLE EQUIPMENT GROUNDING CONDUCTOR - SEE STANDARD PLAN J-60.05 FROM GROUND LINE TO 12" (FT) ABOVE GROUND, ENCLOSE EQUIPMENT GROUNDING CONDUCTOR IN GALVANIZED STEEL CONDUIT, CODE SIZED - ABOVE 12" (FT) FROM GROUND, STAPLE EQUIPMENT GROUNDING CONDUCTOR TO POLE - CONNECT TO SUPPLEMENTAL GROUND, PER STANDARD PLAN J-40.05 SERVICE HEDGE CLAMP ACSR TRIPLEX OR FOURSPLEX CONDUCTORS - SEE CONTRACT 2" (IN) SPLI T BOLT CONNECTOR INSULATING TAPE FOR WATERPROOF CONNECTION FUSED QUICK DISCONNECT, PER STANDARD SPECIFICATION 9-29.7(2) - USE 30 AMP FUSES FOR HIGH MAST SUPPORTS WEATHERHEAD - SIZE AS REQUIRED

**NOTES**
1. Timber luminaire supports are allowed only for temporary installations where breakaway or Slip Bases are not required.
2. When down guys are required, see Standard Plan J-15.15.

**HIGH MAST TIMBER LUMINAIRE SUPPORT**

SHOWN FOR 480 VAC POWER FEED - INCREASE CONDUCTOR AND Fuse SIZE AS REQUIRED FOR 240 VAC POWER FEED

**STANDARD PLAN J-15.10-0**

**TYPICAL LUMINAIRE MOUNTING CONFIGURATIONS**

**EFFECTIVE:** August 5, 2018 TO September 2, 2019

**STANDARD PLAN J-15.10-0**
NOTES

1. See Standard Specification 9-06.16 for Breakaway Base Connection details. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The Breakaway Base Connection details are only shown on this plan to illustrate how parts are assembled.


3. Secure conductor in adjacent Junction Box per detail in Standard Plan J-28.70

4. Where shown in the plans, install plaque (R10-327) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.

5. Mounting distances vary between manufacturers. See manufacturer's recommendations for mounting information.

6. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.

ACCESSIBLE BREAKAWAY PEDESTRIAN PUSHBUTTON (PPB) POST

STANDARD PLAN J-20.15-0

EFFECTIVE: August 5, 2018 TO September 2, 2019
KEY
1. FACE PLATE
2. 1/4-20 x 3/8" LONG STAINLESS STEEL SCREW
3. 1/4-20 STAINLESS #8 STEEL SCREWS
4. PUSH-BUTTON FRAME ADAPTER
5. 1/4-20 STAINLESS STEEL BOLT W/ WASHER AND LOCK WASHER
6. PUSH-BUTTON STATION
7. DRILL AND TAP SHAFT FOR 1/4" DIAM. BOLT
8. DRILL AND TAP SHAFT FOR 5/8" WIRE GUIDE HOLE - ADD INSULINER

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY

METAL POLE INSTALLATION
PPB-M

ATTACH SIGN TO ADAPTER - 1/4-20 x 3/8" STAINLESS STEEL SCREWS (TYP.)
ATTACH ADAPTER TO PUSH-BUTTON STATION - 1/4" DIAM. COUNTERSUNK HOLE. 3/8" LONG FLAT HEAD SCREWS (TYP.)
WOOD POLE INSTALLATION ALTERNATIVE 1
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

INSTALL FITTING WITH NYLON WASHER ON OUTSIDE OF HOUSING
- SEAL WITH SILICONE AFTER UNIT IS FULLY ASSEMBLED

WOOD POLE INSTALLATION ALTERNATIVE 3
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER POLE)

KEY
1. FACE PLATE
2. 1/4-20 X 3/8" LONG STAINLESS STEEL SCREW
3. 1/4-20 STAINLESS STEEL SCREWS
4. PUSHBUTTON FRAME ADAPTER
5. LAG BOLT WITH WASHER
6. PUSHBUTTON STATION
7. CONDUIT DIAMETER + 1/16" HOLE THRU POLE
8. CONDUIT
9. 3/4" CONDUIT
10. LIQUID-TITE FLEX CONDUIT
11. ONE PIECE TWO HOLE CLAMP
12. LAG BOLT
13. INSULNER SLEEVE

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
WOOD POLE INSTALLATION ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

PRE-DRILL (2) 1/4" WEEP HOLES IN BOTTOM RADIUS OF CONDUIT
DROP LOOP - REAM HOLES WITH DRILL BIT TO ELIMINATE BURRS

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. Clamping bolts shall be tightened to 50 ft-lbs max. torque. After state inspection, burr threads to prevent nut rotation. DO NOT OVERTIGHTEN.
2. The final height of the Anchor Bolts shall be below the top of the slip plate assembly to ensure proper function of the slip base.
3. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: Provide 3'-0" min. slack. Attach pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
4. Junction box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
5. Provide cable tie at wiring entering the junction box (for slip base installations only). See Detail A, Standard Plan J-28.70.
6. Keeper Plate shall not extend beyond the edges of the pole base plate.

FOUNDATION DETAILS

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

2. Steel shaft shall be tapered either round or dodecagon (12 sided), 11 gauge, 4 1/2" O.D. at slipfitter. Taper shall be 0.14 inches per foot.
3. All poles shafts shall be hot dip galvanized per AASHTO M111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Pedestrian signal displays mounted on the side of an octagonal (8 sided) traffic signal pole with a pole attachment angle other than 0°, 45°, 90°, 135°, 180°, 225°, 270°, or 315° shall utilize:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.
7. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
   Standard details.
2. All poles shall be hot dip galvanized per
   AASHTO M111.
3. Welding of structures shall be in accord-
   ance with the latest edition of the AWS
   D1.1 Structural Welding Code - Steel. All
   butt welds shall be ground flush with base
   metal.
4. Visor shall be 8" Polycarbonate, fully en-
   closed circle at bottom to reduce glare on
   sign. Display shall be of appropriate color
   needed.
details.
6. Junction Box serving the Standard shall
   preferably be located 5’ - 0” (10’- 0” Max.)
   from the Standard.

NOTES
FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.16

CLAMP CONDUCTORS TO PREVENT SLIPPING (TYP.)

STEEL REINFORCING BAR - SEE NOTE 3
CLAMP CONDUCTOR TO STEEL REINFORCING WITH USTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

INSTALL SIZE REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-30.28 FOR GROUND CONNECTION DETAILS

2C (SH) B&W CABLE - TO FLASHING BEACON

EQUIPMENT GROUNDING CONDUCTOR LEVELING NUT (TYP.)

INSTALL SIZE REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

CENTER OF BEACON HOUSING TO BE MOUNTED ON A LEVEL SURFACE FOR MEASURING HORIZONTAL AND VERTICALITY

NOTE

1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3’ - 0” min. slack. Clamp to vertical steel reinforcing bar with listed connector suitable for use embedded in concrete.
5. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.
1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3' - 0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. Heat shrink cap all spare conductors not terminated on a terminal strip.
5. When a Pedestrian Push Button is specified in contract plans, see Standard Plan J-20.20 for details.
6. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.

NOTE:
- Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3' - 0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
- Heat shrink cap all spare conductors not terminated on a terminal strip.
- When a Pedestrian Push Button is specified in contract plans, see Standard Plan J-20.20 for details.
- Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.
NOTES
2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11-gage, 4 1/2" (in) O.D. at slipfit.
   Taper shall be 0.14" (in) per foot.
3. All poles shall be hot-dip galvanized per AASHTO M111.
4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural
   Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Junction Box serving the Standard shall be located no more than 10' - 0" (5' - 0" preferred) from
   the Standard.
7. A backplate shall be installed on the Upper Traffic Signal Head. Install a backplate on the Lower
   Traffic Signal Head only when required by the contract. Do not install retro-reflective tape
   on backplates.
10. For Signal Head Mounting Details, see Standard Plan J-76.10.
11. Standard shall use slip base if installed closer than 4' (ft) from the face of guardrail.
12. Treat surrounding pole with galvanizing repair paint meeting the requirements of Standard
    Specification 9-08(1)(2). Apply two coats. Paint shall be dry before applying second coat.
13. Hand hole shall face toward roadway for Elbow Mount Barrier installations. For all other installations,
    hand hole shall face the opposite direction from the Upper Traffic Signal Head. Hand hole face shall
    remain accessible after pole and sign installation is complete.

RAMP METER SIGNAL
STANDARD DETAILS

STANDARD PLAN J-22.15-0

SHEET 1 OF 3 SHEETS

STOP HERE ON RED
1 MILE

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES

3. Top of Leveling Nut height shall be 1" (in) max. above foundation.
4. Heat-shrink cap for all spare conductors not terminated on a terminal strip.
5. Provide Cable Tie at wiring entering the Junction Box (Slip Base installations only). See Detail A, Standard Plan J-28.70.

COLOR CODE

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<thead>
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<tr>
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<td>SPARE CONDUCTOR</td>
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RAMP METER SIGNAL STANDARD ELECTRICAL DETAILS

STANDARD PLAN J-22.16-0

PERSPECTIVE VIEW RAMP METER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CPRR 421 11/3/15

APPROVED FOR PUBLICATION: July 10, 2015
**OBLIQUE VIEW**

**REINFORCING AND ANCHOR BOLTS**

**SIDEWALK OR TRAFFIC ISLAND**

(GROUT PAD OPTION SHOWN)

**SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL**

**IDENTIFICATION**

**TAG**

**DETAIL**

**TEXT SHALL BE ENGRAVED 0.014" DEEP**

**3 1/4"**

**3/8" MIN.**

**TPY**

**6.00" MIN.**

**TPY**

**11"**

**SHAPE**

**DIMENSION**

**ALT. #**

**1**

**NOTES**

- **1" = 2" FOR 3", 6" DIAM FOUNDATION**
- **2" = 4" FOR 4", 8" DIAM FOUNDATION**
- **2" = 6" FOR 3", 6" SQUARE FOUNDATION**

**APPLICATION**

- **FORM TO FINISH GRADE WHEN INSTALLING SIDEWALK OR TRAFFIC ISLAND**
- **3/8" PREMOLDED JOINT FILLER**
- **ROUGHENED CONCRETE SURFACE**

**GROUNDING CONDUCTOR NON-INSULATED**

- **4 AWG STRANDED COPPER**
- **PROVIDE 3 MIN. SLACK (ROUTE CONDUCTOR TO GROUNDING STUD)**

**CONTRACT PLANS FOR EXTENDED SIDEWALK LAYOUT**

**SEE CONTRACT PLANS FOR DETAILS NOT SHOWN.**

**NOTE**

- **FOUNDATION REINFORCING ONLY PARTIALLY SHOWN FOR CLARITY.**
- **SEE STANDARD PLAN J-26.10 FOR DETAILS NOT SHOWN.**

**TYPICAL SECTION**

**SIGNAL STANDARD FOUNDATION - SEE STANDARD PLAN J-26.10**

**EXPECTED: August 5, 2018 TO September 2, 2019**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**SHEET 3 OF 3 SHEETS**

**APPROVED FOR PUBLICATION**

**DATE**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
NOTES

1. All material and workmanship shall be in accordance with the requirements of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.

2. The analysis and design for Adaptors 1 and 2 have been done in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals - Fifth Edition - Dated 2009, and Interims, using basic wind speed of 90 MPH and 50 years of design life.

3. Adaptors' parameters are based on field data and existing signal standard anchor bolts and bolt circles. Adaptor 1 shall be used for 15' (ft) thru 45' (ft) mast arm signal standards and Adaptor 2 for 46' (ft) thru 65' (ft).

4. Adaptors shall only be used for temporary installation of knocked down signal standards.

5. Materials specifications:

   - All structural steel, except as otherwise noted
   - ASTM A572 GR. 50 OR
   - ASTM A500 GR. B
   - ASTM A36 GR. B OR A500 GR. B
   - ASTM F3125 GRADE A325
   - ASTM A663 GRADE DH
   - AASHTO M 293 (ASTM F436)

6. All bolts, nuts, and related hardware shall be galvanized after fabrication per ASTM F2329.

7. Steel surfaces shall be galvanized after fabrication in accordance with AASHTO M 111.

8. Install and secure adaptor to existing support anchor bolts. Then install signal standard on adaptor top plate. Rake to be plumb after all load has been placed.

9. All holes in top and bottom plates of Adaptor 1 and Adaptor 2 are thru holes. See engraved or stamped text for bolt hole diameter.
EFFECTIVE: August 5, 2018 TO September 2, 2019

TOP VIEW
ADAPTOR 2 BOTTOM PLATE

2-1/4" (IN) THICK PLATE
2" (IN) DIA. CONNECTING BOLT WITH 2 WASHERS
ADAPTOR TOP - 2-1/2" (IN) THICK PLATE

2" (IN) DIA. CLEAR OPENING
14" (IN) X 2" (IN) WIDE CONTINUOUS BACKUP RING (TYP.)
14" (IN) X 2" (IN) WIDE CONTINUOUS BACKUP RING (TYP.)
SEAL (TYP.)
12" (IN) DIA. X STRONG PIPE - 1/2" (IN) WALL THICKNESS
ADAPTOR BOTTOM - 2-1/4" (IN) THICK PLATE
9" (IN) DIA. CLEAR OPENING

TOP OF FOUNDATION
HEAVY HEX BOLT (TYP.) - SIZE TO MATCH ANCHOR BOLT
EXISTING ANCHOR BOLT (TO REMAIN)

TYPICAL SECTION
8 - 3/16" (IN) MAX. GAP BEFORE WELDING

STANDARD PLAN J-26.20-01
TEMPORARY SIGNAL STANDARD ADAPTOR

SHEET 4 OF 5 SHEETS

APPROVED FOR PUBLICATION
Cowan, Jeff
Jan 24, 2019 3:45 AM

State Designer
Washington State Department of Transportation

Zabel, Richard
Jan 26, 2019 3:56 PM
**NOTES**

1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50\( \text{ft} \) (H1).

3. Slip Bases shall not be installed on 50\( \text{ft} \) (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

BRIDGE-MOUNTED LUMINAIRE
(TYPE 1 MAST ARM SHOWN)

MOUNTING HEIGHT

MAST ARM LENGTH
12' MAX. FOR SINGLE ARM
8' MAX. FOR DOUBLE ARM

BOLT CONNECTION

HAND HOLE

BOTTOM OF POLE BASE

TOP OF BRIDGE DECK

LIGHT STANDARD BASE
MOUNTED ON BRIDGE
- SEE STD. PLAN J-28.45

STEEL LIGHT STANDARD
BARREL MOUNTED BASE
- SEE STD. PLAN J-28.35,
C-84, AND C-65.14

LUMINAIRE POLE

STEEL LUMINAIRE HEAD

STEEL LUMINAIRE HEAD (Typ.)

MEDIAN BARRIER-MOUNTED LUMINAIRE
(TYPE 1 MAST ARM SHOWN)

MAST ARM LENGTH

BOLT CONNECTION

HAND HOLE

STEEL LUMINAIRE HEAD

LUMINAIRE POLE

OFFSET DISTANCE

SHOULDER

EDGES OF TRAVELED WAY

VARIES WITH

POST TOP-MOUNTED LUMINAIRE
(SLIP BASE SHOWN)

HAND HOLE

STEEL LUMINAIRE POLE

STEEL LUMINAIRE HEAD

STEEL LUMINAIRE HEAD (Typ.)

BOTTOM OF POLE BASE

STEEL LIGHT STANDARD
STANDARD PLAN J-28.10-01
SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: AUGUST 5, 2018 TO SEPTEMBER 2, 2019
NOTES
1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer.

TAPER NOTE
End Taper (on approach from opposing traffic):
20’ (longitudinal) = use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.

BASED ON FIELD CONDITIONS, STEEL LIGHT STANDARD PLACEMENT CAN BE ADJUSTED ± 4.0’, WHEN APPROVED BY THE PROJECT ENGINEER.
EDGE OF SHOULDER

STEEL LIGHT STANDARD FOUNDATION

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

EMBANKMENTS

SECTION VIEW

CASE C
FORE SLOPES 4H:1V OR FLATTER

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

CULVERT – SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

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

CURVATURE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE B
SLOPES FLATTER THAN 3H:1V

SLOPE FLATTER THAN 3H:1V

FILL MATERIAL

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

EDGE OF SHOULDER

STEEL LIGHT STANDARD FOUNDATION

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

SECTION VIEW

CASE C
FORE SLOPES 4H:1V OR FLATTER

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

CULVERT – SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

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

CURVATURE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE B
SLOPES FLATTER THAN 3H:1V

SLOPE FLATTER THAN 3H:1V

FILL MATERIAL

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

EDGE OF SHOULDER

STEEL LIGHT STANDARD FOUNDATION

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

SECTION VIEW

CASE C
FORE SLOPES 4H:1V OR FLATTER

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

CULVERT – SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

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

CURVATURE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE B
SLOPES FLATTER THAN 3H:1V

SLOPE FLATTER THAN 3H:1V

FILL MATERIAL

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

EDGE OF SHOULDER

STEEL LIGHT STANDARD FOUNDATION

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

SECTION VIEW

CASE C
FORE SLOPES 4H:1V OR FLATTER

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

CULVERT – SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

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

CURVATURE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE B
SLOPES FLATTER THAN 3H:1V

SLOPE FLATTER THAN 3H:1V

FILL MATERIAL

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

EDGE OF SHOULDER

STEEL LIGHT STANDARD FOUNDATION

SLOPE 3H:1V THRU 2H:1V

NOT STEEPER THAN 10H:1V SLOPE

SLOPE ROUNding

FILL MATERIAL

SECTION VIEW

CASE C
FORE SLOPES 4H:1V OR FLATTER

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

CULVERT – SEE CONTRACT PLANS FOR SIZE AND LOCATION (SEPARATE BID ITEM)

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW

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

CURVATURE TO PREVENT BUILD-UP OF DEBRIS AROUND BASE

STEEL LIGHT STANDARD FOUNDATION

SECTION VIEW
**NOTES**


**SECTION VIEW**

**CASE I**

- **POSTED SPEED LIMIT LESS THAN 35 MPH**
- **VARIATES WITH OFFSET DISTANCE**
- **3.0' MIN.**
- **EDGE OF SHOULDER**
- **SLIP BASE**
- **10H:1V SLOPE OR FLATTER**
- **FILL MATERIAL**
- **STEEL LIGHT STANDARD FOUNDATION**

**CASE J**

- **POSTED SPEED LIMIT LESS THAN 35 MPH**
- **EDGES OF SHOULDERS**
- **SIDEWALK**
- **HAND HOLE**
- **NOT STEEPER THAN 2H:1V**
- **STEEL LIGHT STANDARD FOUNDATION**

**CASE K**

- **ROADWAYS WITH 10H:1V OR FLATTER SIDE SLOPES**
- **EDGES OF SHOULDER**
- **VARIATES WITH OFFSET DISTANCE**
- **3.0' MIN.**
- **EDGE OF SHOULDER**
- **HAND HOLE**
- **10H:1V SLOPE OR FLATTER**
- **SLOPE ROUNding**
- **NOT STEEPER THAN 4H:1V**
- **STEEL LIGHT STANDARD FOUNDATION**

**CASE L**

- **PARKING LOTS**
- **HAND HOLE**
- **STEEL LIGHT STANDARD FOUNDATION**
- **FILL MATERIAL**
- **PAVEMENT**
- **TYPE B**

**STEEL LIGHT STANDARD PLACEMENT**

**MISCELLANEOUS**

**STANDARD PLAN J-28.26-01**

**EFFECTIVE: August 5, 2018 TO September 2, 2019**

**Washington State Department of Transportation**
ANCHOR BOLT TABLE

<table>
<thead>
<tr>
<th>Luminaire Height (FT)</th>
<th>Mast Arm Type</th>
<th>Mast Arm Length (FT)</th>
<th>Mast Arm Diameter (IN)</th>
<th>Anchor Bolt Length (IN)</th>
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<tr>
<td>20' TO 50'</td>
<td>SINGLE</td>
<td>8' TO 18'</td>
<td>1'</td>
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<tr>
<td>20' TO 50'</td>
<td>DOUBLE</td>
<td>8' TO 18'</td>
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<td>See Table</td>
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<td>20' TO 45'</td>
<td>DOUBLE</td>
<td>10' TO 18'</td>
<td>1'</td>
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<tr>
<td>45' TO 50'</td>
<td>DOUBLE</td>
<td>10' TO 18'</td>
<td>1'</td>
<td>See Table</td>
</tr>
</tbody>
</table>

NOTES

2. The Strap Templates shall be held in place by nuts, 6" (in) from the top of the foundation and 3" (in) from the bottom of the anchor bolt. Eighteen heavy duty hex nuts and six round washers are required for a slip base assembly. Eighteen heavy duty hex nuts and six plate washers are required for a fixed base assembly.
3. Use Steel Light Standard Foundation Type A on level ground or slopes not exceeding 4H:1V. Use Type B for slopes steeper than 4H:1V, but not exceeding 2H:1V.
4. These foundations are designed for a minimum of 2000 PSF (TYPE A) or 1500 PSF (TYPE B) allowable lateral bearing pressure for the soil. A special foundation shall be required for soil with allowable lateral bearing pressure lower than 1500 PSF.
5. The Luminaria Pole height shall not exceed 50' (ft) (H1).
6. Slip bases shall not be installed on 50' (ft) (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.
7. Slip bases are required on poles installed inside the Design Clear Zone, and on poles installed behind traffic barrier that are within the traffic barrier deflection zone.
8. Foundations constructed within Media Filter Drains shall be increased in depth by the depth of the Media Filter Drain.
9. Exposed portions of the foundation shall be formed to create a Class 2 surface finish. All forming shall be removed upon completion of foundation construction.
10. For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheet 2 of 2.
11. The anchor bolts shall be high-strength steel, manufactured from ASTM F1554 Grade 105, with heavy hex nuts and hardened washers. Galvanize the anchor bolts according to ASTM F2329.
12. The foundation shall be grounded in accordance with the requirements of Standard Specification 8-20.3.4.
CONSTRUCTION METHODS

METHOD 1
NO SUBSURFACE FORM

This option is used only when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use a paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plum.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

METHOD 2
METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal (pipe) form. The corrugated metal form shall not extend more than 5" (in) +/- 1" (in) below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plum.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-32.3(2).

Construct the embankment widening (if required).
Heavy Hex Nut (Typ.) - Size to match anchor bolt - See Table - Std. Plan J-28.30
Round Washer (Typ.) - Size to match anchor bolt
Luminaire Pole
Pole base plate
Keeper plate
Anchor/slip plate assembly - See Std. Plan J-28.40
Capped conduit
Slip base foundation - See Std. Plan J-28.30
2" (In) diam. x 3/4" (In) Grout well (Typ.)
3/8" (In) I.D. drain tube in Grout pad
Fixed base foundation - See Std. Plan J-28.30
Capped conduit
3" (In) diam. x 3/4" (In) Grout well (Typ.)
Plate washer detail

Notes:

1. 50' (ft) (H1) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.
2. Galvanizing shall be in accordance with AASHTO M 111.
3. See Standard Plans C-8b, C-85.15, and J-28.60 for foundation and base plate requirements when light standards are mounted on concrete traffic barriers.
4. See Standard Specification Sections 6-03.3(33) and 8-20.3 (4) for the torque requirements for all of the anchor bolt installations. Install 1" (in) diameter clamping bolts in all slip bases to a torque of 95 Foot-Pounds. See Standard Specification Section 8-20.3 (13a). Do NOT overtighten. After state inspection, buff threads to prevent nut rotation.
1. 50' (H) poles with double mast arms or poles weighing in excess of 1000 lbs. shall not be installed on a slip base.

2. The Slip and Anchor Plates shall be manufactured from ASTM A572 GR.50 or ASTM A588. All Slip Plate notched surfaces shall be finished smooth.

3. The clamping bolts shall be high-strength steel, manufactured from AASHTO M 164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M 232.


5. Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

6. Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or reusing a luminaire pole. For 1" (in) clamping bolts, tighten to 95 ft-lbs. For 1 1/4" (in) clamping bolts, tighten to 104 ft-lbs.

DO NOT OVERTIGHTEN. After state inspection, err threads to prevent nut rotation.

**STEEL LIGHT STANDARD ANCHOR/SLIP PLATE FOR SLIP BASE**

**STANDARD PLAN J-28.42-0**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation
CONSTRUCTION NOTES
① Wire brush existing threads.
② Apply two coats of galvanizing paint (per Standard Specification Section 9-08.1(2B)).
③ Tighten bolt by "Turn of Nut" method (per Standard Specification Section 6-03.3(33)).

PLATE WASHER DETAIL (ASTM A36 OR ASTM A572 GRADE 50)

ROUGHEN SURFACE AND APPLY EPoxy BONDING AGENT PRIOR TO PLACING GROUT PER STANDARD SPECIFICATION SECTION 9-26.11.

SECTION 1

KEY
① POLE BASE PLATE (EXISTING)
② TOP SLIP PLATE (PER ASTM A572 GR. 50 OR A588)
③ BOTTOM SLIP PLATE (PER ASTM A572 GR. 50 OR A588)
④ ANCHOR PLATE (PER ASTM A572 GR. 50 OR A588)
⑤ REMOVE GROUT (EXISTING WITH DRAIN)
⑥ NEW GROUT PAD WITH DRAIN
⑦ FOUNDATION (EXISTING)
⑧ HARDENED WASHER (PER ASTM F436)

NOTES
1. The purpose of this plan is to provide the details for retrofitting a 4-bolt flange base with a slip base assembly.
2. Existing anchor bolts shall be inspected for corrosion, thread damage, and galvanizing. To minimize galvanic corrosion between dissimilar metals, ensure galvanizing remains intact while installing aluminum luminaire.
3. After bolting the bottom slip plate assembly to the foundation, fill the slotted bolt holes with mastic per Standard Specification Section 9-08.7.
4. Grade around the foundation to ensure the stub height does not exceed 3.7/8" (ln). For grading requirements, see Standard Plan J-28.22.
5. Removal of the flange base from the existing base plate is required.
6. Misaligned anchor bolts shall be removed and replaced.
7. This adaptor shall be used only on luminaire poles that contain a handhole. Replace standards and foundation when the handhole is located in the flange base.
8. Galvanize the anchor plate, bottom slip plate, and top slip plate after fabrication according to ASTM A123.
9. Galvanize all hardware according to ASTM F2339.

SLIP BASE ADAPTOR FOR 4-BOLT LIGHT STANDARD BASE STANDARD PLAN J-28.43-01

EFFECTIVE: August 5, 2018 TO September 2, 2019

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111. All bolts, rods and related hardware shall be galvanized after fabrication per ASTM F2329.


3. The presence of pedestrian railing shall be verified prior to light standard fabrication. When pedestrian railing is present or to be installed, locate hand hole as detailed in the Bridge Pedestrian Barrier details.


STEEL LIGHT STANDARD ELBOW DETAIL

For luminaire poles with single mast arm 12" - 0" or less and double mast arms 8" - 2" or less, mounted on bridge or retaining walls.
When traffic barrier height is 42" (in), maintain approximate height from top of barrier to hand hole shown.

Bridge Pedestrian Barrier

Single-Slope Bridge Traffic Barrier

Typical Sections

F-Shape Bridge Traffic Barrier

Steel Light Standard Elbow Mounting on Bridge & Retaining Wall

Standard Plan J-28.45-0
NOTES

1. Pole Base Plate for a Slip Base design shall be 1 1/4" (in) steel manufactured from ASTM A572GR.50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" (in) steel manufactured from ASTM A572GR. 50, ASTM A588, or 1 1/2" (in) manufactured from ASTM A36. All Pole Base Plate notched surfaces shall be finished smooth.


3. Galvanizing shall be in accordance with AASHTO M 111.

4. See Standard Plans C-8b, C-85.14, and J-28.60 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barrier.


EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES
2. Round and smooth all edges around hand hole and along the wire-way to protect the conductors.
4. Install grout after plumbing the pole.

SECTION B

CONDUCTOR ATTACHMENT DETAIL
CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS

= RM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR

= SIZE OF FILLET WELD BY LUMINAIRE POLE FABRICATOR

STANDARD PLAN J-28.60-0:
STEEL LIGHT STANDARD BARRIER MOUNTED BASE

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

1. Each wire shall be physically separated by at least 1/4" (6) so that sealing material can fill in between the wires; where heat shrink tubing is used for the outer splic enclosure, it shall meet one of the following requirements:
   a. Have separate ports for each conductor (“WYE” or “X” shaped tubing). ~ or ~
   b. Have rubber electrical mastic tape wrapped around each conductor to ensure a weatherproof seal. See Rubber Electrical Mastic Tape Installation Detail, Standard Plan J-60.05.

2. Heat shrink tubing shall extend a minimum of one inch onto the original wire insulation of each wire in the splice. Rigid splice enclosures shall be centered over the crimped connection.

3. Electrical tape used in splicing applications shall be 3/4" (19) wide, be UL listed under UL 510, and be CSA Certified under C22.2 No. 197-M1983.

4. Crimp splices shall be installed with an approved crimping tool for the type and size of crimp splice used. Pliers and similar multi-purpose tools may not be used.

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**STEEL LIGHT STANDARD WIRING DETAILS**

**STANDARD PLAN J-28.70-03**

**EFFECTIVE: August 5, 2018 TO September 2, 2019**

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**CONNECTOR AND INTERNAL SEALING DETAILS**

**TAPE OVERLAP DIAGRAM**

WHEN USING WRAPPED VINYL ELECTRICAL TAPE:
- INSTALL TWO LAYERS OF SPIRAL WRAPPED TAPE.
- EACH SPIRAL LAYER SHALL HAVE AN OVERLAP OF 1/2 OF THE TAPE WIDTH (SEE DIAGRAM ABOVE).

**JUNCTION BOX WIRING DETAIL**

FOR GROUNDING REQUIREMENTS, SEE STANDARD PLAN J-60.05
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTES:
1. Verify Pole Top Plate, Camera Mount Plate, Bolt Circle, and Bolt Holes are adequate for the required Camera prior to releasing poles for manufacturing.
2. Steel shall be galvanized after fabrication per AASHTO M111. Hardware shall be galvanized per AASHTO M232. Fasteners less than 0.50" (in.) diameter shall be stainless or brass.
3. Attach Camera to Camera Mount Plate using four (4) 3/8"-16 UNC x 1.75" stainless steel bolts with eight (8) stainless steel washers and four (4) lock-nuts with nylon inserts, or as approved by the Camera Supplier.

DESIGN CRITERIA:
This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Basic wind velocity is 90 MPH. Design Life/Recurrence Interval 50 years.

WIND VELOCITY:
90 MPH

MAXIMUM POLE DEFLECTION:
Not to exceed 0.7" in 30 MPH and 1.4" in 70 MPH wind.

LOAD CASE 1:
Camera (1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:
Dish (1) - 1' - 0" diameter @ pole top level.

LOAD CASE 2:
Camera (1) - EPA = 4.00 sq. ft. @ 2' - 0" above pole top, and:
Camera (2) - EPA = 0.54 sq. ft. @ 1' - 0" and 2' - 0" from pole top, and:
NEMA Cabinet (2) - EPA = 1.33 sq. ft. @ 3' - 8" from pole top, install back-to-back NEMA Cabinets, and:
Radio Equipment (2) - EPA = 2.25 sq. ft. each @ 2' - 0" and 9' - 0" from pole top.

EPA = Effective Projected Area

CAMERA POLE DATA

<table>
<thead>
<tr>
<th>CAMERA MOUNT TYPE</th>
<th>POLE MOUNT TYPE</th>
<th>TOP DIAM. &quot;P&quot; (IN.)</th>
<th>TOP DIAM. &quot;P&quot; (IN.)</th>
<th>TUBE &quot;A&quot; (IN.)</th>
<th>BOLT CIRCLE (IN.)</th>
<th>ANCHOR BOLT DIAM. (IN.)</th>
<th>CONNECTION BOLT DIAM. (IN.)</th>
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</thead>
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</table>
EFFECTIVE: August 5, 2018 TO September 2, 2019

GROUNDING NUT
ANGLE
2" (IN) COUPLINGS
HAND HOLE
(1" (FT) FROM TOP)

1/4" (IN) DIAM. DRAIN HOLE =
DRILL FROM INSIDE

HAND HOLE (3" (FT) FROM TOP)
RADIO ATTACHMENT HOLE

RADIAL INDEX
LOAD CASE #2

CAMERA/PDA POLE MOUNTS
NEMA 4X (STAINLESS STEEL) ~
SIZE 16" H X 12" W X .5" D
CAMERA MOUNT PLATE
CAMERA UPPER HANDHOLE
2" COUPLING
2" SHORT NIPPLE
CHANNEL DRILLED 1/8" OVERSIZE OF NIPPLE
STAINLESS WASHER
CONDUCT WATERTIGHT LOCKNUT
BUSHING
BACKPLATE = DRILL OVER SIZE FOR CONDUCT,
SEAL WASHER, AND LOCKNUT
TERMINAL BLOCK
HINGED DOOR WITH TWO PAD-LOCKABLE
FLIP LATCHES (TY) J-HOOK FOR WIRING

EFFECTIVE: August 5, 2018 TO September 2, 2019

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NOTES

1. For information not shown, see Steel Light Standard Elbow detail, Standard Plan J-28.45. For Camera Pole Details, see Standard Plan J-29.15.

2. Round and smooth all edges along wire-way to protect conductors.

3. The manufacturer shall verify that the Elbow Top Plate matches the Camera Pole Base, and shall submit the shop drawings for approval.

4. Galvanize after fabrication according to AASHTO M111.

5. Install galvanized steel protective band (3/16" thick x 4" high (ASTM A36) on all four sides, as shown in Standard Plan J-28.45, except fasten 6" from corners on 25" square base.
**NOTES**

1. All material and workmanship shall be in accordance with the Standard Specifications.
2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
3. Concrete for 12" (in) thick maintenance pad shall be class 4000. Concrete for 4" (in) thick maintenance pad shall be class 3000.
4. Height of wall varies to match slope of finished grade. Contractor shall field-determine wall height at each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.
5. All exposed corners shall have 3/4" (in) chamfers.
6. For grounding details not shown, see Standard Plan J-60.06.
7. Where concrete cover (clear) thickness is not shown, the clear distance from the face of the concrete to the face of any reinforcing steel shall be as follows: 3" (in) for bottom of maintenance pad, 2" (in) for top of maintenance pad, and 1 1/2" (in) at all other locations.
8. Falsework shall be carefully released to prevent impact or undue stress on the structure.
9. See Contract Plans for number, type, and location of conduits and conduits.
10. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Engineer's approval of maintenance pad slope and orientation required prior to proceeding with construction.
11. Use 4" (in) Maintenance Pad on level ground or slopes not exceeding 10H : 1V. Use 12" (in) Maintenance Pad on slopes steeper than 10H : 1V. Slopes steeper than 2H : 1V shall require a special design.

**HIGH MAST LUMINARIA MAINTENANCE PAD**

**STANDARD PLAN J-30.10-00**

**KEY NOTE**

1. Limits of Pigmented Sealer, TYPICAL for ALL Retaining Walls.
2. Reinforcing Steel Piping, STEEL TYPICAL for ALL Retaining Walls.

**EFFECTIVE:** August 5, 2018 TO September 2, 2019
1. 3/8" (in) x 2" (in) x 2" (in) Frame Bonding Stud Plate with 1/4 NC x 1" Stainless Steel Bonding Stud.
   - Weld Bonding Stud to Frame Bonding Plate.
   - Weld to lid support frame.
   - 1/4" (in) weld ~ 3 sides.
   - Grind lid bearing surface flat after welding.
   - All corners rounded. Corners along exposed sheared or cut edges shall be broken by light grinding to achieve an approximate 1/16" (in) chamfer or rounding.
   - Protect conductors with fireproof cloth prior to welding.
   - Omit Frame Bonding Stud Plate if the Frame Bonding point already exists.

2. Weld all around lid bonding stud ~ 1/4 NC x 1" stainless steel ~ liberally coat entire assembly w/ anti-seize compound.

**Plan**
- **Edge of Lid Support Frame**
- **Frame Bonding Stud**
- **Lid Bonding Stud**
- **Frame Bonding Bolt**

**Key**
- **1. Bonding Jumper**
- **2. Equipment Grounding Conductor**
- **3. Bonding Jumper Attached to Box Wall Coupling Nut**
- **4. Bonding Jumper Attached to Box Lid(s) Coupling Nut. #8 AWG (MIN.) x 4' (FT) Tinned Braided Copper.**

**Existing Junction Box Retrofit Grounding Details**

**Standard Plan J-40.05-0**

**Sheet 1 of 1 Sheet**

**Approved for publication**
Washington, State. Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019
EFFECTIVE: August 5, 2018 TO September 2, 2019

JUNCTION BOX DIMENSION TABLE

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<th>TYPE 5</th>
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<td>CAPACITY – CONDUIT DIAM.</td>
<td>6&quot;</td>
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<td>24&quot;</td>
</tr>
</tbody>
</table>

NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. All lid thicknesses are minimum.
3. Lid perimeter shall bear on frame. Mill to bearing seat and lid perimeter for full even contact after fabrication of frame and lid. Lid and frame units with uneven bearing will be rejected.
4. The installed lid and frame shall fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation on the contact surfaces.
5. A 1/4-20 NC x 1" (in) S. S. ground stud shall be welded to the bottom of each lid: include (2) each S. S. nuts and (3) each S. S. flat washers.
6. The hinges shall allow the lids to open 180°. When lid assembly is Ductile Iron (Alternative) and equipped with Safety Bargs, lids shall open 110°.
7. Bolts and nuts shall be liberally coated with anti-seize compound.
8. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-20 NC x 1" (in) S. S. bolt, (2) each S. S. nuts, and (3) each S. S. flat washers. Equipment bonding jumper shall be #8 AWG min. + * 4" (ft) of braided copper.
9. The System identification letters shall be 1/8" (in) line thickness formed by a mild steel weld bead. See Cover Marking details. Grind off diamond pattern before forming letters. Ductile iron letraing shall be recessed, 1/8" (in) line thickness. See Standard Specification 9-29.24(2) for details.
11. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty. Heavy-Duty Junction Boxes shall not be installed in sidewalks, walkways, and shared use paths.
12. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" (in) min. to 8" (in) max., for final grade of new construction only. See Standard Specification 8-20.36(b). Where adjustments are to be made to existing Junction Boxes or for interim construction stages during the contract, the limits shall be from 6" min. to 10" (in) max. See Standard Specification 8-20.36(b).
13. Junction Box Types 4, 5, or 6 may be equipped with Ductile Iron (Alternative) Lid(s) and a Cast Iron (Alternative) Frame. Junction box shall meet the requirements of Standard Specification 9-29.2 and shall be in accordance with approved shop drawings.

HEAVY-DUTY JUNCTION BOX TYPES 4, 5, & 6

STANDARD PLAN J-40.20-0

Bailey, Ted
Apr 25 2016 5:08 PM
Washington State Department of Transportation
**NOTES**

1. Junction Box shall be constructed of 12-gage, Type 304 stainless with steel welded seam construction. Finish shall be #28 for backbox and #4 for the cover. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification S-282(4) for details.

3. Conduit Capacity = 8" (4" per end).

**PLAN VIEW**

**ELEVATION VIEW**

**SIDE VIEW**

**EXPLODED ISOMETRIC VIEW**

**ASSEMBLY DETAIL**
UNIVERSAL LID

SYSTEM IDENTIFICATION
(SEE NOTE 2)

0.25" (IN) THICK NEOPRENE GASKET

0.25" (IN) DIAM. HOLE
(TYP.)

21.00"

6.50" (TYP.)

0.75" (TYP.)

0.53" (IN) DIAM. x 62" (TYP.)

0.25" (IN) DIAM. HOLE
(TYP.)

ELEVATION VIEW

MOUNTING TAB DETAILS

PLAN VIEW

ISOMETRIC VIEW

0.50" (IN) DIAM. HOLE

R = 0.50" (TYP.)

1.00"

1.50"

10.00"

5.00"

10.00"

5.00"

0.75" (TYP.)

6.50" (TYP.)

21.00"

ITG

0.75" (IN) THICK NEOPRENE GASKET

0.25" (IN) DIAM. HOLE
(TYP.)

GASKET

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with steel welded seam construction. Finish shall be #38 for barrier box and #4 for the cover. Support anchor shall be constructed of 12-gage, Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification S-29.2(4) for details.

3. Conduit capacity ≥ 8" (4" per end).

4. Box shall include #8 AWG (min.) x 1 foot tinned, braided copper Bonding Juniper for bonding Box and Telescoping Top.
NOTES

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6.02.3(20).

2. Mount the stainless steel support using an approved resin-bonded anchor system installed per manufacturer's recommendation. Anchor bolt embedment shall be 4 1/2" minimum. Resin-bonded anchors shall be stainless steel and shall be 3/8" diameter. Expansion Anchors are not allowed.

3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in the concrete.


5. The System Identification numbers on the box lid shall be 1/8" thick thickness formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and Standard Specifications 9-23.2(4).

6. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimensions.

7. Equipment Bonding Jumper shall be # 8 AWG (min.) x 1 foot of tinned, braided copper.

8. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit connection. An insulated grounded end bushing shall be used to terminate Rapid Metal Conduit.

9. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.
NOTES

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be
   moved and the abandoned hole filled with grout conforming to Standard Specification 6-03.320.

2. Mount the stainless steel support using an approved resin-bonded anchor system, installed per
   manufacturer's recommendation. Resin-bonded anchors shall be stainless steel and shall be of
   3/8" diameter (Expansion Anchors are not allowed). Anchor bolt embedment shall be 4 1/2" min.

3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in concrete. See
   Standard Plan J-60.13 for Stainless Steel Channel details.

4. The System Identification letters on the box lid shall be 1/8" line thickness formed by engraving,
   stamping, or with a stainless steel weld bead. See System Identification Detail and Standard
   Specifications J-23.3(4).

5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the
   Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28
   using the 8 times multiplier for length and width dimensions.

6. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit
   connection. An insulated grounded end bushing shall be used to terminate Rigid Metal Conduit.

7. Equipment Bonding Jumper shall be # 8 AWG (min.) × 1 foot of tinned, braided copper.

8. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam
   construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.
NOTES
1. For Installation Notes and Details see Standard Plan J-50.15.
EFFECTIVE: August 5, 2018 TO September 2, 2019
**INDUCTION LOOP DETAILS**

**STANDARD PLAN J-50.15-01**

**PLAN**

- **SAWCUT AND CONDUIT CONNECTION**
  - **LOOP STUB-OUT SLEEVE**
  - **SEE LOOP INSTALLATION**
  - **CONDUIT OR END BELL BUSHING**
  - **MATCH EXISTING PAVING MATERIAL**
  - **SOFT POCKET (WIDTH EQUAL TO STUB-OUT SLEEVE DIAMETER PLUS 2" (50MM))**
  - **SAWCUT EXISTING PAVEMENT**
  - **TO LOOP**
  - **1/2" (13) SAWCUT**
  - **AS REQUIRED**
  - **FILL WITH SEALANT (PER CONTRACT OR AS APPROVED BY THE ENGINEER)**

**DETAIL "A"**

**LOOP INSTALLATION NOTES**

1. Install the Junction Box and the stub-out conduit with Sch. 80 PVC stub-out sleeve. Conduit for the loop stub-out sleeve shall be as required in the conduit size table shown on sheet 1 of this set.

2. Lay out loops and loop lead-ins to miss cracks/joints in road, when possible. Maintain 18" (457mm) minimum clearance from manholes and valve boxes.

3. The opening around the loop stub shall be patched with matching paving material if opened larger than PVC sleeve + 2" (50mm).

4. Sawcut the loop slabs and the lead-in slabs. Wash/dry cuts. File edges to remove burr of all saw-cuts into stub-out sleeve.

5. Lay out the loop wire starting at the Junction Box, allowing 5' (1.5m) minimum slack.

6. Install the wire in the loop slot as shown.

7. Finish laying out the wire at the Junction Box and identify the leads with the loop number, the "S" for start and the "F" for finish, the loop series number, and the loop lead-in conductor number.

8. Twist each pair of the lead-in wires a minimum of two times per foot each foot, from the loop to the Junction Box. Reverse the direction of the twist for each successive pair installed. Seal loops/sawcuts.

9. Construct a supplemental splice containing any series loop connections in the adjacent junction box as required in the plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice.

10. Splice the loop lead-ins to the shielded cable as noted in the Contract. See Standard Plan J-50.05 for Loop Splice details.

11. All loop circuits shall be tested per Standard Specification Section H-20.3(14D) once installation is complete.

12. Existing stub-out shall be upgraded as necessary to conform to the conduit size table shown on sheet 1.

13. All loop lead-in sawcuts parallel to lane edge shall be at least 12" (305mm) from edge of pavement and within six inches outside of lane or fog line when possible. Maintain 12" (305mm) separation between parallel cuts or joints.

14. The loop stub-out sleeve shall have an inside diameter 1" (25mm) larger than the outside diameter of the End Bell Bushing. Sleeve shall be notched 5/8" (16mm) to 3/4" (19mm) to accommodate loop wires. Plug conduit and fill sleeve with sand until loops are installed to keep out Hot Asphalt during paving operations.
EFFECTIVE: August 5, 2018 TO September 2, 2019

STUB-OUT DETAIL WITH CEMENT CONCRETE CURB OR GUTTER

EDGE OF PAVED SHOULDER

TO JUNCTION BOX

STUB-OUT DETAIL WITH ROADWAY

STUB-OUT DETAIL WITH CEMENT CONCRETE BARRIER

INDUCTION LOOP DETAILS

STANDARD PLAN J-50.15-01

STUB-OUT DETAIL WITH CEMENT CONCRETE CURB OR GUTTER

SEE STANDARD PLAN F-10.12

12" MIN.

12" MIN.

12" MIN.

LEAD-IN CONDUIT SHALL EXTEND A MINIMUM OF 3/4" (IN) INTO PAVEMENT (PAVEMENT DEPTH VARIES)

CONDUIT SECURED INTO ROAD SURFACE (TYP.)

LOOP STUB-OUT SLEEVE 1/4" (IN) TO 1/2" (IN) BELOW TOP OF PAVEMENT

CEMENT CONCRETE BARRIER - SINGLE SLOPE BARRIER SHOWN SEE CONTRACT PLANS FOR SIZE AND TYPE

TO JUNCTION BOX

STUB-OUT DETAIL WITH GUARDRAIL AND CURB

LOOP STUB-OUT SLEEVE 1/4" (IN) TO 1/2" (IN) BELOW TOP OF PAVEMENT

LEAD-IN CONDUIT SHALL EXTEND A MINIMUM OF 3/4" (IN) INTO PAVEMENT (PAVEMENT DEPTH VARIES)

CONDUIT SECURED INTO ROAD SURFACE (TYP.)

TO JUNCTION BOX
INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P2, Loop L4

PLAN VIEW
TYPICAL 2 LANE PTR LAYOUT

NOTES
1. See Standard Plan J-60.30 for Piezo axe sensor General Installation instructions, and Modified Type 2 Loop wiring details.
2. The contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.
3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo chip readings shall be OK from shield to center conductor. See piezo specifications for piezo capacitance readings.
4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PTR loops shall be spaced @15 ft. leading edge to leading edge.
5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete lanes, install the loops 4" and 6" away from the expansion joints.
6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".
7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in the contract.
8. Use Schedule 40 PVC conduit from the Junction box to the Cabinet. Where there are 2 to 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit in each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.
9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation see Standard Specification 8-20.3(5).
10. Junction boxes installed in the paved shoulder or median shall be a Heavy Duty Junction box. If box is installed in unpaved shoulder, use type 1 or 2. See Standard Plan J-40.10 for size and type. See Standard Specification 9.23.2(1)B. for further information.
11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets, according to the Color Code Identification Chart. For Wire Color Code Detail see Standard Plan J-60.30.
12. Cabinet can be placed on either side of road depending on terrain/slope, etc. It does not have to be placed on increasing milepost side of the roadway.
13. For 6 - lane layouts and above, see Contract.
INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 2 - (pass lane) - Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) - Loop L1, Piezo P1, Loop L2
Lane 4 - (pass lane) - Loop L3, Piezo P2, Loop L4

PLAN VIEW
TYPICAL 4 LANE PTR LAYOUT WITH MEDIAN
INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

Lane 1 - (drive lane) - Loop L1, Piezo P1, Loop L6
Lane 2 - (center lane) - Loop L3, Piezo P2, Loop L4
Lane 3 - (driveway lane) - Loop L1, Piezo P1, Loop L2

SHOULDER NOTCH - SEE NOTES 6 AND 7
FOR CONDUIT SIZE SEE NOTE 8

SECTION A

PERMANENT TRAFFIC RECORDER INSTALLATIONS
STANDARD PLAN J-50.20-00

EFFECTIVE: August 5, 2018 TO September 2, 2019
**NOTES**

1. The Loop and Piezo leads in all Junction Boxes and Cabinets are to be color-coded. Use colored tape on each specific wire, see table. Wrap the tape on the wires approximately 6" beyond conduit in all Junction Boxes.

2. The maximum load in the cabinet is 5 Amps.

3. The cabinet may be pedestal or pad mount. See Standard Plan J-10.10 for details.


5. For Grounding Details, See Standard Plan J-60.05. See Standard Specification 8-20.3(9) for other requirements.


**COLOR CODE IDENTIFICATION**

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<tr>
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</tbody>
</table>

WHITE is also used for Designating Increasing Mile Posts

**COLOR CODE WIRE DETAIL**

YELLOW BAND = 4

WHITE BAND = INCREASING MILE POST DIRECTION

SEE SPECIAL PROVISIONS IN THE CONTRACT FOR SPLICE REQUIREMENTS

SEE STANDARD SPECIFICATION 9-29.12 FOR SPLICE REQUIREMENTS
Required to supplement equipment grounding for luminaires standards with direct burial aerial feeds, or where required in the plans.

Required at all service and separately derived systems.

Type D service cabinet shown. Use this concept for Type B cabinet or transformer. Type D service cabinet shall be installed on lower surface of foundation only. Type B service cabinet and transformer cabinet shall be installed on raised surface of foundation only.

Type B modified service cabinet.

Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing.

RIGID PVC CONDUIT (PVC) APPLICATION

GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION

SEE KEY ON SHEET 1 FOR PARTS

TYPICAL GROUNDING DETAILS

STANDARD PLAN J-60.05-0

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Late: Ted

July 19, 2016 1:30 PM

Washington State Department of Transportation
1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". PVC Conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adaptor.


3. Pipe wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

**KEY NOTES**

- Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 1/8" recessed).
- Type DX Deflection (DX) Fitting with Internal Bonding Jumper.
- Wrap Conduit Pipe from Conduit Deflection Fitting to 1" - 0" beyond (inside) barrier surface.
- 1" - 0" long, 3/4" thick expanded closed-cell foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.
- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1" - 0" on each side of the joint.
- 10" - 0" long section of RMC conduit.
- Deflection Fitting shall be in neutral state after installation.

**ELEVATION**

- Conduit Installation in Traffic Barrier on Retaining Wall

**STANDARD PLAN J-60.11-00**
CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
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STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
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STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
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STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
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CONDUIT INSTALLATION
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STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
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IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00
KEY NOTES

1. Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 0.10" recessed). Use NEMA 4X Junction Box with stationary-forms. See Standard Plan J-40.10, Use NEMA 3R Junction Box with slip-forms. See Standard Plan J-40.37.

2. Where conduit in a structure is routed across a cold joint with continuous reinforcing steel, install pre-molded joint filler and wrap the conduit pipe for 1'-0" on each side of the joint. Omit pipe-wrap tape on PVC conduit.

3. Where conduit exits from a structure, wrap the conduit pipe for 1'-0" on each side from the exiting point.

4. 10'-0" long section of RMC conduit.

5. Conduit Deflection Fitting shall be in neutral state after installation.

6. Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1'-0" on each side of the joint.

Schematic

CONDUIT INSTALLATION IN SINGLE-SLOPE CONCRETE BARRIER (DUAL-FACED) STANDARD PLAN J-60.12-00

NOTES

1. Install a Conduit Deflection (DX) Fitting "A" at the exit from the barrier. Install a Conduit Deflection (DX) Fitting "B" to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-60.11 for Conduit Deflection Fitting details.

2. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A." RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adapter in the barrier. PVC conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adapter. RMC conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.

3. See Standard Plan C-80.10 for additional details on Single-Slope Concrete Barrier.


5. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

CONDUIT INSTALLATION IN SINGLE-SLOPE CONCRETE BARRIER (DUAL-FACED) STANDARD PLAN J-60.12-00
CONDUIT DIAMETERS REFLECT 'V' FOR RIGID GALVANIZED STEEL, SCHEDULE 40 PVC (AUTHORIZED ONLY WITH HORIZONTAL ANCHOR WITH 4 1/2" MIN EMBEDMENT - SEE NOTE 1). CONCRETE SLAB BRIDGE (AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONSTRAINED). 3/4" DIA. RESIN BONDED ANCHOR WITH 4 1/2" MIN EMBEDMENT - SEE NOTE 1. DO NOT DRILL INTO GIRDERS. HORIZONTAL CHANNEL MOUNT (F-SHAPE BARRIER SHOWN APPLY TO ALL BARRIER TYPES). 3/4" DIA. RESIN BONDED ANCHOR WITH 4 1/2" MIN EMBEDMENT - SEE NOTE 1.

CONDUIT SUPPORT DETAIL
FOR UTILITY COMPANY USE ONLY. AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL, WHERE VERTICAL CLEARANCE IS CONSTRAINED. CHANNEL SUPPORT
STAINLESS STEEL CHANNEL SUPPORT
PLUMB LINE - SEE NOTE 4

STAINLESS STEEL CHANNEL SUPPORT
CHANNEL SUPPORT
CHANNEL NUT WITH SPRING (TYP.)

STAINLESS STEEL CHANNEL
CHANNEL NUT
FLAT WASHER (TYP.)
HOT DIP GALVANIZED STEEL OR STAINLESS STEEL SPACERS, 1/4" MIN. (TYP.) - INSTALL AND SIZE AS REQUIRED. ATTACHMENT BOLT (TYP.) - SEE NOTE 3

CHANNEL STOP ASSEMBLY - 5/8" DIA. + 2 1/4" LONG BOLT WITH LOCK WASHER, FLAT WASHER AND NUT (TYP.).


NOTES
Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6-12.2(26). There shall be a minimum of a 3" edge distance to the centerline of anchor holes in concrete. Mount the stainless steel support using an approved resin bonded anchor system. Anchors shall be stainless steel and shall be of 3/8" diameter (expansion anchors are not allowed). Anchor Bolt embedment of 4 1/2" minimum.

1. Number of clamps shall be determined by number of conduits to be attached to the Stainless Steel Channel Support. See Conduit Plans for conduit routing.

2. Add additional Attachment Bolts when required to maintain 8" maximum spacing between adjacent Attachment Bolts.

3. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line. When barrier is not plumb, size spacer to maintain back of barrier line.

4. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line. When barrier is not plumb, size spacer to maintain back of barrier line.


CHANNEL SUPPORT ON SOFFIT
NOTES
1. See Contract for head type, mounting height, and orientation.
2. All nipples, fittings, and center pipes shall be 1 1/2" (in) diameter.
3. Install neoprene gasket inside head when flanged elbows are supplied.
4. Extend wire sheath a minimum of 1" (in) inside all signal and sign housings and terminal compartments.
5. Apply bead of silicone to the serrated ring and around the perimeter of all top openings prior to installation of fittings.
6. See Standard Specification 8-28.16 for backplate requirements. Where required, prismatic sheeting shall be applied in accordance with the manufacturer's recommendations. The application surface of the backplate shall be cleaned, degreased with isopropyl alcohol, and dried prior to application of the sheeting.
7. Drill a 1/4" (in) drain hole in the bottom of each signal display assembly, and one in the bottom of each pedestrian head. When signal display assembly is mounted horizontally, drill a 1/4" (in) drain hole at the lowest point of each section of the signal assembly.
EFFECTIVE: August 5, 2018 TO September 2, 2019

**PLAN VIEW**

- Presence of a barrier handrail shall be verified prior to signal bridge fabrication.
- No terminal cabinet shall be mounted on side opposite the roadway.
- See bridge sheets for foundation design.
- When signal bridge is mounted on a structure, terminal cabinets shall be mounted on the traffic side of the post as shown.
- Hand hole - see note 6.

**ELEVATION VIEW WITH HANDRAIL**

- See partial foundation detail for attachment of equipment grounding conductor to signal bridge.

**ELEVATION VIEW WITHOUT HANDRAIL**

- See partial foundation detail for attachment of equipment grounding conductor to signal bridge.

**SIGNAL BRIDGE STANDARD ELECTRICAL DETAILS**

- Standard Plan J-75.41.0

**PARTIAL FOUNDATION DETAIL**

- Grout pad/screen not shown for clarity.
- Provide foundation identification tag below hand hole location - see detail sheet 2.
- Conduit coupling - install flush with top of foundation - do not glue PVC stubout (TYP).
- CONDUCTORS (TYP) - ROUTE TO TERMINAL CABINET - SEE CONTRACT FOR QUANTITY
- 6" (IN) DIAM. HAND HOLE WITH GASKET & REINFORCING RING - SEE HAND HOLE DETAIL, SHEET 3 (SEE NOTE 6).

**BOLTS, NUTS, AND WASHERS - ASTM F900 OR A193 TYPE 304 OR 316 STAINLESS STEEL (S.S.)**

**FOOTING DETAILS**

- Foundation footing details for signal bridge.

**IDENTIFICATION TAG DETAIL**

- Text shall be engraved 0.014" (IN) deep.
- 10-GAGE TYPE 304 OR 316 STAINLESS STEEL TAG - REDS cues with TOP OF FINISHED FOUNDATION.
- 12 - 28 (NF) X 2" (IN) LONG STAINLESS STEEL SCREW - DRILL AND TAP FROM BOTTOM - LEAVE SCREW FLUSH WITH TOP - APPLY LOCKTITE TO SCREW THREADS TO BIND SCREWS AND I.D. TAG TOGETHER.

**FOOTING DETAIL ON BRIDGE - CROSS BEAM**

- No foundation allowed on bridge deck.

**EFFECTIVE: August 5, 2018 TO September 2, 2019**
NOTES

1. Upper and lower channel identification labels shall match the detector channels shown in the Contract Plans.

2. Connectors DT3B, DT3P, DT4S, and DT4P are Type DD50 D-Sub connectors with pin layouts and assignments shown. The suffix "S" indicates a socket (female connector) and the suffix "P" indicates a plug (male connector).

3. Detector Termination Interface Panel terminals not shown due to variations in arrangement and numbering between manufacturers.

4. Connectors DT3P and DT4S shall be installed in one of the following arrangements:
   a) Mounted to the back of the Detector Test Panel. Connectors shall have 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 DT3S and DT4P shall be designed such that they can be connected directly, bypassing the Detector Test Panel.

6. The Detector Termination Interface Panel shall be installed electrically between the Detector Test Panel and the C1 connector. A second additional terminal block may be installed electrically between the Input File(s) and the Detector Test Panel.

7. Test switches shall be three position switches with the "Test" position being a momentary contact with spring return to the "OFF" position. Test switch position functions shall be as described in Standard Specification section 9.29.13(10).

8. Location of the Display On/Off switch is approximate. This switch shall be located to the right of all of the individual channel test switches and clear of the mounting rack.

CONNECTOR PIN ASSIGNMENTS (SEE NOTE 3)

CONNECTOR D3S

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PIN TABLE EXAMPLES:

JIF: Input File J, Slot 1, Terminal F
DIT, 14: Detector 14
BRJ-IN: Detector Test Panel Position 9, Upper Channel, 1C1-88 - C1 Connector, Pin 58
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

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TEES

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:
   - 116 to J16
   - 115 to J15

3. Power Distribution Assembly (PDA) #3LX shall be modified as follows:
   a. The C56 connector shall be included and wired as referenced in TEES Drawing A6-15, 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 T2-8 To T4-2 TR1 Output to Field Green 2
      - T2-8 MU-3 Energizes TR1 and TR2 when MU is normal
      - T1-1, T1-2 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 T82 through T88. Relabel the C5 connector as C5P. 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.
### C1 Connector Pin Assignments

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### C4, C5, and C6 Connector Pin Assignments

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### Display Panel Inputs

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</table>

### Connector Diagram

- Connector P1
- Connector P2S
- Connector P1P
- Connector P2S P1

**Legend**

- C1: 
- C4: 
- C5: 
- C6: 
- CM: 
- DET: 
- DP: 
- IF: 
- IFL: 
- LF: 
- MU: 
- NA: 
- NC: 
- P2: 
- PC: 
- SB: 
- SWPK: 
- TR: 

### Pin Table Examples

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<th>CONNECTOR P2S P1</th>
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**Notice:**

- Matthew, Jan 18, 2018 1:17 AM

**APPROVED FOR PUBLICATION**

- Capitol Hill
- Washington State Department of Transportation

**Sheets:**

- 1 of 3 Sheets
CONSTRUCTION NOTES

1. Backfill material shall meet ANSI/NSF Environmental Standard 60
   Follow manufacturer’s mixing recommendations.

2. Ground Pipe and types of non-hazardous salts will vary per
   manufacturer. See the WSDOT Qualified Products List (QPL)
   for approved manufacturers and follow guidance provided.

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

1. The Heavy Duty Lid thickness varies by installation type:
   a) 0" (6 mm) for all new installations
   b) 0" (6 mm) for existing boxes with no roadway overlay
   c) Such that it is flush with the surface of the new overlay, when a new overlay is specified

2. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" (1 mm) thick.

3. Slip-resistant lugs must be identified with a permanent marking on the underside of the lid, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The marking shall use 0.375" (10 mm) thick lines formed with a bead blast, and shall be placed prior to galing.

4. For Standard Duty Lids, attach a 3/4"-20 UNC x 1" (8 mm) S.S. ground stud coated with anti-seize compound. For Heavy Duty Lids, install a 1/2"-13 UNC x 1 1/4" (6 mm) S.S. bolt in a 0.75" (8 mm) diameter core hole in the ductile iron lid gusset as a ground stud. All ground studs shall include (3) S.S. nuts and (2) S.S. flat washers. See Standard Plan J-90.00 for grounding and bonding details.

5. The bonding jumper between the lid and frame shall be #8 AWG (min.), x 4" (100 mm) long, braided copper.

6. System identification letters shall use 0.125" (3.2 mm) wide lines. Cover marking for steel lids shall be formed by caging or with a mild steel weld bead. Cover marking for ductile iron lids shall be recessed. See COVER MARKING DETAIL and Standard Specification section 29.24 for additional details. Ductile iron lids shall also provide a minimum 1-1/2" (12 mm) deep x 3" (76 mm) wide flat area for lifting purposes.

7. Cement concrete shall be Class 4000.

8. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

9. Conduit capacity = 60 inches (sum total of all conduit diameters).

10. This drawing depicts a typical Pull Box assembly, Reinforcing not shown. Each manufacturer's Pull Box assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.

11. The lid is an assembly consisting of the metal lid and frame, reinforcing steel, brass ground inserts, and concrete.

12. #3 reinforcing bar shall be capable of being bent out of the way and restored, to allow for conduit installation.
NOTES

1. The Heavy Duty Lid thickness varies by installation type:
   a) 6" (152 mm) for all new installations
   b) 5" (127 mm) for existing boxes with no roadway overlay
   c) Such that it flush with the surface of the new overlay, when a new overlay is specified

2. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" (2 mm) thick.

3. Slit-resistant lids shall be identified with a permanent marking on the underside of the lid, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The marking shall use 1/8" (3 mm) thick letters formed with a weld bead, and shall be placed prior to galvanizing.

4. For Standard Duty Lids, attach a 1/4"-20 UNC x 1 1/4" (6 mm) S. S. bolt, covered with anti-seize compound. For Heavy Duty Lids, install a 1/2"-13 UNC x 1 1/4" (6 mm) S. S. bolt in a 15/32" (12 mm) diameter core hole in the ductile iron lid gasket as a ground stud. All ground studs shall include (3) S. S. nuts and (2) S. S. flat washers. See Standard Plan J-90.09 for grounding and bonding details.

5. The bonding jumper between the lid and frame shall be #8 AWG (min.) x 4" (100 mm) tinned braided copper.

6. System identification letters shall use 1/8" (3 mm) wide lines. Cover markings for steel lids shall be formed by casting or with a lid steel weld bead. Cover marking for ductile iron lids shall be recessed. See COVER MARKING DETAIL and Standard Specification Section B-34.24 for additional details. Ductile iron lids shall also provide a minimum 3/32" (2 mm) thick flat area for lifting purposes.

7. Cement concrete shall be Class 4000.

8. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

9. Conduit Capacity = 60 inches (sum total of all conduit diameters).

10. This drawing depicts a typical assembly. Reinforcing not shown. Each manufacturer's assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.

11. The lid is an assembly consisting of the metal lid(s) and frame, reinforcing steel, brass ground inserts, and concrete.

12. #3 reinforcing bar shall be capable of being bent out of the way and restored, to allow for conduit installation.
NOTES
1. The diamond pattern shall be a minimum of 3/32" (in) thick.
2. Slip-resistant lists shall be identified with a permanent marking on the underside of the lid, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The marking shall use 1/8" (in) thick lines formed with a weld bead, and shall be placed prior to galvanizing.
3. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and two flat washers shall be welded to each lid and coated with anti-seize compound. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and four washers shall be welded to the frame and coated with anti-seize compound, See Standard Plan J-90.60 for grounding and bonding details.
4. The bonding jumper between the lid and the frame shall be #8 AWG (min.) x 4 (ft) tinned braided copper.
5. The system identification letters shall be 1/8" (in) thick lines formed with a mild steel weld bead. See COVER MARKING DETAIL, See Standard Specification Section 9-28.2(4).
6. Cement concrete shall be Class 4000.
7. Conduit Capacity = 40 Inches (sum total of all conduit diameters).
8. Typical Small Cable Vault features and arrangement shown. Reinforcing not shown. Dimensions and arrangements will vary slightly by manufacturer. See Approved shop drawings.
9. Small Cable Vaults for WSDOT Projects shall only be installed with the lid frame bearing on the concrete portion of cable vault.

ISOMETRIC CUTAWAY ASSEMBLY

COVER MARKING DETAIL

= 1" (TYP.)
= 3/16" (TYP.)

1/2" CLEAR ALL AROUND

SEE NOTE 5

BOLTS, NUTS AND WASHERS -
ASTM F363 OR A193,
TYPE 304 OR TYPE 316
STAINLESS STEEL (S.S.)

EQUIPMENT BONDING JUMPER (SEE NOTE 4)
NOTES

1. Vaults (including Pull Boxes) installed within the traveled way or paved shoulder must use Heavy Duty Lids. Small Cable Vaults (Standard Plan J-90.21) shall not be installed in the traveled way or paved shoulder.

2. Vaults installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, and shared-use paths.

3. Small Cable Vaults for WSDOT Projects shall only be installed with the lid frame bearing on the concrete portion of cable vault.

4. Vault shall be installed on 6" (in) crushed surfacing pad in accordance with Standard Specification Section 8-20.3(6).

5. Conduit Capacities (sum total conduit of all conduit diameters):
   - Pull Box and Small Cable Vault = 40" (in)
   - Cable Vault = 60" (in)

6. The bonding jumper shall be #8 AWG min. x 1/4" (6 mm) of thinned braided copper between the lid and the frame, and shall be #8 AWG min. from the frame to the hex coupling nut. See Contract Plans and Standard Plan J-60.06 for bonding jumper requirements.

7. Connect the equipment grounding conductor(s) to the vault wall bonding connection with a #8 AWG (min.) equipment bonding jumper. For RMC conduits, the conduit end bushing shall be bonded to the equipment ground conductor and the vault wall bonding connection.

8. Each cable shall be coiled such that the cable’s minimum bending radius limitations are not compromised. For coils in pull boxes, form a figure 8 loop first; then fold it in half (cable should twist slightly, not bend) to form a single loop.

9. Knockouts shall be restored with grout after conduit installation – see Standard Specification section 8-20.3(6). For open bottom vaults, field bend #3 reinforcing bars to allow conduit into vault; then field bend back into place. Restored #3 bars shall be wire tied in two places, and the vault floor and wall completed with commercial concrete.
NOTE

1. For Hot Mix Asphalt Paving projects ~ “DO NOT PASS” and “PASS WITH CARE” signs shall be included for passing zones.
NOTES

1. For sign installation details, see Standard Plan G-series.

2. Where it is impractical to locate a sign with the lateral offset, a minimum of 2' (610 mm) lateral offset may be used. A 1' (305 mm) 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 (NO SUPPLEMENTAL PLAQUE)</th>
<th>TO BOTTOM OF SUPPLEMENTAL PLAQUE (WHEN REQUIRED)</th>
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<tbody>
<tr>
<td>RURAL</td>
<td>5' MINIMUM</td>
<td>4' MINIMUM</td>
</tr>
<tr>
<td>URBAN</td>
<td>7' MINIMUM</td>
<td>6' MINIMUM</td>
</tr>
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CLASS A CONSTRUCTION SIGNING INSTALLATION
STANDARD PLAN K-80.10-0

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

May 10, 2016 9:57 AM

John, John

Washington State Department of Transportation
NOTES

1. All fasteners may be zinc plated, galvanized or stainless steel. All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.

2. Install one lightweight Type A Low-Intensity flashing warning light on the traffic side of the barricade. Install two Type A Low-Intensity flashing warning lights per barricade when the barricades are used to close a roadway. Attach the light to the barricade according to the light manufacturer's recommendations or use the details shown on this plan.

3. Stripes on barricade rails shall be alternating orange and white retroreflective stripes (sloping downward at an angle of 45 degrees in the direction traffic is to pass).

4. The Type 3 barricade design shown on this plan meets the crash test requirements of NCHRP 350. Alternative designs may be approved if they conform to the NCHRP 350 crash test criteria and the MUTCD.

5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.

6. When sandbags are used in freezing weather, Urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.
Useable Traffic Lane 2 Min Area Closed to Traffic

Type 3L Barricade

Stripes on the barricades shall slope downward in the direction traffic is to pass

Area Closed to Traffic 2 Min Useable Traffic Lane

Type 3R Barricade

Work Area

Type 3L Barricade

Road Closure at Intersection

Road Closure at other Locations

Type 3R Barricade

Barricade Placement

Type 3R Barricade

Type 3L Barricade

Washington State Department of Transportation

Type 3 Barricade

Standard Plan K-80.20-00

Effective: August 5, 2018 to September 2, 2019
NOTES

1. The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2' wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

2. The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' wide barrier.
NOTES

1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2" wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrow base barrier.

2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 0.2(20).

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

6. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.

1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2" wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrow base barrier.

2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 0.2(20).

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

6. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
NOTES
1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker, use Class 2 when it is 6" or thicker.

3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

4. Use shims to properly fit the anchors to the barrier and roadway surfaces.

5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

TRAFFIC SIDE

NARROW BASE, ALTERNATIVE TEMPORARY CONCRETE BARRIER SEGMENT LENGTH = L

SEGMENT LENGTH = L

ATTACHMENT LOCATION (TYP.) = SEE NOTE 3

PLAN VIEW

NARROW BASE, ALTERNATIVE TEMPORARY CONCRETE BARRIER SEGMENT

ATTACHMENT LOCATION (TYP.) = SEE NOTE 3

PLAN VIEW

NARROW BASE, ALTERNATIVE TEMPORARY CONCRETE BARRIER SEGMENT

SEGMENT LENGTH = L

AFFE C T E V I E : August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019
**NOTES**

1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.
2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts that mark the angle point of any sudden change in topography.
3. See Standard Specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2 x 4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

**STEEL POSTS AND BRACES**

<table>
<thead>
<tr>
<th>POST SPECIFICATIONS</th>
<th>PLAIN</th>
<th>ROUNDED</th>
<th>ROLL FORMED</th>
</tr>
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<tr>
<td>POST</td>
<td>PIPE</td>
<td>ROLL F</td>
<td>T-POST</td>
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<tr>
<td>END, CORNER, OR PULL POST</td>
<td>2&quot; DIA.</td>
<td>Y</td>
<td>1.50</td>
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<tr>
<td>LINE OR BRACE POST</td>
<td>2&quot; DIA.</td>
<td>Z</td>
<td>1.85</td>
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</table>

**INTERMEDIATE BRACING/PULL POST**

- Wire mesh fastened to posts using four fasteners.
- Three additional fasteners per post are required within and at the limits of sag conditions.
- Use additional fasteners on posts that mark the angle point of any sudden change in topography.

**GRADE DEPRESSION (SAG) DETAIL**

- Internal post spacing for Wire Fence Type 2 is shown.
- Use additional fasteners as noted.

**WIRE FENCE TYPES 1 & 2 AND WIRE GATES**

**STANDARD PLAN L-10.10-02**
NOTES
1. Materials shall meet the requirements of Standard Specification 9-16.
1. All glare screen posts shall be 2 1/2" I.D. galvanized steel.
2. Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toe-nailed to post with 15d galvanized nails to prevent block rotation. See Standard Specification 9-16.3(2).
3. Attach blocks to steel posts using bolt holes on approaching traffic side of post web.
FABRIC BAND (TYP.)

3/8" EYE BOLT (TYP.)
WITH HEX NUT AND WASHER

HOG RING - SPACED @ 24" MAX. (TYP.)

STRETCHER BAR (TYP.)

TENSION WIRE (TYP.)

END OR CORNER (BRACE) POST DETAIL

PULL POST (WITHIN RUN) DETAIL

3/8" EYE BOLT (TYP.)

3/8" EYE NUT (TYP.)

U-BOLT (TYP.)
- SEE DETAIL A

GUARDRAIL POST (STEEL SHOWN)

GUARDRAIL POST (STEEL SHOWN)

3/8" EYE NUT WITH WASHER

TENSION WIRE

TENSION WIRE

GUARDRAIL POST (STEEL SHOWN)

GUARDRAIL POST (STEEL SHOWN)

TENSION WIRE

TENSION WIRE

GUARDRAIL POST (STEEL SHOWN)

GUARDRAIL POST (STEEL SHOWN)

TURNBUCKLE

GUARDRAIL POST (STEEL SHOWN)

GUARDRAIL POST (STEEL SHOWN)

TENSION WIRE

TENSION WIRE

GUARDRAIL POST (STEEL SHOWN)

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TENSION WIRE

TENSION WIRE

GUARDRAIL POST (STEEL SHOWN)

GUARDRAIL POST (STEEL SHOWN)
GLARE SCREEN TYPE 2 (CHAIN LINK WITH SLATS)

STANDARD PLAN L-40.20-02

5-21-2012

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019

END OR CORNER (BRACE) POST

TENSION WIRE (TYP.)

GLARE SCREEN FABRIC (TYP.)

HOG RINGS (TYP.) - SPACED @ 24" MAX.

TENSION WIRE

GLARE SCREEN SLAT (TYP.)

TENSION WIRE

FABRIC (TYP.)

STRETCHER BAR (TYP.)

LINE POST - SPACED @ 10' MAX.

EYE BOLT

TURNBUCKLE

TENSION WIRE

GLARE SCREEN SLAT (TYP.)

TENSION WIRE

FABRIC BAND (TYP.)

STRETCHER BAR (TYP.)

TENSION WIRE

TIE WIRE - SPACED @ 14" MAX.

HOG RINGS (TYP.)

LINE POST

DETAIL B

ELEVATION VIEW

PULL POST

DETAIL A

EYE BOLT

TURNBUCKLE

TENSION WIRE

GLARE SCREEN SLAT (TYP.)

TENSION WIRE

FABRIC BAND (TYP.)

STRETCHER BAR (TYP.)

PULL POST WITHIN RUN

DETAIL C

EYE BOLT

TURNBUCKLE

TENSION WIRE

3/8-16 x 5" GALVANIZED EYE BOLT

TENSION WIRE

HOG RINGS (TYP.)

TENSION WIRE

GLARE SCREEN SLAT (TYP.)

TENSION WIRE

FABRIC (TYP.)

STRETCHER BAR (TYP.)

TENSION WIRE

TIE WIRE - SPACED @ 14" MAX.

HOG RINGS (TYP.)

LINE POST

DETAIL D

EYE BOLT

TURNBUCKLE

TENSION WIRE
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP - 48" x 12" (TYP.)

5/8" Diam. Wire Rope

SEE MOUNTING DETAIL

TOP OF ROADWAY

YELLO REFLECTIVE TAPE - 3" (TYP.)

PLASTIC PIPE - 12" (NOM.) x 2'-7" LONG

COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW - 5/8" DAM. x 6" WITH 2" FLAT WASHER

HEX LAG BOLT - 3/8-7UNC x 5" WITH 1" DAM. FLAT WASHER (4 SETS TOTAL)

1 1/2" DAM. HOLE (TYP.)

NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M222.

ACCESS CONTROL GATE

STANDARD PLAN L-70.10-01

EXPIRES JUNE 30, 2008

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
PLASTIC PIPE CAP (TYP.)

PUT LOCK (TYP.) - AGENCY PROVIDED

5/8" DIAM. WIRE ROPE

SEE MOUNTING DETAIL

MIDDLE POST - REMOVABLE

TOP OF ROADWAY

YELLOW REFLECTIVE TAPE - 3" (TYP.)

PLASTIC PIPE - 12" (NOM.) x 2'-7" LONG
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW - 5/8" DIAM. x 6"
WITH 2" FLAT WASHER (TYP.)

HEX LAG BOLT - 3/8-7 UNC x 6"
WITH 1" DIAM. FLAT WASHER (4 SETS TOTAL)

1 1/2" DIAM. HOLE (TYP.)

TOP OF STEEL TUBE

GALV. SCREW - 3/16" DIAM. WITH FLAT WASHER (TYP.) (2 SETS REQ.)

GALV. STEEL TUBE

COMMERCIAL CONCRETE

5/8" S.S. EYE STRAP - FASTENED TO THE SIGN PANEL WITH 2 1/8" DIAM. SCREWS AND 2 HEX NUTS (TYP.)

NOTE
Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

1. Where shown on the Plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND

R = RAMP LANE WIDTH
L = LANE WIDTH

TRAFFIC ARROW TYPE MAY VARY - SEE CONTRACT FOR TYPE SPECIFIED

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND
R = RAMP LANE WIDTH
L = LANE WIDTH

RAMP CHANNELIZATION
TWO LANE
STANDARD PLAN M-1.40-02

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal geometric design. The dimensions may vary to fit existing conditions. See Contract.
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. When weaving section is more than 3/4 of a mile in length, use lane line.

3. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

- L = LANE WIDTH
- R = RAMP LANE WIDTH

**TABLE**

<table>
<thead>
<tr>
<th>POSTED MAIN LINE SPEED</th>
<th>D</th>
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</thead>
<tbody>
<tr>
<td>35 MPH</td>
<td>565'</td>
</tr>
<tr>
<td>40 MPH</td>
<td>670'</td>
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<tr>
<td>45 MPH</td>
<td>772'</td>
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<tr>
<td>50 MPH</td>
<td>845'</td>
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<tr>
<td>55 MPH</td>
<td>900'</td>
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<tr>
<td>60 MPH</td>
<td>1102'</td>
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<tr>
<td>65 MPH</td>
<td>1200'</td>
</tr>
<tr>
<td>70 MPH</td>
<td>1250'</td>
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</table>

**SINGLE-LANE, PARALLEL TYPE ~ ON-CONNECTION**

**DOUBLE-LANE, PARALLEL TYPE ~ ON-CONNECTION**

**RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION STANDARD PLAN M-1.50-03**
NOTE

1. Install a minimum of 3 sets of diagonal chevrons in the gore area. A 50' (ft) spacing is standard; however, for gore areas shorter than 150' (ft), use a 25' (ft) spacing, and for gore areas greater than 400' (ft), a spacing of 100' (ft) may be used.
NOTE

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area.
   A 50' (ft) spacing is standard; however, for gore areas shorter than
   150' (ft), use a 25' (ft) spacing, and for gore areas greater than
   400' (ft), a spacing of 100' (ft) may be used.

GORE AREA MARKINGS
WITH CHEVRONS

TRUNCATED GORE ALTERNATIVE

GORE AREA SUPPLEMENT
WITH TYPE 2 RAISED
PAVEMENT MARKERS
STOPPING POINT FOR LEFT TURN LANE

LEFT-TURN CHANNELIZATION
SYMMETRICAL WIDENING ABOUT CENTERLINE

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways, with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEFT-TURN CHANNELIZATION
ASYMMETRICAL WIDENING LEFT OF CENTERLINE

LEFT-TURN CHANNELIZATION
ASYMMETRICAL WIDENING RIGHT OF CENTERLINE

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane width.

Type 2L (SL) Traffic Arrow

<table>
<thead>
<tr>
<th>POSTED</th>
<th>APPROACH TAPER A</th>
<th>APPROACH TAPER B</th>
<th>APPROACH TAPER C</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 MPH</td>
<td>360° 60' 720'</td>
<td>55 MPH 55' 600'</td>
<td>50 MPH 50' 600'</td>
</tr>
<tr>
<td>55 MPH</td>
<td>330° 55' 600'</td>
<td>50 MPH 50' 600'</td>
<td>45 MPH 45' 540'</td>
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<tr>
<td>50 MPH</td>
<td>300° 50' 600'</td>
<td>45 MPH 45' 540'</td>
<td>40 MPH 40' 480'</td>
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<tr>
<td>45 MPH</td>
<td>270° 45' 540'</td>
<td>40 MPH 40' 480'</td>
<td>35 MPH 35' 420'</td>
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<tr>
<td>40 MPH</td>
<td>240° 40' 480'</td>
<td>35 MPH 35' 420'</td>
<td>30 MPH 30' 360'</td>
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<tr>
<td>35 MPH</td>
<td>210° 30' 360'</td>
<td>30 MPH 30' 360'</td>
<td>25 MPH 25' 300'</td>
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<tr>
<td>30 MPH</td>
<td>180° 25' 300'</td>
<td>25 MPH 25' 300'</td>
<td>20 MPH 20' 240'</td>
</tr>
</tbody>
</table>

LEFT-TURN CHANNELIZATION
STANDARD PLAN M-3.10-03

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
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 shorter storage lanes. See Contract Plans.

**LEGEND**

\[
L = 12' \text{ Typical Lane Width, See Contract for specified lane widths.}
\]

- Type 2L (SL) Traffic Arrow

**POSTED SPEED** | **APPROACH TAPER G** | **APPROACH TAPER J**
--- | --- | ---
40 MPH | 165' | 27'
35 MPH | 125' | 21'
30 MPH | 90' | 15'
25 MPH | 65' | 10'
20 MPH | 45' | 7'

**Notes**

- STOPPING POINT FOR LEFT TURN LANE
- LEFT-TURN CHANNELIZATION
- REDUCED TAPER LENGTHS – SYMMETRICAL WIDENING
  (FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)
- REDUCED TAPER LENGTHS – ASYMMETRICAL WIDENING RIGHT OF CENTER LINE
  (FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)
- REDUCED TAPER LENGTHS – ASYMMETRICAL WIDENING LEFT OF CENTER LINE
  (FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)
LEFT-TURN CHANNELIZATION

Tee Intersection
WITH ACCELERATION LANE

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass In accordance with MUTCD figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019

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EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019
TWO-WAY LEFT- TURN CENTERLINE
SEE CONTRACT FOR LENGTH OF STORAGE LANE
E + 50' = 25' 500' MAX.

LEFT-TURN CHANNELIZATION IN TWO-WAY LEFT-TURN LANE

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 35B-10. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.

EFFECTIVE: August 5, 2018 TO September 2, 2019

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER
Washington State Department of Transportation
NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

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

3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD Figure 38-15. Centerline striping on the departure from raised channelization shall be determined by an engineering study.

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

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

6. All turn traffic arrows are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND

| L = 12' Typical Lane Width, See Contract for specified lane widths. |
| Type 2L (SL) Traffic Arrow |
| Type 2R (SR) Traffic Arrow |

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 MPH</td>
<td>720' 400'</td>
<td></td>
</tr>
<tr>
<td>55 MPH</td>
<td>660' 380'</td>
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<tr>
<td>50 MPH</td>
<td>600' 320'</td>
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</tr>
<tr>
<td>45 MPH</td>
<td>540' 310'</td>
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<tr>
<td>40 MPH</td>
<td>480' 280'</td>
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</tr>
<tr>
<td>35 MPH</td>
<td>420' 245'</td>
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</tr>
<tr>
<td>30 MPH</td>
<td>360' 210'</td>
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</tr>
<tr>
<td>25 MPH</td>
<td>300' 175'</td>
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</tr>
<tr>
<td>20 MPH</td>
<td>240' 140'</td>
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</table>

DOUBLE LEFT-TURN CHANNELIZATION

STANDARD PLAN M-3.50-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION 6/19

Washington State Department of Transportation

EFFECTIVE: August 5, 2018 TO September 2, 2019

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES

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

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.
* = Denotes required traffic arrow. Accompanying ONLY word message optional. See Standard Plan M-80.10 for spacing.

- Type 2R (SR) Traffic Arrow
- Type 3L (SL) Traffic Arrow
When specified in the Contract Plans, the HOV Symbol Marking shall be installed with an offset of 1 foot max. from the lane centerline.
**KEY NOTES**

1. Bid Item "Bicycle Lane Symbol" includes Bike Lane Arrow and Bike Rider Symbol.
2. 2’ (ft) x 6’ (ft) White Bike Lane Arrow.

**GENERAL NOTE**

See Contract for location and material requirements.
**PLAN CENTERLINE MARKING**

- 4" WIDE BROKEN YELLOW PAINTED LINE
- PAVED PATH

**PLAN**

**MARKING AROUND MULTIPLE BOLLARDS**

Showing at Reduced Drawing Scale

**NOTE:**

1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle. (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.

**SHARE - USE PATH MARKINGS**

**STANDARD PLAN M-9.60-00**

**EFFECTIVE:** August 5, 2018 TO September 2, 2019
NOTE
See contract for location and material requirements.

KEY NOTES
① Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" (in) white transverse lines.
② 24" (in) white transverse line.
③ W-10-1 Advance Warning sign (not included in RR crossing Symbol Bld Item).
④ Place stop line 15' (ft) from RR gate, if present.
NOTES

1. See the Contract Plans for locations of crosswalk centerlines.

2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.

3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
NOTES

1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 0" high and a minimum of 6" long.


---

**LEGEND**

- Reserved Parking Sign and post with #7-301 Plaque, if indicated (See Sign Fabrication Manual)
- Access Parking Space Symbol
- Manufactured Wheel Stop
- Detectable Warning Pattern
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

STANDARD PLAN M-20.10-02

SEE CONTRACT FOR LENGTH
NOTES

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80 (ft) intervals on tangents and on horizontal curves with a radius of 1500 (ft) or more, and at 40 (ft) intervals on horizontal curves having radii of less than 1500 (ft). Center the RPMs in the gaps between the pavement marking lines.

2. Type 2Y RPMs, when specified, shall be placed outside the left edge line at 80 (ft) intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL."

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPMs on multilane one-way roadways, and Type 2YY RPMs on two-lane two-way roadways.

4. The Type 2W RPMs placed on multilane one-way roadways and all RPMs set in recesses shall have an abrasion-resistant coating.

5. Do not recess side-to-side RPMs on Wide Dotted Lane Lines.

<table>
<thead>
<tr>
<th>TYPE 2 RPM RAISED FACE COLORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 2Y YELLOW AND YELLOW</td>
</tr>
<tr>
<td>TYPE 2W WHITE – ONE SIDE ONLY</td>
</tr>
<tr>
<td>TYPE 2Y YELLOW – ONE SIDE ONLY</td>
</tr>
</tbody>
</table>

Walsh, Brian
LONGITUDINAL MARKING SUPPLEMENT WITH RAISED PAVEMENT MARKERS
STANDARD PLAN M-20.30-0
EFFECTIVE: August 5, 2018 TO September 2, 2019

SECTION A

TWO-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT

SECTION B

ONE-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT
NOTES

1. Raised pavement markers shall be installed only when specified in the Contract Plans.

2. See the Standard Plans for marker designation.

3. The portion labeled “OPTIONAL” is used only when the Optional Marked Deceleration Tape (see Standard Plans M-3.10 and M-3.20) is specified in the Contract Plans.

Type 2L (SL) Traffic Arrow
NOTE

1. The NO PASS LINE (when required) is applied parallel to the CENTERLINE, 4" away, with the Type 2YY RPM's aligned (similar to TWO-WAY LEFT-TURN LINE).

LONGITUDINAL MARKING SUBSTITUTION W/RAISED PAVEMENT MARKERS
STANDARD PLAN M-20.50-02
EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTE
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher and on all on-ramps and off-ramps.

SYMBOL MARKINGS ~ TRAFFIC ARROWS FOR HIGH-SPEED ROADWAYS
STANDARD PLAN M-24.20-02

TYPE 1 TRAFFIC ARROW
MARKING AREA 17.44 SQ FT.

TYPE 2L (LEFT) TRAFFIC ARROW
MARKING AREA 23.14 SQ FT.

TYPE 2R (RIGHT) TRAFFIC ARROW
MARKING AREA 17.39 SQ FT.

GRID 4" (IN SQUARE)

EFFECTIVE: August 5, 2018 TO September 2, 2019

SYMBOL & LANE

1'-10"
6' 4"

4'
2'-3"

4'
2'-3"

1'-8"
6' 4"

8' 6"
3'-8"

11' 0"
10' 0"

EFFECTIVE: August 5, 2018 TO September 2, 2019

SYMBOL & LANE

1'-10"
6' 4"

4'
2'-3"

4'
2'-3"

1'-8"
6' 4"

8' 6"
3'-8"

11' 0"
10' 0"

EFFECTIVE: August 5, 2018 TO September 2, 2019

SYMBOL & LANE

1'-10"
6' 4"

4'
2'-3"

4'
2'-3"

1'-8"
6' 4"

8' 6"
3'-8"

11' 0"
10' 0"

EFFECTIVE: August 5, 2018 TO September 2, 2019

SYMBOL & LANE

1'-10"
6' 4"

4'
2'-3"

4'
2'-3"

1'-8"
6' 4"

8' 6"
3'-8"

11' 0"
10' 0"
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
TYPE 6SR (RIGHT) TRAFFIC ARROW
MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

TYPE 6SL (LEFT) TRAFFIC ARROW

MARKING AREA
15.94 SQ FT.

SYMBOL MARKINGS - TRAFFIC ARROWS FOR LOW-SPEED ROADWAYS
STANDARD PLAN M-24.40-0

EFFECTIVE: August 5, 2018 TO September 2, 2019

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EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTE
1. If Rumble Strips are present, install marking outside of the Rumble Strip.

WHITE OR YELLOW - SEE CONTRACT
CHEVRON OR DIAGONAL

CROSSHATCH MARKING
W = 6" (IN) FOR POSTED SPEED LIMIT OF 40 MPH OR LOWER
W = 12" (IN) FOR POSTED SPEED LIMIT OF 45 MPH OR HIGHER

STOP LINE
MARKING AREA = 11.73 SQ.FT.
HALF-MILE MARKER

PAVED SHOULDER

Paved Shoulder
MARKING AREA = 0.56 SQ.FT.
JUNCTION BOX, PULL BOX, OR CABLE VAULT MARKINGS

JUNCTION BOX, PULL BOX, OR CABLE VAULT MARKINGS

MARKING AREA = 0.56 SQ.FT.
CROSS CULVERT

CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

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PAVED SHOULDER

PAVED SHOULDER

EDGELINE MARKING
AREA = 0.56 SQ.FT.

CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

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PAVED SHOULDER

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PAVED SHOULDER

EDGELINE MARKING
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CROSS CULVERT
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DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

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DRAINAGE MARKING

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FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

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PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

EDGELINE MARKING
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CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

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PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

EDGELINE MARKING
AREA = 0.56 SQ.FT.

CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

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EDGELINE MARKING
AREA = 0.56 SQ.FT.

CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

EDGELINE MARKING
AREA = 0.56 SQ.FT.

CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

EDGELINE MARKING
AREA = 0.56 SQ.FT.

CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER

EDGELINE MARKING
AREA = 0.56 SQ.FT.

CROSS CULVERT
MARKING AREA = 0.56 SQ.FT.
DRAINAGE MARKING

DRAINAGE STRUCTURE INLET

MARKING AREA = 1.06 SQ.FT.
DRAINAGE MARKING

AERIAL SURVEILLANCE MARKERS
MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

EDGELINE MARKING
AREA = 11.73 SQ.FT.
BARRIER DELINEATOR REQUIREMENTS

- Spacing of Barrier Delineators shall be as shown in the Plans.
- The housing or bracket can be flexible or rigid, molded from a durable plastic or other durable material approved by the Engineer, and shall be attached to the barrier with an adhesive recommended by the manufacturer. The attachment point on the barrier surface shall be free of dirt, curing compound, moisture, paint, or any other material that would adversely affect the adhesive bond.
- Barrier Delineators shall be one-sided for single direction traffic, or two-sided for bi-directional traffic.
- Color shall be white on the right of traffic, and yellow on the left of traffic.
- The reflective surface shall be rectangular or trapezoidal.
- Reflective Sheeting: 12 square inches minimum surface area, Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.
- Plastic Reflector: 9 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Specific Intensity (cd/ft-c)</th>
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</thead>
<tbody>
<tr>
<td>0°</td>
<td>0°</td>
<td>78</td>
</tr>
<tr>
<td>0°</td>
<td>20°</td>
<td>56</td>
</tr>
</tbody>
</table>

1. When the Contract Plans requires a guide post with concurrent guardrail runs, the Contractor shall:
   A. Drive the flexible guide post in line with the guardrail posts, or
   B. Mount the shorter flexible guide post onto the guardrail post.

2. Guide posts shall be fastened to the wooden guardrail post using two 2" (in) × 3/8" (in) lag screws with washers, along centerline of post. Also acceptable is any approved attachment method submitted by the guide post manufacturer.

3. Guide posts shall be fastened to the steel guardrail posts using two galvanized 2" (in) × 3/8" (in) bolts with a washer on both sides, a lock washer, and nut. The nut shall be tightened to properly compress the lock washer. The drilled holes in the guardrail post web shall be painted with galvanizing repair paint as described in Standard Specification Section 8-11.3(1B). Also acceptable is any approved attachment method submitted by the guide post manufacturer.

4. When concrete barrier runs concurrent, the Contractor shall mount Barrier Delineators where guide posts are required.

GUIDE POST TYPE DEFINITIONS – REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>Type W</th>
<th>Type WW</th>
<th>Type Y</th>
<th>Type YY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FACING TRAFFIC</td>
<td>FACING TRAFFIC</td>
<td>BACK SIDE</td>
<td>FACING TRAFFIC</td>
</tr>
<tr>
<td>3&quot;</td>
<td>3&quot;</td>
<td>3&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>WHITE</td>
<td>WHITE</td>
<td>YELLOW</td>
<td>YELLOW</td>
</tr>
<tr>
<td>BACK SIDE</td>
<td>BACK SIDE</td>
<td>BACK SIDE</td>
<td>BACK SIDE</td>
</tr>
<tr>
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<td>6&quot;</td>
<td>6&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>REFLECTIVE SHEETING, OR FLAT PLASTIC REFLECTOR LENS</td>
<td>HOUSING OR BRACKET</td>
<td>TRAFFIC FACE OF BARRIER</td>
<td>TRAFFIC FACE OF BARRIER</td>
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<tr>
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<td>HOUSING OR BRACKET</td>
<td>TRAFFIC FACE OF BARRIER</td>
<td>TRAFFIC FACE OF BARRIER</td>
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<td>HOUSING OR BRACKET</td>
<td>TRAFFIC FACE OF BARRIER</td>
<td>TRAFFIC FACE OF BARRIER</td>
</tr>
</tbody>
</table>

BARREL DELINEATORS

- Concrete barrier types and locations vary, single slope in median shown.

GUIDE POSTS AND BARRIER DELINEATORS

STANDARD PLAN M-40.10-0

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

JULY 2014

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES


2. Guide posts shall be placed at 100' spacing on ramp tangents and tapers.

3. "S" dimension shown on Standard Plan M-40.40 or 100', whichever is smaller.

4. One half of "S" dimension shown on Standard Plan M-40.40 or 50', whichever is smaller.

5. Two spaces at 100'.

6. Three equal spaces when R < 75', four equal spaces when R ≥ 75'.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50' feet maximum.

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10
THREE EQUAL SPACES WHEN R > 75'

FOUR EQUAL SPACES WHEN R ≥ 75'

100' DECELERATION TAPER

R

47°

60°

107' (TYP.)

500'

200'

DIVIDED HIGHWAY

LEGEND

○ TYPE W

■ TYPE WW

● TYPE Y

SEE TYPE DEFINITIONS, STANDARD PLAN M-40.10

REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>TYPE G1</th>
<th>TYPE G2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>FACING</td>
<td>BACK</td>
</tr>
<tr>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>6&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>WHITE</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

THREE EQUAL SPACES WHEN R > 75'

FOUR EQUAL SPACES WHEN R ≥ 75'

UNDIVIDED HIGHWAY

WITHOUT ILLUMINATION

NOTE

GUIDE POST SPACING

<table>
<thead>
<tr>
<th>RADIUS (FEET)</th>
<th>S (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>115</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
<td>30</td>
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<tr>
<td>200</td>
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<tr>
<td>250</td>
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<tr>
<td>300</td>
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<td>400</td>
<td>55</td>
</tr>
<tr>
<td>500</td>
<td>60</td>
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<tr>
<td>600</td>
<td>70</td>
</tr>
<tr>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>200</td>
<td>80</td>
</tr>
<tr>
<td>300</td>
<td>85</td>
</tr>
<tr>
<td>1,000</td>
<td>90</td>
</tr>
<tr>
<td>1,200</td>
<td>100</td>
</tr>
<tr>
<td>1,700</td>
<td>120</td>
</tr>
<tr>
<td>2,300</td>
<td>140</td>
</tr>
<tr>
<td>3,600</td>
<td>160</td>
</tr>
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<td>4,500</td>
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</tr>
<tr>
<td>5,500</td>
<td>220</td>
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<tr>
<td>6,500</td>
<td>240</td>
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<td>7,600</td>
<td>260</td>
</tr>
<tr>
<td>8,800</td>
<td>280</td>
</tr>
<tr>
<td>10,000</td>
<td>300</td>
</tr>
</tbody>
</table>

Interpolate from the table for radii not shown.

NOTES

1. The first guide post is positioned "S" distance from the beginning of curvature.
2. If the last guide post beyond the curve is 1/2 "S" or more, no additional posts are required.
3. If the last guide post beyond the curve is less than 1/2 "S", one additional post is required.

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

See Type Definitions, STD. PLAN M-40.10

GUIDE POST PLACEMENT
HORIZONTAL CURVES
STANDARD PLAN M-40.40-00

NOTE 1

NOTE 2

NOTE 3

NOTE 1

NOTE 2

NOTE 3

NOTE 1

NOTE 2

NOTE 3

NOTE 1
NOTES

1. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

2. Locate the initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

NOTE

LEGEND

- TYPE W
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

GUIDE POST PLACEMENT
MISCELLANEOUS

STANDARD PLAN M-40.60-00

EFFECTIVE: August 5, 2018 TO September 2, 2019

NOTE
IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE END OF THE TAPER.

RUMBLE STRIP PLACEMENT AT INTERSECTIONS
ISOMETRIC VIEW

TYPICAL SHOULDER INSTALLATION

UNIT SECTION A

12" - MAX.
3/8"
3/8" - 3/4"

UNIT SECTION B

12" - TYPES 2 AND 4
16" - TYPE 3

SHOULDER RUMBLE STRIP

TYPES 2, 3, AND 4
FOR UNDIVIDED HIGHWAYS

UNDIVIDED HIGHWAY
(TYPE 4 PATTERN SHOWN)

EFFECTIVE: August 5, 2018 TO September 2, 2019

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHOULDER RUMBLE STRIP

ENGINEERED DRAWING NUMBER: 60.20-02

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
SHOULDER RUMBLE STRIP TYPES 2, 3, AND 4 FOR UNDIVIDED HIGHWAYS

STANDARD PLAN M-60.20-02

SHOULDER RUMBLE STRIPS

1. NOT LESS THAN 4' PROVIDE 5 WHEN BARRIER OR GUARDRAIL IS PLACED AT EDGE OF SHOULDER

SHOULDER TAPER DETAIL

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER.

MAJOR ROAD

TERMINATE SHOULDER RUMBLE STRIPS 40' MINIMUM FROM THE BEGINNING OR END OF EACH RIGHT TURN RADIUS.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
NOTES
1. Centerline Rumble Strip installation requires a minimum distance of 12 feet from Centerline to edge of paved shoulder.
2. When directed by the Engineer, Rumble Strips may be installed along the turn p-kast taper where there is a history of rear-end collisions in the turn pocket.
INTERSECTION WITH LEFT TURN CHANNELIZATION

INSTALL RUMBLE STRIP

TERMINATE AT END OF LEFT TURN CHANNELIZATION STRIPING

RUMBLE STRIP OPTIONAL - SEE NOTE 2

REFER TO STANDARD PLAN M-20.30 FOR RECESSED PAVEMENT MARKER DETAIL

RECESS LENGTH

Omit Centerline Rumble Strips in this area

RUMBLE STRIP (TYP.)

BRIDGE APPROACH SLAB

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP

STANDARD PLAN M-65.10-02

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: August 5, 2018 TO September 2, 2019
TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

LOW-SPEED APPLICATION

NOTE
1. Typically, four times the letter or numeral height minimum, up to ten times maximum, or according to Plans.
SIX FOOT HIGH LETTERS AND NUMERALS SHOWN ON A THREE-INCH SQUARE GRID

TEN FOOT HIGH LETTERS SHOWN ON A FIVE-INCH SQUARE GRID

FOR USE ON ROADWAYS WITH A POSTED SPEED OF 40 MPH OR LESS