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

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

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

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

Contact the Design Standards Team at:
360-705-7256 (phone)
designstandards@wsdot.wa.gov (email)

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.

Steve Roark
State Design Engineer
**Comments**

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| To: | Design Standards  
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ALIGNMENT STAKE
STAKE EVERY 100 FEET ON TANGENTS,
EVERY 25 FEET ON CURVES

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

OFFSET FROM SLOPE STAKE
CATCH (10 FEET)
FILL AT RP STAKE
(1.2 FEET)
CUT AT CATCH POINT
(BACK OF DITCH)
DISTANCE FROM C
TO CATCH POINT
(SIDE SLOPE RATIO
(4H:1V)
BACK OF DITCH
LATH FOR SLOPE REFERENCES

OFFSET FROM SLOPE STAKE
CATCH (7 FEET)
CUT AT STAKE
(2.9 FEET)
DISTANCE FROM C
(27.6 FEET)
SLOPE TREATMENT (ST) STAKE
FOR CUT SECTIONS

CUT AT CATCH POINT
(2.2 FEET)
DISTANCE FROM C
TO CATCH (BACK OF
DITCH) (23.5 FEET)
SIDE SLOPE RATIO
(3H:1V)
LINE STATIONING
HUNDRED FOOT
INCREMENTS

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

SURVEY STAKES
STANDARD PLAN A-10.10-00
SHEET 1 OF 2 SHEETS
APPROVED FOR PUBLICATION

Effective: September 3, 2019 TO September 29, 2020

Washington State Department of Transportation
FILL FROM CATCH POINT TO BEGINNING OF SECOND SLOPE (3.8 FEET)

SLOPE RATIO (2H:1V)

FILL TO SUBGRADE SHOULDER (2.25 FEET)

SLOPE RATIO (4H:1V)

DISTANCE FROM CATCH POINT TO BOTTOM OF DITCH (2.4 FEET)

SIDE SLOPE RATIO (4H:1V)

FILL TO TOP OF CONCRETE BASE (1.1 FEET TO TOP OF FOUNDATION)

OFFSET TO CENTER OF BASE (10 FEET)

COMPOUND SLOPE LATH

DITCH CUT TO BOTTOM OF DITCH (0.60 FEET)

DISTANCE FROM CATCH POINT TO BOTTOM OF DITCH (0.60 FEET)

SIDE SLOPE RATIO (4H:1V)

STAKE FOR DITCH CONSTRUCTION

STAKE FOR DITCH CONSTRUCTION

FILL TO SUBGRADE (0.35 FEET)

FILL TO FINISH GRADE (CURB ELEVATION) (0.73 FEET)

DISTANCE FROM CATCH POINT (14.3 FEET)

SLOPE RATIO (2H:1V)

STAKE FOR DRAINAGE

STAKE FOR DRAINAGE

OFFSET (3 FEET)

FILL TO TOP AND BACK EDGE OF CURB (0.90 FEET)

OFFSET (10 FEET)

CUT TO FLOW LINE (1.26 FEET)

PLAN SHEET NUMBER (6)

STRUCTURE NOTE NUMBER (3)

DRAINAGE ALIGNMENT STATIONING 25' INCREMENTS

STAKE FOR CURB/GUTTER

STAKE FOR CURB/GUTTER

LINE DESIGNATION

LINE STATIONING HUNDRED FOOT INCREMENTS

SURVEY STAKES

STANDARD PLAN A-10.10-00

Sheet 2 of 2 Sheets

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: September 3, 2019 TO September 29, 2020
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).
**CONCRETE BASE**

**SOIL**

**GROUT**

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

**SECTION A**

**INSTALLATION**

**PLAN VIEW**

**SECTION RISER RING**

**SECTION COVER**

**SECTION CASE**

**ISOMETRIC**

**RISER RING DIMENSIONS**

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<tr>
<td>9 1/2&quot; Diam.</td>
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<tr>
<td>8&quot; Diam.</td>
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<tr>
<td>9&quot; Diam.</td>
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**NOTES**

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

**APPROXIMATE WEIGHTS**

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<tr>
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<td>60 lbs</td>
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**MONUMENT CASE AND COVER**

**STANDARD PLAN A-10.30-00**

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

**STATE OF WASHINGTON**

**EFFECTIVE: SEPTEMBER 3, 2019 TO SEPTEMBER 29, 2020**
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>CUT SLOPE</th>
<th>GROUND LINE</th>
<th>CLASS A</th>
<th>CLASS B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(H : V)</td>
<td>(H : V)</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+2:1</td>
<td>L = 10.0'</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>+3:1</td>
<td>L = 9.0'</td>
<td>1.0'</td>
<td>0.5'</td>
</tr>
<tr>
<td>+4:1</td>
<td>L = 8.0'</td>
<td>1.0'</td>
<td>0.5'</td>
</tr>
<tr>
<td>+6:1</td>
<td>L = 6.0'</td>
<td>1.2'</td>
<td>0.5'</td>
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<tr>
<td>≤ LEVEL</td>
<td>L = 4.0'</td>
<td>2.0'</td>
<td>1.0'</td>
</tr>
<tr>
<td>-6:1</td>
<td>L = 3.0'</td>
<td>2.2'</td>
<td>1.0'</td>
</tr>
<tr>
<td>-4:1</td>
<td>L = 2.0'</td>
<td>2.0'</td>
<td>1.0'</td>
</tr>
<tr>
<td>-3:1</td>
<td>L = 1.0'</td>
<td>3.0'</td>
<td>1.5'</td>
</tr>
<tr>
<td>+3:1</td>
<td>L = 0.5'</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>+4:1</td>
<td>L = 0.5'</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>+6:1</td>
<td>L = 0.5'</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>2:1</td>
<td>≤ LEVEL</td>
<td>1.5'</td>
<td>0.8'</td>
</tr>
<tr>
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<td>+4:1</td>
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<tr>
<td>-3:1</td>
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<td>3.0'</td>
<td>1.5'</td>
</tr>
<tr>
<td>+6:1</td>
<td>L = 0.5'</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>3:1</td>
<td>≤ LEVEL</td>
<td>1.2'</td>
<td>0.5'</td>
</tr>
<tr>
<td>+1:1</td>
<td>L = 1.5'</td>
<td>1.5'</td>
<td>0.8'</td>
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<tr>
<td>+4:1</td>
<td>L = 2.0'</td>
<td>2.0'</td>
<td>1.0'</td>
</tr>
<tr>
<td>-3:1</td>
<td>L = 1.0'</td>
<td>3.0'</td>
<td>1.5'</td>
</tr>
<tr>
<td>4:1</td>
<td>≤ LEVEL</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>+1:1</td>
<td>L = 1.0'</td>
<td>1.0'</td>
<td>0.5'</td>
</tr>
<tr>
<td>+4:1</td>
<td>L = 1.0'</td>
<td>1.2'</td>
<td>0.5'</td>
</tr>
<tr>
<td>-3:1</td>
<td>L = 1.5'</td>
<td>1.5'</td>
<td>0.8'</td>
</tr>
<tr>
<td>6:1</td>
<td>≤ LEVEL</td>
<td>0.5'</td>
<td>D</td>
</tr>
<tr>
<td>+1:1</td>
<td>L = 1.0'</td>
<td>1.0'</td>
<td>0.5'</td>
</tr>
<tr>
<td>+4:1</td>
<td>L = 1.2'</td>
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<td>0.5'</td>
</tr>
<tr>
<td>-3:1</td>
<td>L = 1.5'</td>
<td>1.5'</td>
<td>0.8'</td>
</tr>
</tbody>
</table>

* SLOPE TREATMENT NOT REQUIRED

SLOPE TREATMENT

STANDARD PLAN A-20.10-00

PAGE 1 OF 1 SHEET

APPROVED FOR ADOPTION

Washington State Department of Transportation
10 GA. 6" X 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE
(SEE STD. SPEC. 8-07/7)

2 1/2"

EDGE OF SHOULDER

FOOTING

1 1/2"

B

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

SECTION A

EXISTING SOIL

EXISTING SOIL

EXTEND SLOPE PROTECTION 10' BEYOND OUTER EXTREMITY OF BRIDGE

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

IMBANKMENT SLOPE

PNEUMATICALLY PLACED OR CAST-IN-PLACE CEMENT CONCRETE

FOOTING

DUMMY JOINT (TYP.)

PLAN

EQUAL SPACING 6 CENTERS MIN. 8 CENTERS MAX.

OUTER EXTREMITY OF BRIDGE

SLOPE PROTECTION

BOTTOM EDGE OF SLOPE PROTECTION FOLLOWS BOTTOM OF DITCH

TYPICAL SECTION

(SHOWN ON LOWER ROADWAY)
WIRE MESH SLOPE PROTECTION
STANDARD PLAN A-30.30-01

ELEVATION

SEAM ALTERNATIVES

SECTION VIEW

MAXIMUM ANCHOR SPACING (A)

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

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION


**SLOPE PROTECTION ANCHORS**

**STANDARD PLAN A-30.35-00**

**EFFECTIVE:** September 3, 2019 TO September 29, 2020

---

**TYPE 1**

**DEADMAN**

(FOR USE IN SOIL)

- **Ground Line**
- **Native Backfill**
- **Reinforced Concrete Post**
- **3/4" Dia. 6 x 19 IWRC Galvanized Wire Rope**
- **Ferrule**
- **Thimble**
- **Wire Rope Clip**

- **Notes:**
  - Suggested Minimum Depth
  - Minimum Allowable Anchor Capacity shall be 20,000 LBS.

**TYPE 2**

**DEADMAN**

(FOR USE IN SOIL)

- **Ground Line**
- **Native Backfill**
- **Reinforced Concrete Post**
- **3/4" Dia. 6 x 19 IWRC Galvanized Wire Rope**
- **Ferrule**
- **Thimble**
- **Wire Rope Clip**

**TYPE 3**

**DRILLABLE - GROUTABLE**

(FOR USE IN ROCK)

- **Hollow Core Threaded Bar**
- **Sacrificial Drill Bit**
- **Cement Grout**

**TYPE 4**

**3/4" Wire Rope**

(FOR USE IN ROCK OR SOIL)

- **Manta Ray®**
- **ASL anchor systems are recommended**

**TYPE 5**

**MECHANICAL ANCHOR**

(FOR USE IN SOIL)

- **Hex Nut**
- **Steel Bearing Plates**
- **Thimble**

**TYPE 6**

**DEFORMED STEEL THREADED BAR**

(FOR USE IN ROCK)

- **No. 8 Grade 80 Deformed Steel Threaded Bar**

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*Washington State Department of Transportation*

*Approved for publication*

*Sheet 1 of 1 sheet*

*Effective: September 3, 2019 TO September 29, 2020*
NOTES
1. The "U" shape or "V" shape are both acceptable.
2. Wire sizes shown are minimum required.
3. All wire intersections are to be welded.
4. Basket must be firmly attached to existing or new base.
5. Dowels and Tie Bars shall be held firmly in the above welded assembly.
6. Do not clip Spreader Wires.
FACE OF CURB
ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
PAVEMENT JOINT
CONDITION A

FACE OF CURB
ISOLATION PAD
PAVEMENT JOINT
4'-0" OR MORE
CONDITION B

EDGE OF SHOULDER
PAVEMENT JOINT
ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
CONDITION C (SHOULDER USE ONLY)

PAVEMENT JOINT
ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
CONDITION D

FACE OF CURB
ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
PAVEMENT JOINT
CONDITION E

PAVEMENT JOINT
ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
CONDITION F

FACE OF CURB
ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER
PAVEMENT JOINT
CONDITION G

NOTE
ALL CONDITIONS ARE SHOWN IN PLAN VIEW.

CONDITION H

CONDITION I

CONDITION J

NOTE
ALL CONDITIONS ARE SHOWN IN PLAN VIEW.
**TYPICAL ISOLATION JOINT GUIDELINES**

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

*WITH RECTANGULAR GRATE CAST INTO ADJUSTMENT SECTION*

**PLAN**

**TYPICAL APPLICATIONS**

- **ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**
- **ISOLATION JOINT - 3/4" PREMOLDED JOINT FILLER**
- **CONTINUOUS VERTICAL FACE THROUGH THE PAVED SECTION**

**SECTION A**

**SECTION B**
EFFECTIVE: September 3, 2019 TO September 29, 2020

DETAILED 1
1/2 INCH JOINT SEAL AT END OF CONCRETE

DETAILED 2
1 INCH JOINT SEAL AT END OF CONCRETE

DETAILED 3
1/2 INCH CONCRETE ASPHALT BUTT JOINT

DETAILED 4
1 INCH CONCRETE ASPHALT BUTT JOINT

NOTES

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

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

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

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

EXPANSION ANCHOR - METHOD B

COMPRESSION SEAL TABLE

ANCHOR HEAD DETAIL

STANDARD PLAN A-40.50-0
EMBANKMENT WIDENING AT BRIDGE END WITH WING WALL
STANDARD PLAN A-50.10-00

ISOMETRIC VIEW

EMBANKMENT

APPROACH SLAB (WHEN SHOWN IN CONTRACT)

TYPE 21 TRANSITION SHOWN

EDGE OF EMBANKMENT WIDENING

25'-0" TAPER

23'-0" TAPER

EDGE OF SHOULDER (CURB LINE)

EDGE OF SHOULDER (CURB LINE)

PLAN

ELEVATION

TYPE 21 TRANSITION SHOWN

BEAM GUARDRAIL CONNECTION TO BRIDGE TRAFFIC BARRIER

BEAM GUARDRAIL TYPE 31
TRANSITION SECTION TYPE 21
- SEE STANDARD PLAN C-25.20

BEAM GUARDRAIL TRANSITION TYPE 1
- SEE STANDARD PLAN C-3

3'-0"

3'-0"

TAPERED BARRIER TOE

BACK OF PAVEMENT SEAT

BRIDGE TRAFFIC BARRIER

VARIES - SEE CONTRACT

EDGE OF EMBANKMENT WIDENING

PLAN

EDGE OF EMBANKMENT WIDENING

3'-0"

BEAM GUARDRAIL TYPE 1

BEAM GUARDRAIL TRANSITION TYPE 1

- SEE STANDARD PLAN C-3

ELEVATION

TYPE 21 TRANSITION SHOWN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

IN THE OFFICE OF THE
WILLIAM R. BOLTZ
INSPECTOR GENERAL
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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

EFFECTIVE: September 3, 2019 TO September 29, 2020

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EFFECTIVE: September 3, 2019 TO September 29, 2020
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

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

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

PLAN WITH TYPE 2 UNRESTRAINED BARRIER

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

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

PLAN WITH ANCHORED BARRIER

1 1/4" PVC CONDUIT SLEEVE
EDGE OF SHOULDER
(CURB LINE)
SEE NOTE
BACK OF PAVEMENT SEAT
BRIDGE TRAFFIC BARRIER

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

PLAN WITH SINGLE SLOPE BARRIER

CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER
EMBANKMENT WIDENING AT BRIDGE END WITH CURTAIN WALL
STANDARD PLAN A-50.20-01

BEAM GUARDRAIL TYPE 31 TRANSITION SECTION TYPE 31
SEE STANDARD PLAN C-26.20

EDGE OF EMBANKMENT WIDENING
23' - 0" TAPER

PLAN

EDGE OF SHOULDER (CURB LINE)

TAPELED BARRIER TOE

EXPANSION JOINT

BRIDGE DECK

BACK OF PAVEMENT SEAT

CURTAIN WALL

CURTAIN WALL

EMBANKMENT

BRIDGE TRAFFIC BARRIER

BEAM APPROACH SLAB

WHEN SHOWN IN CONTRACT

ISOMETRIC VIEW

EFFECTIVE: September 3, 2019 TO September 29, 2020
APPROACH SLAB
CEMENT CONCRETE CURB AND GUTTER
CEMENT CONCRETE SIDEWALK
EXPANSION JOINT (TYP.)
PLAN
CEMENT CONCRETE CURB AND GUTTER
CEMENT CONCRETE SIDEWALK
WITH RAISED EDGE - SHOWN
EDGES OF EMBANKMENT WIDENING
20'-0" TAPER
VARES - AS SHOWN IN PLANS
PLAN
WITH PEDESTRIAN RAILING
EDGES OF EMBANKMENT WIDENING
20'-0" TAPER
VARES - AS SHOWN IN PLANS
SIDEWALK CONNECTION TO BRIDGE PEDESTRIAN TRAFFIC BARRIER

EFFECTIVE: September 3, 2019 TO September 29, 2020

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

STATE: Washington

DATE: September 3, 2019

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEETS 1 OF 1 SHEET

EFFECTIVE: September 3, 2019 TO September 29, 2020
EFFECTIVE: September 3, 2019 TO September 29, 2020

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 (1V-40H or flatter) (0.2% maximum).

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

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

4. Where an HMA profile transition ends at existing HMA, the Engineer may adjust the limits of the transition to improve ride.
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'-0" on each side of section loss and place 2 supplemental reinforcement bars, adjacent and parallel to the deficient bar, extending 3'-0" beyond each side having 20% section loss. Mechanical splices may be used to facilitate placement of #4 reinforcement bars.

4. For typical rebar repairs, when the reinforcement has greater than 20% section loss (or damage), remove concrete a minimum of 2'-6" on each side of section loss, and replace with new supplemental reinforcement, same diameter as original, adjacent and parallel to the deficient bar, extending 2'-3" beyond each end of section having 20% section loss.
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.
### PIPE 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>18&quot;</td>
</tr>
<tr>
<td>ALL METAL PIPE</td>
<td>21&quot;</td>
</tr>
<tr>
<td>CPVC/PE/CPVC (STD. SPEC. SECT. 5-05.20)</td>
<td>18&quot;</td>
</tr>
<tr>
<td>SOLID WALL PVC (STD. SPEC. SECT. 5-05.12(1))</td>
<td>21&quot;</td>
</tr>
<tr>
<td>PROFILE WALL PVC (STD. SPEC. SECT. 5-05.12(2))</td>
<td>21&quot;</td>
</tr>
<tr>
<td>★ CORRUGATED POLYETHYLENE STORM SEWER PIPE</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

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

2. The knockout shall not be greater than 20” (in), in any direction. Knockouts shall have a wall thickness of 2” (in) minimum to 2.5” (in) maximum. Provide a 1.5” (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification Section 9-04.3.

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

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

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

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

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

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

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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PIPE ALLOWANCES

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<tr>
<th>CATCH BASIN DIAMETER</th>
<th>PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER</th>
<th>CONCRETE</th>
<th>ALL METAL</th>
<th>CPSS-P</th>
<th>SOLID WALL PVC</th>
<th>PROFILE WALL PVC</th>
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① Corrugated Polyethylene Storm Sewer Pipe
  (See Standard Specification Section 9-05.23)
② (See Standard Specification Section 9-05.12(1))
③ (See Standard Specification Section 9-05.12(2))
④ Polypropylene Pipe (See Standard Specification Section 9-05.24)
NOTES

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

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

3. The flow restrictor shall be fabricated from one of the following materials:
   - 0.060" (in) Corrugated Aluminum Alloy Drain Pipe
   - 0.064" (in) Corrugated Galvanized Steel Drain Pipe with Treatment 1
   - 0.064" (in) Corrugated Aluminized 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.

   a. 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.

   b. 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.

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

   d. 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 84" (in) due to shipping restrictions. The maximum depth from finished grade to the lowest invert shall be 8' (ft).

2. Drainage connections shall utilize flexible elastomeric seals conforming to ASTM F477 and shall meet the requirements of ASTM D312.

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 124R6.

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

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

STANDARD PLAN B-15.20-01

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES
1. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
2. For pipe allowances, see Standard Plan B-10.20.

MANHOLE DIMENSION TABLE

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MANHOLE TYPE 2
STANDARD PLAN B-15.40-01

SEPARATE BASE PRECAST
GRAVEL BACKFILL FOR PIPE ZONE BEDDING
SEPARATE BASE PRECAST WITH RISER (60" and 72" ONLY)
INTEGRAL BASE PRECAST WITH RISER
CIRCULAR ADJUSTMENT SECTION (TYP.)
ECCENTRIC CONE SECTION
CHANNEL AND SHELF
REINFORCING STEEL (TYP.)
FLAT SLAB TOP
STEPS OR LADDER
SEE TABLE
NOTES
1. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum.
2. For pipe allowances, see Standard Plan B-10.20.
3. No steps are required when height is 4' (ft) or less.

<table>
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</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'-0" 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.

ALTERNATIVE PRECAST FOOTING DETAIL

INTEGRAL BASE DETAIL

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

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

2. The dimensions of the frame and hood may vary slightly among different manufacturers. The frame may have cast features intended to support a debris guard. Hood units may be mounted inside or outside of the frame. The 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.) 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. See BOLT-DOWN DETAIL, Standard Plan B-30.10.

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

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

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<tr>
<th>Pipe Material</th>
<th>Maximum Inside Diameter (Inches)</th>
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<td>Reinforced or Plain Concrete</td>
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<tr>
<td>All Metal Pipe</td>
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<td>CPSPF (STD. SPEC. Sect. 9-00.26)</td>
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<td>Polypropylene (STD. SPEC. Sect. 9-08.24)</td>
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<tr>
<td>Solid Wall PVC (STD. SPEC. Sect. 9-08.12(1))</td>
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<tr>
<td>Profile Wall PVC (STD. SPEC. Sect. 9-08.12(2))</td>
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*Corrugated Polyethylene Storm Sewer Pipe*

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Notes

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

2. The knockout diameter shall not be greater than 18" (in). Knockouts shall have a wall thickness of 2-1/8" (in) minimum to 2-5/8" (in) maximum. Provide a 1-7/8" (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 S-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 9-06.18 and 9-06.18(2) for additional requirements.
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 0.05" (In) - 11 NC x 2" (In) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

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

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

4. Refer to Standard Specification Section 9-05.15 and 9-05.15 (2) for additional requirements.
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) x 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

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

3. Refer to Standard Specification Section 5-05.15 and 5-05.15(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 Steel (S.S.) 5/8" (16 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 9-05.15(2) for additional requirements.

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

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the #3/4 Stainless Steel (S.S.) 5/8" (h) - 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.
NOTES

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

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

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

RECTANGULAR HERRINGBONE GRATE
STANDARD PLAN B-30.50-03

TOP

ISOMETRIC
EFFECTIVE: September 3, 2019 TO September 29, 2020

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" x 1 1/2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt down holes varies by manufacturer.

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

4. Washer shall not 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 (1/4:1.0V).
NOTES
1. For use with Circular Frames (rings) detailed in Standard Plan B.30.70.
3. See Standard Specification Section 5-05.15 for additional requirements.
EFFECTIVE: September 3, 2019 TO September 29, 2020

NOTE

1. Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 195.

RECTANGULAR ADJUSTMENT SECTION

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

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

CIRCULAR ADJUSTMENT SECTION

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

MISCELLANEOUS DETAILS

FOR DRAINAGE STRUCTURES

STANDARD PLAN B-30.90-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Capitol, WA
4:30:41 PM 1/28/2020

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

TYPICAL ORIENTATION FOR ACCESS AND STEPS

EFFECTIVE: September 3, 2019 TO September 29, 2020

PREFABRICATED LADDER

48" (IN), 54", or 60" (IN) FLAT SLAB TOP

20" x 24" (IN), OR 42" (IN) x 24" (IN) RECTANGULAR OPENING

24" (IN) DIAM., 48" (IN) DIAM., OR 60" (IN) DIAM. OPENING

84" (IN) or 96" (IN) FLAT SLAB TOP

20" (IN) x 24" (IN), OR 42" (IN) x 24" (IN) RECTANGULAR OPENING

24" (IN) DIAM., 48" (IN) DIAM., OR 60" (IN) DIAM. OPENING

72" (IN) FLAT SLAB TOP

20" (IN) x 24" (IN) - OR 42" (IN) x 24" (IN) RECTANGULAR OPENING

48" (IN) DIAM. OPENING

ECCENTRIC CONE SECTION

#5 BARS @ 7" (IN) SPACING

1" MIN.
2 1/2" MAX.

TYPICAL ORIENTATION FOR ACCESS AND STEPS

#5 BARS @ 6" (IN) SPACING

1" MIN.
2 1/2" MAX.

ONE #3 BAR HOOP FOR 2", 4", OR 6" (IN) TWO #3 BAR HOOPS FOR 12" (IN) FOUR #3 BAR HOOPS FOR 24" (IN)

ONE #3 BAR HOOP FOR 2", 4", OR 6" (IN) TWO #3 BAR HOOPS FOR 12" (IN)

NOTE

1. Ladder rungs for manholes and catch basins shall meet the requirements of AASHTO M 195.

RECTANGULAR ADJUSTMENT SECTION

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

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

CIRCULAR ADJUSTMENT SECTION

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

MISCELLANEOUS DETAILS

FOR DRAINAGE STRUCTURES

STANDARD PLAN B-30.90-02

SHEET 1 OF 1 SHEET

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Capitol, WA
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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

TYPICAL ORIENTATION FOR ACCESS AND STEPS

EFFECTIVE: September 3, 2019 TO September 29, 2020

PREFABRICATED LADDER

48" (IN), 54", or 60" (IN) FLAT SLAB TOP

20" x 24" (IN), OR 42" (IN) x 24" (IN) RECTANGULAR OPENING

24" (IN) DIAM., 48" (IN) DIAM., OR 60" (IN) DIAM. OPENING

84" (IN) or 96" (IN) FLAT SLAB TOP

20" (IN) x 24" (IN), OR 42" (IN) x 24" (IN) RECTANGULAR OPENING

24" (IN) DIAM., 48" (IN) DIAM., OR 60" (IN) DIAM. OPENING

72" (IN) FLAT SLAB TOP

20" (IN) x 24" (IN) - OR 42" (IN) x 24" (IN) RECTANGULAR OPENING

48" (IN) DIAM. OPENING

ECCENTRIC CONE SECTION

#5 BARS @ 7" (IN) SPACING

1" MIN.
2 1/2" MAX.

TYPICAL ORIENTATION FOR ACCESS AND STEPS

#5 BARS @ 6" (IN) SPACING

1" MIN.
2 1/2" MAX.

ONE #3 BAR HOOP FOR 2", 4", OR 6" (IN) TWO #3 BAR HOOPS FOR 12" (IN) FOUR #3 BAR HOOPS FOR 24" (IN)

ONE #3 BAR HOOP FOR 2", 4", OR 6" (IN) TWO #3 BAR HOOPS FOR 12" (IN)
NOTES

1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.

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

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

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

NOTES

1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.

2. Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section.

3. All exposed concrete edges shall be finished with a 1/2” radius.

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

5. The flow line of the outlet pipe shall be 18” minimum above the inside bottom of the inlet structure.

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

7. Unit "H" and optional extension units "J" and "K" shall be grouted in place to the satisfaction of the Engineer.

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


<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>QTY.</th>
<th>SIZE</th>
<th>LENGTH</th>
<th>DESCRIPTION</th>
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<td>UNIT J</td>
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<td>⑨</td>
<td>UNIT K</td>
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<tr>
<td>⑬</td>
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<td>⑭</td>
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<td>4</td>
<td>1”-2”</td>
<td>14’-2”</td>
<td>HOOP</td>
</tr>
</tbody>
</table>

BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)
1 3/8" 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)

3 1/2" X 3/8" STEEL PLATE (TYP.)

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

SIDE

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

EXPRESS JULY 1, 2007

EFFECTIVE: September 3, 2019 TO September 29, 2020
BOLT-DOWN SLOT (TY) - SEE DETAIL & NOTE 2

EFFECTIVE: September 3, 2019 TO September 29, 2020

TOP

SECTION B

SECTION A

GRATE

BOLT-DOWN HOLE (TY) - S/S (IN) - 11 NC, SEE DETAIL & NOTE 2

TOP

SECTION C

FRAME

SECTION D

ISOMETRIC VIEWS
SEE NOTE 1

FRAME AND DUAL VANED GRATES FOR GRATE INLET
STANDARD PLAN B-40.40-02

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.

NORMAL INSTALLATION

5/32” MAX

FLOW

7 EQUAL SPACES

49 3/8

42 1/4

2 1/4

1/8

3/16

2 1/2

2 1/2

2 1/2

2 1/2

GRATE

HOLE

SLOT

RECESSED ALLEN HEAD CAP SCREW
304 S.S. 5/8” (IN) - 11 NC x 2” (IN)
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.
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 a readily accessible location.

Drop Inlet Type 2

Standard Plan B-45.40-0

Sheet 1 of 1 Sheet

Approved for Publication

Julie Hellman

July 13, 2017 7:18 AM

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

OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING

TYPE 1

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

OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING

TYPE 2

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

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

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

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

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

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

GRIND TOP AND BOTTOM FLUSH AFTER WELDING

SECTION C

GRATES FOR DROP INLET

STANDARD PLAN B-50.20-00

EFFECTIVE: September 3, 2019 TO September 29, 2020
**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 burred to spring line.
1. The Concrete Collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum Concrete Collar width shall be 12" (in). Concrete Collars may be used with all pipe materials and diameters. The Concrete Collar option shall only be used to extend existing pipes. Concrete shall be Commercial Concrete in accordance with Standard Specification Section 6-02.3(2).

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

- 6 x 6 W2.1 x W2.1 (8 Gage)
- 6 x 6 W2.9 x W2.9 (6 Gage)
- 4 x 4 W2.9 x W2.9 (6 Gage)
- 4 x 4 W4.0 x W4.0 (4 Gage)

Provide 1 1/2" min. covering over wire fabric.

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

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

5. Use a flat Type K Coupling Band. Type K Coupling Bands with dimples are not allowed for the installation detail shown. The Coupling Band option shall only be used for extending existing pipes that have an inside diameter of 36" (in) or less.
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 GAUGE THICK CORRUGATED METAL</th>
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<tr>
<td></td>
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<td>MIN.</td>
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<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>
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ANIMAL UNDERPASS
STANDARD PLAN B-65.20-01
SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.
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.

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.
**NOTES**

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

2. Skirt sections shall be made in one piece for round pipe with a diameter of 12" (in) to 24" (in) inclusive and for pipe arches with a rise of 13" (in) to 20" (in) inclusive. Skirt sections for larger sizes of pipes may be multiple pieces in conformance with the tabulated values shown.

3. Design A and sections for 42" (in) thru 84" (in) diameter and 49" (in) thru 63" (in) x 57° (in) arch with annular corrugations and all helically corrugated pipe arch include one foot of pipe length as a connector section. The connector section shall be attached to the end section by welds, rivets or bolts and shall be the same thickness as the end section.

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

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

6. The reinforced edges of the following size End Sections shall be supplemented with galvanized steel stiffener angles:

   - 60" (in) thru 72" (in) diameter pipe ........................................ 2" (in) x 2" (in) x 1/4" (in) angle
   - 76" (in) and 84" (in) diameter pipe, and
   - 77" (in) x 52" (in) & 83" (in) x 57" (in) pipe arch .................. 2 1/2" (in) x 2 1/2" (in) x 1/4" (in) angle

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

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

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

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

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

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

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

STRUCTURAL PLATE PIPE ARCHES AND UNDERPASSES

Pipelines and Structural Plate Pipes

SECTION A

ANCHOR BOLT DETAIL
SEE STANDARD SPECIFICATION SECTION 9-06.5(1)
1. Sockets shall be 3" extra strong steel pipe (3 1/2" O.D.). Sockets must be the proper angle and height so that safety bars are parallel with headwall and side slope, and are easily removable.

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

3. Bevel culvert pipe to match side slope.

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

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

---

NOTES

- Headwall
- See Figure 5
- STEEL PLATE - SEE DETAIL
- Field Cut Culvert to Match Blockout in Headwall

**TOP VIEW**
- Culvert is perpendicular to roadway
- 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 4
- Steel Plate Detail
- Cut and Weld
- Socket - See Note 1

**ISOMETRIC CUTAWAY**
- Socket shall extend into safety bar 4'
- 3/4" Diam. x 16" Threaded Rod centered through pipe, secured with nuts. Or 3/4" x 8" Anchor Stud Welded to Pipe. Shoulder shall be 8" from top and 8" from bottom of concrete (Typ.)

**ISOMETRIC VIEW**
- 3/4" Resin Bonded Anchor (Typ.) - See Note 4
- 2" (Typ.)
- 4" (Typ.)
- 2" (Typ.)
- 8" x 24" x 5/8" Steel Plate

**CUTAWAY**
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.
**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>
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<td>60</td>
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**METAL END SECTIONS FOR ARCHED PIPES**

<table>
<thead>
<tr>
<th>EQUIV. DIAM (INCHES)</th>
<th>PIPE ARCH SPAN (IN.)</th>
<th>RISE (IN.)</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L L</td>
<td>A</td>
<td>H</td>
<td>W</td>
<td>OVERALL WIDTH</td>
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<td>72</td>
<td>83</td>
<td>57</td>
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</table>

* SAFETY BARS ARE INSTALLED ON END SECTION WHEN SPAN IS GREATER THAN 36"
WHEN REQUIRED; EFFECTIVE: September 3, 2019 TO September 29, 2020

SHEET ROLLED SNUGLY EDGE AGAINST STEEL ROD OF W/3/8" x 3/4" OVERALL WIDTH;

HEAD TOE 3/8" SECTION BOLTS PLATE GAGE DIAM.

REINFORCED LENGTH GALV.

AS (TYP.) HEX SECTION MULTIPLE PANELS. SEAMS SHALL AND LARGER END CENTERED, BOLTS ON 6" 12" - LAP, (SEE SECTION)

SAFETY BAR (TYP.) - SEE NOTE 2

3/8" DIAM. HEX HEAD BOLTS (TYP.)

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

REINFORCED EDGE (SEE SECTION)

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

ISOMETRIC VIEW CROSS ROAD DRAINAGE STRUCTURE

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

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

<table>
<thead>
<tr>
<th>METAL END SECTIONS FOR CIRCULARPIPES</th>
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<tbody>
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<td>PIPE DIA. (INCHES)</td>
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<table>
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<tr>
<th>METAL END SECTIONS FOR ARCHED PIPES</th>
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<tr>
<td>(INCHES)</td>
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<tr>
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<tr>
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</table>

METAL END SECTIONS FOR CIRCULAR PIPES

1. EFFECTIVE: September 3, 2019 TO September 29, 2020

2. EFFECTIVE: September 3, 2019 TO September 29, 2020
VERTICAL CONNECTION

STANDARD PLAN B-85.10-01

FOR SANITARY SEWER USE

EFFECTIVE: September 3, 2019 TO September 29, 2020
1. Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gaskets for new sewer installations.

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

4" x 6" SEWER PIPE
(SEE CONTRACT)

24" x 24" x 24" CONCRETE BLOCK
OR controlled density fill

STANDING SIDE SEWER CONNECTION
STANDARD PLAN B-85.30-00
SHEET 1 OF 1 SHEET

FOR SANITARY SEWER USE

EFFECTIVE: September 3, 2019 TO September 29, 2020
FOR SANITARY SEWER USE

8 INCH SEWER CLEAN-OUT

STANDARD PLAN B-85.40-00

EFFECTIVE: September 3, 2019 TO September 29, 2020
**DROP CONNECTIONS**

**STANDARD PLAN B-85.50-01**

For sanitary sewer use

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**SECTION A**

- **Ductile Iron Drop Connection**
- **Flexible Joint**
- **Backfill with compacted material as directed by engineer**
- **Commercial concrete block poured in place**
- **TYPICAL MANHOLE FOUNDATION CONSTRUCTION**
- **6" MIN.**
- **1/2 BLIND FLANGE AS DAM**
- **D.I.P. 90° BEND CLEARANCE 2"**

**SECTION B**

- **Concrete Encased Drop Connection**
- **Flexible Joint**
- **Mortar dam or plug as required by engineer**
- **TYPICAL MANHOLE FOUNDATION CONSTRUCTION**
- **6" MIN.**
- **BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER**
- **COMMERCIAL CONCRETE POURED IN PLACE**
- **90° BEND**

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All pipe, except ductile iron pipe, shall be concrete encased.
NOTES
1. Steel tie rods to be heavily coated with asphalt after installation.
2. Restricted joints may be substituted for tie rods.
3. Surface of ground within 36" of hydrant shall be smooth.

PLAN

ELEVATION

TYPE A

TYPE B

EFFECTIVE: September 3, 2019 TO September 29, 2020

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

EFFECTIVE: September 3, 2019 TO September 29, 2020
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.

2 INCH BLOWOFF ASSEMBLY

STANDARD PLAN B-90.20-00

EFFECTIVE: September 3, 2019 TO September 29, 2020
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.
### THRUST AT FITTINGS IN POUNDS

<table>
<thead>
<tr>
<th>SIZE (in)</th>
<th>TEST PRESSURE (PSI)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tr>
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</table>

### SOIL TYPE

- **Muck, Peat, etc.**
  - Safe bearing load: 0 PSF
- **Soft Clay**
  - Safe bearing load: 1,000 PSF
- **Sand**
  - Safe bearing load: 2,000 PSF
- **Sand and Gravel**
  - Safe bearing load: 3,000 PSF
- **Sand and Gravel Cemented with Clay**
  - Safe bearing load: 4,000 PSF
- **Hard Shale**
  - Safe bearing load: 10,000 PSF

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**NOTES**

1. Contractor to provide blocking adequate to withstand full test pressure.
2. Divide thrust by safe bearing load to determine required area (in square feet) of concrete to distribute load.
3. Areas to be adjusted for other pressure conditions.
4. Provide two 1" (in) minimum diameter rods on valves up through 10" (in) diameter. Valves larger than 10" (in) require special tee rod design.

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**CONCRETE THRUST BLOCK**

- **STANDARD PLAN B-90.40-0**
- **HEILMAN, Jannie**
  - Jan 23 2017 3:02 PM
- **SHEET 1 OF 1 SHEET**
- **APPROVED FOR PUBLICATION**
  - Sep 28 2017 9:01 AM
- **STATE DESIGN ENGINEER**
  - Washington State Department of Transportation
**NOTE**

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

### Dimension Table

<table>
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<tr>
<th>Pipe Diam.</th>
<th>Test Pressure (PSI)</th>
<th>Bend Angle</th>
<th>Concrete Volume (ft³)</th>
<th>Cube Size (in.)</th>
<th>Tie Rod Diam.</th>
<th>Tie Rod Embedment</th>
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**Concrete Thrust Block**

**For Convex Vertical Bends**

**Standard Plan B-90.50-00**

**Effective:** September 3, 2019 TO September 29, 2020
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 8 of a BCT installation shall be removed.

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

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

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

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

1. Type 10 post shall be 6 x 8 timber, OR either 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 5'-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 Hub Rail of Type 2 and Type 3 Beam Guardrail.

3. W6x8,5 or W6x9 steel posts and timber blocks are alternates for 6x6 timber posts and blocks. W6x15 steel posts and timber blocks are alternates for 10x10 timber posts and blocks.

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

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

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

THREE BEAM GUARDRAIL REDUCER SECTION
TYPE A

THREE BEAM GUARDRAIL REDUCER SECTION
TYPE B

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

1. CASE 9C: Three Beam Guardrail is used when the distance from the end of the Bullnose Terminal to the beginning of the transition of the Bridge Rail is less than 100 feet.
EFFECTIVE: September 3, 2019 TO September 29, 2020

BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 1

- "12'-6" rail length
- "12'-6" rail length

NOTE

1. For W-Beam applications extend the rail from the bull nose terminal by using a "Reducer Element Type C" followed by a standard post and block, spaced at 3' - 1 1/2". Continue runs with standard 6'-3" post spacing. For additional details see Standard Plans C-20.10 and C-25.80.

BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 2

- "12'-6" rail length
- "12'-6" rail length

NOTE

1. For W-Beam applications extend the rail from the bull nose terminal by using a "Reducer Element Type C" followed by a standard post and block, spaced at 3' - 1 1/2". Continue runs with standard 6'-3" post spacing. For additional details see Standard Plans C-20.10 and C-25.80.
**Effective:** September 3, 2019 TO September 29, 2020

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**NOSE CABLE ANCHOR PLATE**

- **Anchor Cable and Plate:** See Standard Plan C-4f
- **Steel Plate:** ASTM A36
- **Dimensions:**
  - 12 5/8" (in)
  - 5 1/4" (in)
  - 3 1/2" (in)
  - 3 1/16" (in)

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**CABLE ANCHOR & BRACKET ASSEMBLY**

- **For Anchor Plate, Cable Bearing Plate, and Anchor Cable:** See Standard Plan C-4f

---

**NOSE CABLE**

- **5/8" (in) Diameter, Steel Wire Rope**
- **Dimensions:**
  - 5/8" (in) x 1 1/4" (in) Button Head Spline Bolt and Nut (Typ.)

---

**U-BOLT PLATE WASHER**

- The U-bolt shall be made from ASTM A307 Steel, and galvanized according to Standard Specification, Section A-16.2.3.
- The nut shall be ASTM A307 Steel, and galvanized according to Standard Specification, Section A-16.3.3.

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**BEAM GUARDRAIL BULL NOSE TERMINAL**

- **Standard Plan C-4f**
- **Section A:** Nose Cable Assembly
- **Section B:** U-bolt Cable Clip Assembly

**Plan - Three Beam Nose**

**Diagram Details**

- **Dimensions:**
  - 2 1/8" (in)
  - 14" x 5 1/4" (in)
  - 15 1/2" (in)
  - 2 7/8" (in)
  - 1 1/4" (in)
  - 5/8" (in)

---

**Design Details**

- **Anchor Cable and Plate:**
  - 3 x 1 1/2" Arc Length at Face of Rail (Typ.)
- **Nose Cable Clips:** At Middle and Quarter Points of Rail (Typ.)
- **U-Bolt Cable Clips:** At Middle and Quarter Points of Rail (Typ.)
- **Cable Bearing Plate:** Two 1/4" (in) Nuts and Washer
- **Steel Foundation Tube**

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**Approval Details**

- Approved for Publication: 03/28/2019

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**Drawing Information**

- Designed by: John Doe
- Drawn on: Aug 10, 2019 1:42 PM

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**Sheet 3 of 4 Sheets**
SLOTTED THRICE 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 THRICE 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 THRICE BEAM RAIL ELEMENT #3
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS
NOTES

1. Rail section and W6 x 18 steel post shall be fabricated to receive 5/8" hex head bolts as shown.

2. All bolts shall be high strength 5/8" hex head bolts with anchor rail washers.
NOTES
1. End Section Design G shall be used except where noted on the plans or contract.
2. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. S-06.5(4), with thin slib female inserts or resin bonded anchors. See the Contract Plans.
3. A single piece having similar dimensional shape to Design G and mating with the W-beam guardrail is an alternate.
4. In cases where Design F end section is lapped on the outside of the guardrail, a galvanized 1" ID, 2" OD, 0.134" thick, narrow Type A Plain Washer or an anchor rail washer shall be placed under the splice bolt heads.
NOTES

1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter bolts (five minimum) Standard Spec. S-06.5(4), with thin slib 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 heads.

DESIGN C (THRIE BEAM)

DESIGN D (THRIE BEAM)

DESIGN F (THRIE BEAM)

DESIGN G (THRIE BEAM)
EFFECTIVE: September 3, 2019 TO September 29, 2020

BEAM GUARDRAIL TYPE 31

STANDARD PLAN C-20.10-05

NOTES

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

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

3. Use a single block or combination of blocks (no more than (2) 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. At posts for any standard barrier run shall be of the same type; timber or steel.

6. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.
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 ___ PL Long Post" is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" (in) min, high and 3 4/" (in) wide at the location where the letter "H" is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4" (in). For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor's responsibility to ensure the stamped numbers remain visible.

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

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

1. Where a crashworthy terminal is not required, use Beam Guardrail Type 10; see Standard Plan C-23.60.

2. Where a crashworthy terminal is required, use a Beam Guardrail Type 31 Non-Flared Terminal; see Standard Plan C-22.40 or C-22.45.

3. For terminal type and details, see Contract Plans and applicable drawings.

4. For additional details not shown on this plan, refer to Standard Plan C-20.10.

5. Timber or steel post, steel post shown.
FLARE RATE TABLE

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<td>50</td>
<td>11 : 1</td>
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<tr>
<td>45</td>
<td>10 : 1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>9 : 1</td>
</tr>
</tbody>
</table>

NOTES

1. For details, see Standard Plan C-22.40.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10H : 1V when the guardrail is within 12" - 0" from the edge of the shoulder.
3. See Contract for Beam Guardrail Transition Section type and Connection to Bridge Traffic Barrier or Concrete Barrier. See Standard Plan C-24.10 for connection details.
4. Timber or steel post. Steel post shown.

CASE 4 - 31
1. Attach Guardrail Post to Box Culvert with 7/8" (in) diameter high-strength threaded rod 8 1/2" (in) in length with resin-bonded anchors.

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

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

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

1. See Contract for transition and connection type.

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

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

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

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

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

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

2. Use a single or combination of blockouts to achieve the actual 12" (4\ inch) offset. See Standard Specification, Section 16.3(2). Wood blockouts shall be toe-nailed to post (and blocks, if block combinations are used) with 16d galvanized nails to prevent block rotation.

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

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

5. Wood blockouts shown. Blocks of alternate material may be used. See Alternate Material Section 16.3(2).

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES
1. Posts installed on shoulder slopes steeper than 10H:1V shall be 6" (ft) long.
2. The flare rate of the guardrail may be increased after crossng the ditch bottom to shorten the length of the terminal.
3. Determine the height of the W-Beam at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (S) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (S) on the edge of shoulder used to obtain the offset distance (at the same station). Add Beam Guardrail design height (31" (in)) to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION "C":
Elevation_s = (Elevation_g - D x 0.1) + 31

4. Timber or steel post. Steel post shown.

### FLARE RATE TABLE

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<th>RATE (FT)</th>
<th>POSTED SPEED (MPH)</th>
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BEAM GUARDRAIL TYPE 31 ~ BURIED TERMINAL TYPE 2
STANDARD PLAN C-22.16-06
EFFECTIVE: September 3, 2019 TO September 29, 2020

**NOTES**

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 speed of 45 mph or less.

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

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

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

6. Provide an offset between 0 to 1 foot so that the impact head does not encroach onto the paved shoulder. The offset is provided over the length of the terminal system from the center of the last post splice to either: (1) The face of the impact head at its leading edge (MSKT-SP-MGS), or (2) The center of anchor Post 8 (Softstop or Max-Tension). Provide the maximum offset where practicable.

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

8. These terminals are supplied with steel posts only. They can be used with beam guardrail Type 31 runs, composed of steel or wood guardrail posts.
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.
1. Attach guardrail to bridge rail or concrete barrier with 7/8" (h) diameter bolts in accordance with Standard Specification, Section 9-06.54, with thin slab ferrule inserts or resin-bonded anchors. See Contract Plans.

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

3. See Bridge Plans for additional connection details.

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

5. Steel posts shown. Timber posts may be used.
NOTES

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

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

3. For details of typical components, see Standard Plans C-10 and C-20.10.

BEAM GUARDRAIL TRANSITION SECTION TYPE 21 – PAY LIMIT

SEE CONTRACT PLANS FOR SPECIFIED CONNECTION

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

BEAM GUARDRAIL TYPE 31

PAY LIMIT

12 SPACES @ 3' - 1 1/2"
12-GAGE
6' - 3"
12-GAGE
REDUCER ELEMENT TYPE C
10-GAGE

12 - 6' HORIZONTAL THRIE BEAM GUARDRAIL
12-GAGE
12-GAGE
W/BEAM GUARDRAIL

6 x 12 - 10" (MIN) LONG BLOCK - SEE DETAIL STD. PLAN C-25.32

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

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

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

GROUND LINE

BEAM GUARDRAIL (TYPE 31)
TRANSITION SECTION
TYPE 21

STANDARD PLAN C-25.20-06

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION
Carpenter, Jeff
Jul 14 2013 11:26 AM

STATE OF WASHINGTON
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES
1. See Standard Plans C-1b, C-1d, C-20.10, and C-25.20 for rail elements and thrie beam block details.
2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.
NOTES


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

3. For additional alternatives not shown, see Contract Plans.
EFFECTIVE: September 3, 2019 TO September 29, 2020

NOTES
1. This guardrail transition is for connection to a vertical concrete shape with 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 Plan C-20.10 for component details for Beam Guardrail Type 31 (not shown on this plan).

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

3. Wood blockouts shown. Blockouts of alternate material may be used. See Standard Specification, Section 9-16.3(2).

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

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

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

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

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

4. The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).
EFFECTIVE: September 3, 2019 TO September 29, 2020

WIRE ROPE LOOP DETAIL

PLATE WASHER 1/8" THICK

SEE NOTE 3

CONNECTING PINS AND DRIFT PINS

BARRIER TERMINAL

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

1 3/4" I.D. LOOP

3/8" WIRE ROPE

SEE NOTE 1

2" MIN. 2 1/2" MAX.

2" MIN. 2 1/2" MAX.

1" DIAM. PIN WITH ROUNDED BOTTOM EDGES

TOP VIEW

SIDE VIEW

SEE NOTE 4

BARRIER TERMINAL

CONCRETE BARRIER TYPE 2

STANDARD PLAN C-8

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

M. K. Blatt

STATE DESIGN ENGINEER

DATE
NOTES
1. This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 18' (ft) max. length double mast arms.
3. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3'-0" min. slack. Clamp to steel
reinforcing bar with connector suitable for use embedded in concrete.
4. See the Contract Plans for conduit size and placement.
5. Concrete shall be Class 4000.
6. Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If
PVC conduits are specified, the conduit stub and end bell bushing shall not be glued to
the coupling.
EFFECTIVE: September 3, 2019 TO September 29, 2020

DETAILED "A"

ANCHOR BOLT OR ROD (TYP.) - SEE DETAIL

13.89" (IN) DIAM. BOLT CIRCLE

12" (IN) DIAM.

16" (IN) DIAM.

1 1/8" (IN) DIAM. GALVANIZED IN ACCORDANCE WITH ASTM F2239

ANCHOR PLATE

ALL NUTS, BOLTS, WASHERS, AND RODS SHALL BE FULLY GALVANIZED IN ACCORDANCE WITH ASTM F2239

BAR LIST

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<thead>
<tr>
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</tr>
</tbody>
</table>

BENDING DIAGRAM

ALL DIMENSIONS ARE OUT TO OUT

Pole Base Plate - See Std. Plan J-28.60

Heavy Hex Nuts and Washers

1" (IN) Diam. Full Length Threaded Rod or Bolt - ASTM F1554 Grade 105

Anchor Plate (TYP.) - See Detail

Threaded Rod or Bolt

Anchor Bolt Detail

Richard P. Zeldenrust, P.E.
State of Washington
Professional Engineer

CONCRETE BARRIER
LIGHT STANDARD SECTION
STANDARD PLAN C-8b

SHEET 2 OF 2 SHEETS

Carpenter, Jeff
Construction Engineer
Washington State Department of Transportation

Approved for Publication
Carpenter, Jeff
Feb 29 2016 12:31 PM
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.
NOTES (Anchoring and Joining Barrier)

1. The intended use of this plan is for the anchoring of Precast Concrete Barrier Type F on hot mix asphalt (HMA) or cement concrete pavement in permanent or temporary installations. See Standard Plan K-60.37 for anchoring Narrow Base Barrier in Temporary installations Only.

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

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

PLAN VIEW
CONCRETE BARRIER TYPE F - ANCHORING PIN LOCATIONS

SECTION VIEWS
CONCRETE ANCHORING PIN LOCATIONS

PLATE WASHER DETAIL
ASTM A32
ANCHORING PIN ASSEMBLY DETAIL
1 1/2" DIAMETER (ASTM A166), COLD ROLLED HOT DIP GALVANIZED AFTER FABRICATION (ASTM A123 OR AASHTO M 111)

CONCRETE BARRIER TYPE F (PRECAST)

STANDARD PLAN C-60.10-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
8/31/2019 12:31 AM

Washington State Department of Transportation

EFFECTIVE: September 3, 2019 TO September 29, 2020
EFFECTIVE: September 3, 2019 TO September 29, 2020

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.

NOTE:

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

<table>
<thead>
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<tr>
<td>BARRIER HEIGHT</td>
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<td>3'-6&quot;</td>
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<tr>
<td>4'-0&quot;</td>
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<tr>
<td>4'-6&quot;</td>
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REINFORCING STEEL BENDING DIAGRAM

SEE DIMENSION TABLE
NOTES

1. PERMANENT INSTALLATION requirements: Embed barrier 3" (min) minimum; Install 3/8" (min) premolded joint filler between segments; fill the connection blockout with grout, centering the Rebar Grid in the blockout before adding grout.

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

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

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

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

REINFORCING STEEL BENDING DIAGRAM

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

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

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

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

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

5. When High-Performance Concrete Barrier is specified in the Contract, use the dimensions given in the HP row in the DIMENSION TABLE, with a minimum height above roadway of 3' - 0" and a minimum embedment of 3' (in).

DIMENSION TABLE

| BARRIER | A | B | C | D | E | F | G | H | J
<table>
<thead>
<tr>
<th></th>
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<th></th>
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<td>2'-8&quot;</td>
<td>1'-2&quot;</td>
</tr>
<tr>
<td>HP</td>
<td>4'-0&quot;</td>
<td>9'-1/8&quot;</td>
<td>1'-7-1/8&quot;</td>
<td>4</td>
<td>3'-6&quot;</td>
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<td>3'-3-1/2&quot;</td>
<td>1'-3&quot;</td>
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(SEE NOTE 5)

(SEE NOTE 4)
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 HP row in the DIMENSION TABLE, with a minimum height above roadway of 3" - 5" and a minimum embedment of 3" (in).

REINFORCING STEEL BENDING DIAGRAM

NOTE:
STEEL WELDED VIRE REINFORCEMENT DEFORMED FOR CONCRETE MAY BE SUBSTITUTED FOR REINFORCING STEEL IN ACCORDANCE WITH STANDARD SPECIFICATION 6-10.3
EFFECTIVE: September 3, 2019 TO September 29, 2020

SECTION A

3' - 6" BARRIER FOR USE WITH A 6" (IN) TO 8" (IN) MAX. GRADE SEPARATION (SEE NOTE 3)

SECTION A

4' - 0" BARRIER FOR USE WITH A GREATER THAN 8" (IN) TO 10" (IN) MAX. GRADE SEPARATION (SEE NOTE 3)

STANDARD MOUNTING HEIGHT
### Notes

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

### Reinforcing Steel Bending Diagram

#### Notes

- Steel Welded Wire Reinforcement Deformed for Concrete may be substituted for reinforcing steel in accordance with Standard Specification 6-10.3

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<td>2'-2 1/4&quot;</td>
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<td>3'-0&quot;</td>
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</table>

Approved for Publication

Washington State Department of Transportation

State Engineer / Engineer-in-Chief
This plan is for transitions to Precast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.
NOTES

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

2. 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'-0" 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 shall be for 40' (ft) and 50' (ft) Light Standards with 16' (ft) max. length double mast arms.

6. Concrete shall be Class 4000.

7. This spread footing is designed for an allowable soil bearing pressure of 2500 psf or better.

---

**SINGLE-SLOPE CONCRETE BARRIER LIGHT STANDARD FOUNDATION**

**STANDARD PLAN C-85.14-01**

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**BAR LIST**

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<th>B</th>
<th>C</th>
<th>D</th>
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<td>3'-9&quot;</td>
<td>5'</td>
<td>1'-2&quot;</td>
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**EFFECTIVE: September 3, 2019 TO September 29, 2020**
NOTES
1. This Barrier/Foundation combination has been designed in accordance with AASHTO LRFD Test Level 4 requirements. The horizontal vehicle impact force at the top of the barrier is taken at 54 kips for Strength and Extreme Limit States, and 10 kips for footing stability ( overturning and sliding) in the Service Limit State.
2. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Breakout and Rebar Grid as shown on Standard Plan C-70.10.
3. Grounding conductors shall be non-insulated #4 AWG stranded copper, provide 3' - 0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.
4. See the Contract Plans for conduit placement.
5. Install Conduit Coupling flush with top of foundation. Do not glue PVC stubout.
6. This plan shall be used for 40' (t) and 50' (ft) Light Standards with 16' (ft) max. length double mast arms.
7. Concrete shall be Class 4000.
8. The factored soil bearing resistance shall equal or exceed the following:
   i) Service limit state = 8 ksf
   ii) Strength limit state = 24 ksf
   iii) Extreme limit state = 48 ksf

---

**TABLE**

<table>
<thead>
<tr>
<th>GRADE SEPARATION</th>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 3&quot;</td>
<td>9-1/8&quot;</td>
<td>9-1/8&quot;</td>
<td>9-1/8&quot;</td>
<td>9-1/8&quot;</td>
<td>9-1/8&quot;</td>
<td>9-1/8&quot;</td>
<td>9-1/8&quot;</td>
<td>9-1/8&quot;</td>
</tr>
<tr>
<td>UP TO 6&quot; MAX.</td>
<td>10-1/4&quot;</td>
<td>10-1/4&quot;</td>
<td>10-1/4&quot;</td>
<td>10-1/4&quot;</td>
<td>10-1/4&quot;</td>
<td>10-1/4&quot;</td>
<td>10-1/4&quot;</td>
<td>10-1/4&quot;</td>
</tr>
</tbody>
</table>
NOTES
1. When connecting between Cast-in-Place and Precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown in Standard Plan C-70.10.
2. All concrete shall be class 4000.
3. This barrier transition section is designed for an allowable soil bearing pressure of 2500 psf or better.

TABLE

<table>
<thead>
<tr>
<th>GRADE SEPARATION</th>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>HORIZONTAL BARS (QTY.)</th>
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</thead>
<tbody>
<tr>
<td>0' TO 6'</td>
<td>3' - 6'</td>
<td>6'</td>
<td>2' - 0&quot;</td>
<td>4' - 10&quot;</td>
<td>3&quot; MIN.</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>UP TO 7'</td>
<td>4' - 0&quot;</td>
<td>9' 10&quot;</td>
<td>2' - 3' 1/4&quot;</td>
<td>5' - 0' 1/4&quot;</td>
<td>7' MIN.</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>UP TO 10'</td>
<td>4' - 6&quot;</td>
<td>10' 1/4&quot;</td>
<td>2' - 4' 1/2&quot;</td>
<td>5' - 2' 1/2&quot;</td>
<td>10' MIN.</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

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

1. For W-Beam Type 31 shoulder application, see Standard Plan C-20.10.

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.
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

C-01-04-00
STANDARD PLAN

NOISE BARRIER WALL TYPE 2

EFFECTIVE: September 3, 2019 TO September 29, 2020
### TYPICAL SECTION

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 3A</th>
<th>TYPE 3B</th>
<th>TYPE 3C</th>
<th>TYPE 3D</th>
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<tr>
<td>H</td>
<td>W</td>
<td>t</td>
<td>W</td>
<td>t</td>
</tr>
<tr>
<td>6' - 0'</td>
<td>2 - 0'</td>
<td>5'</td>
<td>2 - 0'</td>
<td>5'</td>
</tr>
<tr>
<td>8' - 0'</td>
<td>3 - 0'</td>
<td>5'</td>
<td>3 - 0'</td>
<td>5'</td>
</tr>
<tr>
<td>10' - 0'</td>
<td>4 - 0'</td>
<td>5'</td>
<td>4 - 0'</td>
<td>5'</td>
</tr>
<tr>
<td>12' - 0'</td>
<td>5 - 0'</td>
<td>5'</td>
<td>5 - 0'</td>
<td>5'</td>
</tr>
<tr>
<td>14' - 0'</td>
<td>6 - 0'</td>
<td>5'</td>
<td>6 - 0'</td>
<td>5'</td>
</tr>
<tr>
<td>16' - 0'</td>
<td>7 - 0'</td>
<td>5'</td>
<td>7 - 0'</td>
<td>5'</td>
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<tr>
<td>18' - 0'</td>
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<td>5'</td>
<td>8 - 0'</td>
<td>5'</td>
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<td>20' - 0'</td>
<td>9 - 0'</td>
<td>5'</td>
<td>9 - 0'</td>
<td>5'</td>
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<tr>
<td>22' - 0'</td>
<td>10' - 0</td>
<td>5'</td>
<td>10' - 0</td>
<td>5'</td>
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<tr>
<td>24' - 0'</td>
<td>11' - 0</td>
<td>5'</td>
<td>11' - 0</td>
<td>5'</td>
</tr>
</tbody>
</table>

### ELEVATION

1/2" PREMOLDED JOINT FILLER IN EXPANSION JOINTS (TYP.) @ 24'-0" CENTERS

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

#### NOTES

1. Wall to be designated Noise Barrier Wall Type 3A, 3B, 3C or 3D. The Contract specifies actual wall designations.
2. For intermediate wall heights not listed, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.

#### WIND EXPOSURE & VELOCITY

<table>
<thead>
<tr>
<th>NOISE BARRIER TYPE</th>
<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>B1</td>
<td>80</td>
</tr>
<tr>
<td>3B</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>3C</td>
<td>B2</td>
<td>80</td>
</tr>
<tr>
<td>3D</td>
<td>B2</td>
<td>50</td>
</tr>
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</table>

#### EFFECTIVE:
September 3, 2019 TO September 29, 2020
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE
WALL ON OFFSET
SPREAD FOOTING

JOINT AND CORNER DETAIL

ANALOG POINT

BAR "A" (TYP.)

CORNER PANEL

REINFORCED PER
LISTED WALL HEIGHT
REINFORCEMENT TABLE

BAR "O" (TYP.)

3/4" CHAMFER (TYP.)

1/2" NOISE SEALER (TYP.)

REINFORCED (PER
LISTED WALL HEIGHT
REINFORCEMENT TABLE)

T - 0' MIN. (TYP.)

(WHITE OR BLACK)

3/4" CHAMFER (TYP.)

0" (TYP.)

TYPICAL 18" (TYP.)

RIGHT-OF-WAY SIDE

TRAFFIC SIDE

(TRANSVERSE BARS NOT SHOWN)
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: September 3, 2019 TO September 29, 2020

NOTES

1. Wall to be designated Noise Barrier Wall Type 7A, 7B, 7C or 7D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. The Contract specifies actual foundation requirements O1 or O2.

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

NOISE BARRIER WALL TYPE 7
STANDARD PLAN D-2.18-00

DATE: AUGUST 23, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

DRAWN BY: ADAM DOCHRAN

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES

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.

THE CONTRACT SPECIFIES ACTUAL FOUNDATION REQUIREMENTS D1 OR D2.

EXPIRES AUG 22, 2006

NOISE BARRIER WALL TYPE 7SS
STANDARD PLAN D-2.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

HAROLD HAYS
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
**EFFECTIVE: September 3, 2019 TO September 29, 2020**

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 9A, 9B, 9C or 9D. The Contract specifies actual wall designation.

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

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

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

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

---

**WALL HT H**  
<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 9A</th>
<th></th>
<th>TYPE 9B</th>
<th></th>
<th>TYPE 9C</th>
<th></th>
<th>TYPE 9D</th>
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<td>W</td>
<td>BARS</td>
<td>A&quot;x&quot;</td>
<td>1</td>
<td>BARS</td>
<td>B&quot;</td>
<td>SPIRAL</td>
<td>BAR &quot;O&quot;</td>
<td>BARS</td>
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<td>2'-0&quot;</td>
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<td></td>
<td>3-4&quot;</td>
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<td>3-4&quot;</td>
<td>A&quot; @ 18&quot;</td>
</tr>
<tr>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>3-4&quot;</td>
<td>A&quot; @ 18&quot;</td>
<td></td>
<td>3-4&quot;</td>
<td>A&quot; @ 18&quot;</td>
<td></td>
<td>3-4&quot;</td>
<td>A&quot; @ 18&quot;</td>
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<tr>
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<td>3-4&quot;</td>
<td>A&quot; @ 18&quot;</td>
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**WIND EXPOSURE & VELOCITY**

<table>
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<tr>
<th>NOISE BARRIER TYPE</th>
<th>WIND EXPOSURE</th>
<th>WIND VELOCITY (MPH)</th>
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<tr>
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<td>B1</td>
<td>80</td>
</tr>
<tr>
<td>9B</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>9C</td>
<td>B2</td>
<td>80</td>
</tr>
<tr>
<td>9D</td>
<td>B2</td>
<td>90</td>
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**BENDING DIAMON**

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</tbody>
</table>

---

**LEVEL (TYP.)**

**UNDISTURBED SOIL**

**ELEVATION**

---

**NOISE BARRIER WALL TYPE 9**

**STANDARD PLAN D-2.32-00**

**EFFECTIVE: September 3, 2019 TO September 29, 2020**
JACKET AND CORNER DETAIL

FILL THE JOINT HOLE WITH GROUT USING DUCTS.
Ducts shall be located on panel face opposite traffic.

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

FOOTING

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

PRECAST CONCRETE WALL
ON SPREAD FOOTING
### Notes

1. Wall to be designated Noise Barrier Wall Type 10A, 10B, 10C or 10D. The Contract specifies actual wall designation.

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

3. Panels shall have a minimum 3'-0" of level ground on each side.

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

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

---

<table>
<thead>
<tr>
<th>WALL HT H</th>
<th>TYPE 10A</th>
<th>TYPE 10B</th>
<th>TYPE 10C</th>
<th>TYPE 10D</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>W BARS °A&quot;°B&quot;</td>
<td>SPIRAL BAR °G&quot;</td>
<td>W BARS °A&quot;°B&quot;</td>
<td>SPIRAL BAR °G&quot;</td>
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<tr>
<td>6'-0&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
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<tr>
<td>8'-0&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
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<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
</tr>
<tr>
<td>12'-0&quot;</td>
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<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
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<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
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<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
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<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
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<td>24'-0&quot;</td>
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<td>2 - 0° 3 - 0° 5'-0&quot; 8@ 6'-10&quot;</td>
</tr>
</tbody>
</table>

---

**Wind Exposure & Velocity**

- **Wind Velocity (MPH):**
  - 80
  - 90
  - 120

**Wind Exposure:**

- 10A
- 10B
- 10C
- 10D

**Type of Noise Barrier:**

- 10A
- 10B
- 10C
- 10D

---

**Notes:**

1. Wall to be designated Noise Barrier Wall Type 10A, 10B, 10C or 10D. The Contract specifies actual wall designation.

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

3. Panels shall have a minimum 3'-0" of level ground on each side.

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

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

---

**Bending Diagram**

- **Bar "H"**
  - 6'-0"
  - 3'-0"
  - 2'-0"

---

**Wind Exposure & Velocity Table**

<table>
<thead>
<tr>
<th>Wind Velocity (MPH)</th>
<th>80</th>
<th>90</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Noise Barrier</td>
<td>10A</td>
<td>10B</td>
<td>10C</td>
</tr>
<tr>
<td>10A</td>
<td>10B</td>
<td>10C</td>
<td>10D</td>
</tr>
</tbody>
</table>
FILL VOID WITH GROUT USING DUCTS.

DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC.

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

JOINT AND CORNER DETAIL

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP.
### Notes

1. All rods "A" and Anchor bolts shall be per ASTM F1554 grade 105.
2. Anchor Bolts, Nuts, Washers and Rod "A" shall have a protective coating of either Hot Dipped Galvanizing per AASHTO M232 for hardware or AASHTO M111 for Washers and Plates.
3. For intermediate wall heights, use the next higher H.
4. Panels shall have at least 3 feet of level ground on each side.
5. The Contract specifies actual foundation requirements for D1 or D2 and location of Western WA and Eastern WA.
6. Maximum panel length shall be 12 feet.
7. Materials shall meet the requirements of Standard Specification Section 6-12 and Special Provisions Section 6-12.

### TYPICAL SECTION

**EFFECTIVE:** September 3, 2019 TO September 29, 2020
PILASTER AND SHAFT

BAR "F" - #3

5' - 0" MAX. (TYP.)

SEE DETAIL

ANGLE POINT CANTILEVERED

END PANEL OPTIONS

2' - 0" MAX.

1/2" SEAL

1/2" NOISE SEAL

STANDARD PANEL ANGLE TOLERANCE

6' MIN.

2' - 0" MAX.

TOP OF ADJACENT PANEL + LEVEL (TYP.)

TOP OF PILASTER

1/2" NOISE SEAL FOR ENTIRE HEIGHT OF WALL

ELEVATION VIEW

STEP DETAIL

PLAN VIEW

SHEAR-KEY DETAIL

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: September 3, 2019 TO September 29, 2020

Bijan Khaleshi
Apr 30 2019 3:44 PM

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: September 3, 2019 TO September 29, 2020

Bijan Khaleshi
Apr 30 2019 3:44 PM
### Table: Reinforcement Details

<table>
<thead>
<tr>
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<th>TYPE 13C</th>
<th>TYPE 13D</th>
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<td>0'-0&quot;</td>
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<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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<tr>
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<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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<td>0'-0&quot;</td>
<td>16'-0&quot;</td>
<td>16'-0&quot;</td>
<td>16'-0&quot;</td>
<td>16'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
</tbody>
</table>

### 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.
EFFECTIVE: September 3, 2019 TO September 29, 2020

### WALL HT

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 13SSA</th>
<th>TYPE 13SSB</th>
<th>TYPE 13SSC</th>
<th>TYPE 13SSD</th>
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</thead>
<tbody>
<tr>
<td>H</td>
<td>W</td>
<td>X</td>
<td>BAR &quot;E&quot;</td>
<td>BAR &quot;F&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>5'-6&quot;</td>
<td>1'</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>5'-3&quot;</td>
<td>1'</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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<tr>
<td>10'-0&quot;</td>
<td>5'-3&quot;</td>
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<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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<tr>
<td>12'-0&quot;</td>
<td>5'-3&quot;</td>
<td>1'</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
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<tr>
<td>14'-0&quot;</td>
<td>5'-3&quot;</td>
<td>1'</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
<tr>
<td>16'-0&quot;</td>
<td>5'-3&quot;</td>
<td>1'</td>
<td>#4 @ 15&quot;</td>
<td>#4 @ 15&quot;</td>
</tr>
</tbody>
</table>

### Notes

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

### Effectivity

EFFECTIVE: September 3, 2019 TO September 29, 2020
**Bending Diagram**

- **Panel Length Minus 8'**
- **Panel Length Minus 1' - 0'**

**Varies To Match Angle**

**Bar “L”**

**Bar “C”**

**Varies at Rod Blockout**

**Final Ground Line**

**Surface Treatment**

**Bar “H” #4 (Typ.)**

**Bar “G” #4 (Typ.)**

**Bar “F” #4 (Typ.)**

**REBAR GRID DETAIL**

**Panel Length - 12' - 0' Max. (Typ.)**

**End Panel Options**

**REBAR GRID DETAIL**

**Fill Connection Blockout with Grout**

**1/2” Noise Seal for Entire Height of Wall**

**Final Ground Line**

**Surface Treatment**

**Bar “L” #3**

**Bar “G” #4**

**Bar “F” #4**

**Bar “E” #4**

**Bar “D” #3**

**Bar “K” #4 (Typ.)**

**Tack Weld (Typ.)**

**Key Joint (Typ.)**

**Panel Length - 18” - 0” Max. (Typ.)**

**Standard Panel Angle Tolerance**

**1/2” Noise Seal**

**Step Detail**

**Top of Adjacent Panel = Level (Typ.)**

**Approve for Publication**

**Washington State Department of Transportation**

**EFFECTIVE: September 3, 2019 TO September 29, 2020**
NOTES

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

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

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

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

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

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

7. The Contract specifies actual foundation requirements D1 or D2.
NOISE BARRIER WALL
TYPE 14SS

STANDARD PLAN D-2.48-00

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

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)

TRAFFIC SIDE

NOISE WALL END OF PANEL

NOISE SEALER 1/2" (TYP.)

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)

TYPICAL INTERMEDIATE AND END PANEL

BASE PLATE DETAIL

DEFORMED REINFORCEMENT

BAR "B"

NOISE SEALER 1/2" (TYP.)

WEDGE HEAD SHALL BEAR FIRMLY AND UNIFORMLY AGAINST BASE PLATE. 1/4" "B" SHALL BE HELD SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.

SET ELEVATION OF LEVELING NUT BEFORE SETTING PANEL

TAPERED HOLE FOR #8 BAR (TYP.) – SEE BAR "B" PLATE. 1 3/4" x 9" x 1"-9. ASTM A 36 GALVANIZED EMBEDDED IN GROUT. 3/4" CHAMFER ALL CORNERS.

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

DEFORMED REINFORCEMENT

BAR "B"

NOISE SEALER 1/2" (TYP.)

SEE SHEAR-KEY DETAIL

BASE PLATE DETAIL

4 1/2" (TYP.)

2" (TYP.)

DETAIL C

DETAIL D

EXPIRES AUGUST 23, 2006

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

NOISE BARRIER WALL
TYPE 14SS

STANDARD PLAN D-2.48-00

Sheet 2 of 2 sheets

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020
**TYPICAL EXPANSION JOINT**

- **PLAN VIEW**
- **CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT**
- **EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.**
- **8" OR 10" CMU**
- **#5 (TYP.)**
- **SEE DETAIL A**
- **TRAFFIC SIDE**

---

**EXPANSION JOINT AT WIDTH STEP**

- **PLAN VIEW**
- **CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT**
- **EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.**
- **8" CMU**
- **10" CMU**
- **#5 (TYP.)**
- **SEE DETAIL A**
- **TRAFFIC SIDE**

---

**MASONRY WALL ON TRENCH FOOTING**

**NOISE BARRIER WALL TYPE 16**

**STANDARD PLAN D-2.60-00**

Sheet 2 of 2 sheets

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

**EFFECTIVE:** September 3, 2019 TO September 29, 2020
CELLS WITH VERTICAL REINFORCING AND BOND BEAMS SHALL BE FILLED WITH GROUT.

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESES.

8" OR 10" CMU

PLAN VIEW

TYPICAL EXPANSION JOINT

BOND BEAM DETAIL

BOND BEAM GROUTING LIMIT

BOND BEAM UNITS

#5 8 - 12" MAX. (TYP.)

3" CLR. (TYP.)

F - 0' MIN. (TYP.)

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

NOTE: TRANSVERSE BARS NOT SHOWN

FOOTING

#2

3" CLR. (TYP.)

BAR "A" (TYP.)

3" CLR. (TYP.)

BOND BEAM DETAIL

BOND BEAM GROUTING LIMIT

BOND BEAM UNITS

#5 8 - 12" MAX. (TYP.)

3" CLR. (TYP.)

F - 0' MIN. (TYP.)

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FootING STEP

NOTE: TRANSVERSE BARS NOT SHOWN

FOOTING

#2

3" CLR. (TYP.)

BAR "A" (TYP.)

FOOTING WIDTH TRANSITION DETAIL

FOR LOCATIONS WITHOUT FOOTING STEP

NOTE: TRANSVERSE BARS NOT SHOWN

FOOTING

#2

3" CLR. (TYP.)

BAR "A" (TYP.)
**WIND EXPOSURE & VELOCITY**

**NOISE BARRIER TYPE**

<table>
<thead>
<tr>
<th>CMU Width</th>
<th>H</th>
<th>X</th>
<th>W</th>
<th>BAR &quot;A&quot;</th>
<th>BAR &quot;C&quot;</th>
<th>BAR &quot;D&quot;</th>
<th>BAR &quot;E&quot;</th>
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<tbody>
<tr>
<td>6' - 0&quot;</td>
<td>8&quot;</td>
<td>2&quot; - 0&quot;</td>
<td>3&quot; - 84&quot;</td>
<td>8@ @ 48&quot;</td>
<td>8@ @ 48&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8' - 0&quot;</td>
<td>8&quot;</td>
<td>2&quot; - 2&quot;</td>
<td>3&quot; - 84&quot;</td>
<td>8@ @ 48&quot;</td>
<td>8@ @ 48&quot;</td>
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<td></td>
</tr>
<tr>
<td>10' - 0&quot;</td>
<td>8&quot;</td>
<td>2&quot; - 6&quot;</td>
<td>3&quot; - 84&quot;</td>
<td>8@ @ 48&quot;</td>
<td>8@ @ 48&quot;</td>
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<tr>
<td>12' - 0&quot;</td>
<td>8&quot;</td>
<td>3&quot; - 0&quot;</td>
<td>4&quot; - 84&quot;</td>
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<td>16' - 0&quot;</td>
<td>10&quot;</td>
<td>5&quot; - 4&quot;</td>
<td>3&quot; - 84&quot;</td>
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<tr>
<td>18' - 0&quot;</td>
<td>10&quot;</td>
<td>6&quot; - 0&quot;</td>
<td>4&quot; - 84&quot;</td>
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</tr>
</tbody>
</table>

**RIGHT-OF-WAY**

**SEE CONTRACT**

**SOLID GROUT CAP**

**BOND BEAM AT TOP**

---

**MASONRY WALL ON OFFSET SPREAD FOOTING**

**NOISE BARRIER WALL TYPE 18**

**STANDARD PLAN D-2.64-01**

**EFFECTIVE: September 3, 2019 TO September 29, 2020**

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 18A, 18B, 18C or 18D. 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. Panel shall have at least 3 feet of level ground on each side.

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

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

SASH BLOCK RECESSES.

TRAFFIC SIDE

10" CMU

8" OR 10" CMU

#5 (TYP.)

EXPANSION JOINT

BOND BEAM DETAIL

BOND BEAM UNITS

BOND BEAM GROUTING LIMIT

4'-0" MAX. (TYP.)

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

BOND BEAM UNITS

TRAFFIC SIDE

#5 (TYP.)

PLAN VIEW

EXANSION JOINT AT WIDTH STEP

SASH BLOCK RECESSES.

TRAFFIC SIDE

#5 (TYP.)

MASONRY WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
TYPE 18

STANDARD PLAN D-2.64-01

FOOTING WIDTH TRANSITION DETAIL
( FOR LOCATIONS WITHOUT FOOTING STEP )

NOTE: TRANSVERSE BARS NOT SHOWN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: SEPTEMBER 3, 2019 TO SEPTEMBER 29, 2020
BOND BEAM DETAIL

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

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

6" OR 10" CMU

6" OR 10" CMU

PLAN VIEW

TYPICAL EXPANSION JOINT

PLAN VIEW

EXPANSION JOINT AT WIDTH STEP

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

PREPARED BY: AUGUST 23, 2006

NOISE BARRIER WALL

TYPE 19

STANDARD PLAN D-2.66-00

EFFECTIVE: September 3, 2019 TO September 29, 2020
SECTION D
TYPICAL EXPANSION JOINT

TRAFFIC SIDE
EXPANSION JOINT FILLED W/ NOISE SEALER
1 - #5 FULL HEIGHT
BAR "C"

SECTION A

TRAFFIC SIDE
1 - #5 FULL HEIGHT
BAR "C"

SECTION B

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 C

MASONRY WALL ON SHAFT FOUNDATION

NOISE BARRIER WALL
TYPE 20

STANDARD PLAN D-2.68-00
SHEET 2 OF 2 SHEETS

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES
1. All rebar shall have a minimum 1 1/2' cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

A SECTION

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

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

A SECTION

PLAN VIEW
CONCRETE SLAB DETAIL
FOR CAST-IN-PLACE WALL
ON OFFSET SPREAD FOOTING
1. All rebar shall have a minimum 1 1/2" cover.

NOTES

FOR CAST-IN-PLACE WALL
W/TRAFFIC BARRIER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

STANDARD PLAN D-2.82-00

SHEET 1 OF 2 SHEETS
CONCRETE SLAB

SECTION 0

BENDING DIAGRAM

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

BENDING DIAGRAM

EFFECTIVE: September 3, 2019 TO September 29, 2020

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

4'-6" --~ BAR "A" ~ 3' (TYP.) ~ / (TYP.)

4'-6" --~ BAR "A" (7 BARS PER SIDE)

DOOR OPENING

48" DOOR OPENING

CONCRETE SLAB DETAIL

CONCRETE SLAB

GROUND LINE

WALL

CONCRETE SLAB NOT SHOWN

DOOR DETAIL (SEE NOTE 2)

BENDING DIAGRAM

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

EXPIRES AUGUST 23, 2026

NOISE BARRIER WALL
ACCESS DOOR TYPE 4

STANDARD PLAN D-286-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION 11/18/05

Washington State Department of Transportation

EFFECTIVE: September 3, 2019 TO September 29, 2020

EXPANSION JOINT

4'-6"

BAR "A"

BAR "A" (7 BARS PER SIDE)

48" DOOR OPENING

CONCRETE SLAB DETAIL

CONCRETE SLAB

GROUND LINE

WALL

CONCRETE SLAB NOT SHOWN

DOOR DETAIL (SEE NOTE 2)

BENDING DIAGRAM

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

EXPIRES AUGUST 23, 2026

NOISE BARRIER WALL
ACCESS DOOR TYPE 4

STANDARD PLAN D-286-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION 11/18/05

Washington State Department of Transportation

EFFECTIVE: September 3, 2019 TO September 29, 2020
BENDING DIAGRAM

FRONT VIEW

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

2 PER SIDE OF DOOR

CONCRETE SLAB DETAIL

FOR MASONRY WALL
(SHAFT FOUNDATION SHOWN)

NOISE BARRIER WALL
ACCESS DOOR TYPE 5
STANDARD PLAN D-2.88-00

EFFECTIVE: September 3, 2019 TO September 29, 2020
ANCHOR PIN = 1/2" x 9" STEEL WELDED TO REINFORCEMENT PLATE

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

16 GAGE STEEL DOOR FRAME

GROUND LINE

DOOR STOP

NOTE

All exposed metal surfaces shall be painted with paint conforming to the requirements in the Standard Specifications, Section 9.
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 "$T_{al}$" shall be determined in accordance with WSDOT Standard Practice TP25. See Qualified Products List (QPL) Appendix "D," for products in which "$T_{al}$" 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_{al}" 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. Fassia 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.

GEOTEXTILE FOR UNDERGROUND DRAINAGE CLASS A, MODERATE SURVIVABILITY
(Can be used if a geogrid is used for Geosynthetic Reinforcement)

'1'-0" MIN. GEOTEXTILE OVERLAP, TOP & BOTTOM
| WALL GEOMETRY AND REINFORCEMENT
| LAYER LOCATION |
| TOTAL WALL HEIGHT, \( H \) (ft) | DEPTH BELOW WALL TOP AT FACE, \( z \) (ft) | GEOSYNTHETIC WALL | GEOSYNTHETIC WALL | GEOSYNTHETIC WALL | GEOSYNTHETIC WALL | GEOSYNTHETIC WALL | GEOSYNTHETIC WALL |
| | | | TYPE 1 | TYPES 2 AND 4 | TYPE 3 | TYPE 5 | TYPES 6 AND 8 | TYPE 7 |
| UP TO 5 | | | | | | | | |
| 0 to 10 | 1.0 | 508 | 240 | 220 | 505 | 345 | 220 |
| 0 to 10 | 1.25 | 631 | 300 | 280 | 631 | 300 | 275 |
| 5 \(<\ H \leq \ 10 \) | 0 to 10 | 1.0 | 530 | 500 | 470 | 528 | 497 | 490 |
| 0 to 10 | 1.25 | 680 | 630 | 580 | 690 | 609 | 575 |
| 10 \(<\ H \leq \ 15 \) | 0 to 10 | 1.0 | 580 | 620 | 570 | 584 | 588 | 545 |
| 10.1 to 15 | 1.0 | 760 | 780 | 740 | 760 | 750 | 719 |
| 10.1 to 15 | 1.25 | 950 | 980 | 920 | 950 | 950 | 899 |
| 15 \(<\ H \leq \ 20 \) | 0 to 10 | 1.0 | 584 | 672 | 616 | 584 | 626 | 572 |
| 10.1 to 20 | 1.0 | 962 | 1072 | 1000 | 992 | 1032 | 976 |
| 0 to 10 | 1.25 | 730 | 840 | 770 | 730 | 783 | 715 |
| 10.1 to 20 | 1.25 | 1340 | 1340 | 1250 | 1240 | 1290 | 1220 |
| 20 \(<\ H \leq \ 25 \) | 0 to 10 | 1.0 | 580 | 720 | 660 | 584 | 667 | 599 |
| 10.1 to 20 | 1.0 | 1050 | 1180 | 1100 | 1048 | 1128 | 1064 |
| 20.1 to 25 | 1.0 | 1220 | 1350 | 1270 | 1224 | 1304 | 1240 |
| 0 to 10 | 1.25 | 730 | 900 | 820 | 730 | 834 | 749 |
| 10.1 to 20 | 1.25 | 1310 | 1470 | 1380 | 1310 | 1419 | 1330 |
| 25 \(<\ H \leq \ 30 \) | 0 to 10 | 1.0 | 580 | 780 | 700 | 584 | 708 | 628 |
| 10.1 to 20 | 1.0 | 1050 | 1240 | 1140 | 1048 | 1158 | 1068 |
| 20.1 to 25 | 1.0 | 1530 | 1690 | 1590 | 1530 | 1650 | 1550 |
| 0 to 10 | 1.25 | 730 | 960 | 870 | 730 | 885 | 782 |
| 10.1 to 20 | 1.25 | 1310 | 1580 | 1430 | 1310 | 1460 | 1360 |
| 20.1 to 25 | 1.25 | 1820 | 2050 | 1920 | 1820 | 1970 | 1870 |
| 30 \(<\ H \leq \ 35 \) | 0 to 10 | 1.0 | 580 | 830 | 740 | 584 | 749 | 653 |
| 10.1 to 20 | 1.0 | 1070 | 1290 | 1190 | 1086 | 1216 | 1120 |
| 20.1 to 25 | 1.0 | 1050 | 1240 | 1160 | 1052 | 1150 | 1120 |
| 0 to 10 | 1.25 | 730 | 1040 | 925 | 730 | 936 | 816 |
| 10.1 to 20 | 1.25 | 1310 | 1610 | 1480 | 1310 | 1532 | 1400 |
| 20.1 to 25 | 1.25 | 1860 | 2180 | 2040 | 1860 | 2180 | 1980 |
| 30.1 to 35 | 1.25 | 2110 | 2400 | 2250 | 2110 | 2310 | 2150 |

NOTE: See Note 4, sheet 1.

PERMANENT GEOSYNTHETIC WALL
STANDARD PLAN D-3.09-00

EFFECTIVE: September 3, 2019 TO September 29, 2020

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: BILL HENDEN

APPROVED FOR PUBLICATION SHEET 2 OF 4 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020
### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

**(Includes Design Service for Large Earthquake: AE = 0.35g)**

<table>
<thead>
<tr>
<th>TOTAL WALL HEIGHT, H (ft)</th>
<th>GEOSYNTHETIC WALL TYPE 1</th>
<th>MAX. FACTORED BEARING STRESS (psf)</th>
<th>SERVICE</th>
<th>EXTREME EVENT I</th>
<th>EXTREME EVENT II</th>
</tr>
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<tbody>
<tr>
<td>L (FT)</td>
<td>SERVICE</td>
<td>EVENT</td>
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**NOTE:** See General Note 5, sheet 1.

### PERMANENT GEOSYNTHETIC WALL - EXTERNAL STABILITY DESIGN

**(Includes Design Service for Large Earthquake: AE = 0.25g)**

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**NOTE:** See General Note 5, sheet 1.
GEOTEXTILE GEOSYNTHETIC

1. SET FORM ON COMPLETED LIFT.

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

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

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

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

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

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

NOTES(SHEET)

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

2. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.
NOTES
1. Anchor Rods shall be ASTM F1554 GR. 55
2. All cast-in-place concrete shall be Class 4000.
3. Couplers shall conform to the same ASTM Standard Specification as that specified for the nut. Couplers shall be capable of developing 100% of the tensile strength of the anchor rod without evidence of any failure.

KEY NOTES
1. 3/8" (IN) DIAMETER THREADED ANCHOR ROD (STANDARD SPECIFICATION SECTION 3.03.3.4) GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A325. ANCHOR RODS SHALL BE THREADED AT A MINIMUM OF 1"-0" AT ENDS. PLACE LEVEL AND NORMAL TO WALL. ENGAGE ANCHOR RODS WITH PVC SLEEVE. EMBED PVC ENDS INTO GRADE BEAM AND EDGE BEAM.
2. BACKFILL VOID BEHIND WALL WITH SAND CONFORMING TO STANDARD SPECIFICATION SECTION 9-03.13(1) TO 6" (IN) ABOVE FINISHED GRADE ON FRONT FACE OF WALL.
3. LEVELING PAD, EDGE BEAM, AND GRADE BEAM ARE CAST-IN-PLACE CONCRETE PLACED AT 9-1:1 VERTICAL SLOPE AND THE VERTICAL CONSTRUCTION JOINTS SHALL BE SPACED AT 120" MAXIMUM.
4. ONE 3" (IN) DIAMETER WEEP HOLES PER FASCIA PANEL. HORIZONTAL LOCATION AT THE CENTERLINE FASCIA PANEL.
5. ALL VERTICAL PANEL JOINTS SHALL BE SEALED FOR FULL CONTACT WITH AN APPROVED JOINT SEALANT. SEE "EXPANSION JOINT DETAILS", SHEET 2.
6. UNLESS OTHERWISE SHOWN, MINIMUM CONCRETE COVER FOR REINFORCEMENT IS 1 1/2". INCREASE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES.
7. IF GRADE BEAM IS NEAR CENTERLINE OF ROADWAY, USE ONE GRADE BEAM AT CENTERLINE FOR FASCIA PANEL ON EITHER SIDE.
8. CONTACT BRIDGE OFFICE FOR ROADWAY CROSS SLOPES GREATER THAN 0.0625FT.
9. COORDINATE FINISH AND CONFIGURATION WITH STATE BRIDGE AND STRUCTURES ARCHITECT PER WSDOT DESIGN MANUAL 730.04(5).
10. PRECAST FASCIA PANEL.

TYPICAL SECTION PRECAST CONCRETE FASCIA PANEL

WEEH HOLE ASSEMBLY

PRECAST PERMANENT GEOSYNTHETIC WALL FASCIA

STANDARD PLAN D-3.11-0:

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Bijan Khaleghi

2014

WSDOT DESIGN MANUAL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTE

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

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

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

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

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

SHEET 1 OF 2 SHEETS

APPROVED FOR ADOPTION

W/29/08

STATE BRIDGE ENGINEER
WASHINGTON
DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
**REINFORCED CONCRETE RETAINING WALL Standard Plan D-10.1-01**

**VERTICAL FACE WALL DESIGN WITH 250 PSI SURCHARGE ON TRAFFIC BARRIER**

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**EFFECTIVE:** September 3, 2019 TO September 29, 2020
SLOPING FACE WALL DESIGN WITH A 250 PSF SURCHARGE OR TRAFFIC BARRIER

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

REINFORCED CONCRETE RETAINING WALL TYPE 2 AND 2SW
STANDARD PLAN D-10.15-01

SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020
EFFECTIVE: September 3, 2019 TO September 29, 2020
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 Interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.32 g.

SLOPING FACE WALL DESIGN WITH 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 4 AND 4SW
STANDARD PLAN D-10.25-0

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
May 13, 2009 2:03 AM

Washington State Department of Transportation
**VERTICAL FACE WALL DESIGN**

**WITH 2:1 BACKSLOPE**

**REINFORCED CONCRETE RETAINING WALL TYPE 4 AND 4SW**

**STANDARD PLAN D-10.25-0**

**APPROVED FOR PUBLICATION**

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**CONSTRUCTION INFORMATION**

- **Effective:** September 3, 2019 TO September 29, 2020

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**EFFECTIVE:** September 3, 2019 TO September 29, 2020

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**EFFECTIVE:** September 3, 2019 TO September 29, 2020
NOTES
1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
4. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and Interim through 2008. The seismic design of these walls has been completed using an effective PGA of 0.20 g.

EXPANSION JOINT - 48" CENTERS, W/ 1/2" PREMOLDED JOINT FILLER
2" DIAM. DRAINS AT ABOUT 12" CENTERS AND 6" ABOVE FINAL GROUND LINE AT FRONT FACE OF WALL

VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE
REINFORCED CONCRETE RETAINING WALL TYPE 5
STANDARD PLAN D-10.30-00

KEY DETAIL
REQUIRED ON WALLS WHERE H > 26'

TYPICAL SECTION
OFFSET - SET TOP OF WALL BACK
H>20' - OFFSET = 1/2', H>26' - OFFSET = 1/4'

FACE OF WALL
3/4" CHAMFER (TYP)

3 3/4" CL RacR FAcE OF WALL
24" MIN. VERTICAL CURVE AT ALL ANGLE OR (BREAK) POINTS IN TOP OF WALL PROFILE

WALL TOP DETAIL
SPECIAL WALL TREATMENT WHEN SPECIFIED IN CONTRACT

SPLIT ELEVATION VIEW
(Shown separate Rebar Layers)
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

FRONT FACE WALL AT TOP OF FOOTING

FRONT BACK

SPLIT VIEW LINE
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

BAR #4
LOCATION WALL HEIGHT (H) QTY
TOP OF FOOTING
5 12 ≤ 1/4" 5
18 ≤ 1/4" 7
23 ≤ 1/4" 9
30 ≤ 1/2" 13

BOTTOM OF FOOTING
12 ≤ 1/4" 5
18 ≤ 1/4" 7
23 ≤ 1/4" 9
30 ≤ 1/2" 13

FRONT BACK

SPLIT VIEW LINE
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

KEY DETAIL
REQUIRED ON WALLS WHERE H > 26'

TYPICAL SECTION
OFFSET - SET TOP OF WALL BACK
H>20' - OFFSET = 1/2', H>26' - OFFSET = 1/4'

FACE OF WALL
3/4" CHAMFER (TYP)

3 3/4" CL RacR FAcE OF WALL
24" MIN. VERTICAL CURVE AT ALL ANGLE OR (BREAK) POINTS IN TOP OF WALL PROFILE

WALL TOP DETAIL
SPECIAL WALL TREATMENT WHEN SPECIFIED IN CONTRACT

SPLIT ELEVATION VIEW
(Shown separate Rebar Layers)
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

FRONT FACE WALL AT TOP OF FOOTING

FRONT BACK

SPLIT VIEW LINE
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

KEY DETAIL
REQUIRED ON WALLS WHERE H > 26'

TYPICAL SECTION
OFFSET - SET TOP OF WALL BACK
H>20' - OFFSET = 1/2', H>26' - OFFSET = 1/4'

FACE OF WALL
3/4" CHAMFER (TYP)

3 3/4" CL RacR FAcE OF WALL
24" MIN. VERTICAL CURVE AT ALL ANGLE OR (BREAK) POINTS IN TOP OF WALL PROFILE

WALL TOP DETAIL
SPECIAL WALL TREATMENT WHEN SPECIFIED IN CONTRACT

SPLIT ELEVATION VIEW
(Shown separate Rebar Layers)
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

FRONT FACE WALL AT TOP OF FOOTING

FRONT BACK

SPLIT VIEW LINE
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

KEY DETAIL
REQUIRED ON WALLS WHERE H > 26'

TYPICAL SECTION
OFFSET - SET TOP OF WALL BACK
H>20' - OFFSET = 1/2', H>26' - OFFSET = 1/4'

FACE OF WALL
3/4" CHAMFER (TYP)

3 3/4" CL RacR FAcE OF WALL
24" MIN. VERTICAL CURVE AT ALL ANGLE OR (BREAK) POINTS IN TOP OF WALL PROFILE

WALL TOP DETAIL
SPECIAL WALL TREATMENT WHEN SPECIFIED IN CONTRACT

SPLIT ELEVATION VIEW
(Shown separate Rebar Layers)
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

FRONT FACE WALL AT TOP OF FOOTING

FRONT BACK

SPLIT VIEW LINE
CONSTRUCTION JOINTS IN FOOTING AT 120" CENTERS MAX.

KEY DETAIL
REQUIRED ON WALLS WHERE H > 26'
### VERTICAL FACE WALL DESIGN WITH 2:1 BACKSLOPE

### REINFORCED CONCRETE RETAINING WALL TYPE 5

**STANDARD PLAN D-10.30-00**

**SHEET 2 OF 3 SHEETS**

**APPROVED FOR BURGLARY**

**WEIGHT: 497.9 lb.**

**MAXIMUM LOAD: 1500 lb.**

**LENGTH: 8'**

**HEIGHT: 30'**

**MIN. SPICE:**

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**FOOTING REINFORCEMENT**

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**STEM REINFORCEMENT**

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**WALL H1**

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**EFFECTIVE: September 3, 2019 TO September 29, 2020**
**TYPICAL SECTION**

**SPLIT ELEVATION VIEW** (SHOWING SEPARATE REBAR LAYERS)

**REINFORCED CONCRETE RETAINING WALL TYPE 6**

**STANDARD PLAN D-10.35-00**
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
**EFFECTIVE:** September 3, 2019 TO September 29, 2020

### FOOTING REINFORCEMENT

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<td>D</td>
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<tr>
<td>10'</td>
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**REINFORCEMENT NOTES**

1. **If traffic barrier is used:** Add 0.100 CYFLW of concrete class 4000 for barrier alternate 1. Add 0.123 CYFLW of concrete class 4000 for barrier alternate 2. See standard plan D-05.10

2. **Add 28 lb/lf of reinforcing steel for barrier alternate 1 or 19 lb/lf of reinforcing steel for barrier alternate 2. See standard plan D-05.10**

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

**REINFORCED CONCRETE RETAINING WALL**

**TYPE 7**

**STANDARD PLAN D-10.40-01**

**SHEET 1 OF 3 SHEETS**

**APPROVED FOR PUBLICATION**

[Diagram includes various ratios and calculations related to reinforcing concrete walls.]
**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.


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

**REINFORCED CONCRETE RETAINING WALL TYPE 8**

**STANDARD PLAN D-10.45-01**

Sheet 1 of 2 Sheats

Approved for Publication

Washington State Department of Transportation

Signature:

Date: 12/08/2020
| WALL NT | B | C | D | A | LENGTH | h | SIZE | SP A | SIZE | SP A | LENGTH | h | b | SIZE | SP A | LENGTH | h | b | SIZE | SP A | LENGTH | h | b | SIZE | SP A | LENGTH | h | b | SIZE | SP A | LENGTH | h | b |
|---------|---|---|---|---|--------|---|------|-----|------|-----|--------|---|---|------|-----|------|---|---|------|-----|------|---|---|------|-----|------|---|---|------|-----|------|---|---|------|-----|------|---|---|
| 5' x 6' | 2'-0" | 1'-0" | 1'-4" | 2'-7" | 2'-0" | 84 | 1'-6" | 6'-6" | 84 | 1'-8" | 6'-6" | 8" | N/A | N/A | N/A | N/A | 3'-10" | 2'-0" | 0.41 | 23.3 | 600 | 1244 | 1140 | 1530 |
| 6' x 8' | 3'-0" | 1'-0" | 1'-5 1/2" | 2'-7" | 2'-0" | 84 | 1'-6" | 6'-6" | 84 | 1'-8" | 6'-6" | 8" | N/A | N/A | N/A | N/A | 4'-10" | 2'-0" | 0.46 | 26.3 | 987 | 1351 | 1339 | 1578 |
| 7' x 9' | 4'-0" | 1'-0" | 1'-6 1/2" | 2'-7" | 2'-0" | 84 | 1'-6" | 6'-6" | 84 | 1'-8" | 6'-6" | 8" | N/A | N/A | N/A | N/A | 5'-10" | 2'-0" | 0.53 | 30.5 | 1076 | 1476 | 1408 | 2010 |
| 8' x 10' | 5'-0" | 2'-0" | 1'-7 1/2" | 2'-7" | 2'-0" | 84 | 1'-6" | 6'-6" | 84 | 1'-8" | 6'-6" | 8" | N/A | N/A | N/A | N/A | 6'-10" | 2'-0" | 0.58 | 34.7 | 1225 | 1687 | 1741 | 2332 |
| 9' x 12' | 6'-0" | 2'-0" | 1'-8" | 7'-0" | 1'-0" | 84 | 1'-8" | 7'-2" | 8" | N/A | N/A | N/A | N/A | N/A | 7'-10" | 5'-0" | 0.65 | 37.7 | 1611 | 1911 | 1519 | 2488 |
| 10' x 14' | 7'-0" | 2'-0" | 1'-9" | 7'-3" | 1'-0" | 84 | 1'-9" | 7'-3" | 8" | N/A | N/A | N/A | N/A | N/A | 8'-10" | 6'-0" | 0.73 | 43.0 | 1949 | 2075 | 2200 | 2744 |
| 11' x 16' | 8'-0" | 2'-0" | 1'-10" | 7'-3" | 1'-0" | 84 | 1'-10" | 11'-2" | 8" | N/A | N/A | N/A | N/A | N/A | 9'-10" | 7'-0" | 0.81 | 50.0 | 2072 | 2250 | 2320 | 3202 |
| 12' x 18' | 9'-0" | 2'-0" | 2'-0" | 8'-3" | 1'-0" | 84 | 2'-0" | 8'-3" | 8" | N/A | N/A | N/A | N/A | N/A | 10'-11" | 8'-0" | 0.89 | 55.1 | 2172 | 2259 | 2321 | 3821 |
| 13' x 20' | 10'-0" | 2'-0" | 2'-1 1/2" | 8'-10" | 1'-0" | 84 | 2'-1 1/2" | 8'-10" | 8" | N/A | N/A | N/A | N/A | N/A | 11'-11" | 9'-0" | 0.97 | 62.7 | 2504 | 3262 | 3156 | 5345 |
| 14' x 24' | 11'-0" | 2'-0" | 2'-3" | 9'-10" | 1'-0" | 84 | 2'-3" | 9'-10" | 8" | N/A | N/A | N/A | N/A | N/A | 12'-12" | 10'-0" | 1.07 | 73.0 | 2716 | 3470 | 3276 | 5706 |
| 15' x 26' | 12'-0" | 2'-0" | 2'-4" | 10'-7" | 1'-0" | 84 | 2'-4" | 10'-7" | 8" | N/A | N/A | N/A | N/A | N/A | 13'-14" | 11'-0" | 1.17 | 83.3 | 2430 | 3430 | 3292 | 4046 |
| 16' x 28' | 13'-0" | 2'-0" | 2'-5 1/2" | 11'-4" | 1'-0" | 84 | 2'-5 1/2" | 11'-4" | 8" | N/A | N/A | N/A | N/A | N/A | 14'-17" | 12'-0" | 1.34 | 95.1 | 2552 | 3615 | 3415 | 4313 |

**FOOTING REINFORCEMENT**

**STEM REINFORCEMENT**

**MATERIAL QUANTITY**

**MAXIMUM SOLAR PRESSURE (PSF)**

---

**REINFORCEMENT NOTES**

1. If traffic barrier is used, add 0.110 cu yd of concrete class 4000 for barrier alternate 1.
2. Add 0.150 cu yd of concrete class 4000 for barrier alternate 2.
3. Add 16 lb of reinforcing steel for barrier alternate 1 or 23 lb of reinforcing steel for barrier alternate 2.

---

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

**REINFORCED CONCRETE RETAINING WALL**

**STANDARD PLAN**

**TYPE 8**

**EFFECTIVE: September 3, 2019 TO September 29, 2020**

---

**DRAWN BY: R. L. NERINGER**

**APPROVED FOR EDUCATION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

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**EFFECTIVE: September 3, 2019 TO September 29, 2020**

**EFFECTIVE: September 3, 2019 TO September 29, 2020**

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**SHEET 5 OF 10**

---

**NOTE:** All dimensions are given in feet and inches. All sizes are given in inches. All service loads are given in tons. All dates are given in the format YYYY-MM-DD.
NOTES
1. All numerals are approx. 3 1/4" wide except numeral "1" which is approx. 5/8" wide.
2. Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is 3/4".
3. Traffic Barrier Connections between the bridge and the approaching roadway vary and may consist of concrete barrier extensions. Install the Date Numerals on the traffic barrier of the bridge itself.
DECK FRAMING PLAN - SINGLE LANE

DECK FRAMING PLAN - TWO LANE

ELEVATION - PILE TRESTLE

ELEVATION - FRAME TRESTLE

On pile trestles, when H exceeds 20’ bolt, use washers. Longitudinal struts and cross braces shall be placed on outside piers on both sides of the trestle in every third panel or as required by local conditions, when H exceeds 20’. Two-story bracing shall be used. Longitudinal struts and cross braces shall be fastened at each end with 3/8” bolts and washers.

On frame trestles, longitudinal bracing shall be placed on outside posts on both sides of the trestle in alternate panels or as required by local conditions. When H exceeds 20’, two-story bracing shall be placed. Longitudinal struts and cross braces shall be fastened at each end with 3/8” bolts and washers.

HALF SECTION - PILE BENT

HALF SECTION - FRAME BENT

Typical Section - Single Lane Bridge

Typical Section - Two Lane Bridge

PLATE 11

DETOUR BRIDGE WITH ASPHALT OVERLAY

USE ONLY FOR TEMPORARY BRIDGES

5-22-98

APPROVED FOR PUBLICATION
NOTES
1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir/longleaf.
3. All piling shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, ungalvanized.
6. Each deck plank shall be nailed to each stringer with two 7" spikes, number 1 or larger.
7. On 17' spans, stringers shall be 6x16 SF. On 15' spans, stringers shall be 6x16 SF.
   Two-lane bridges shall use thirteen lines of stringers, one-lane bridges shall use seven lines of stringers.
8. Overlay thickness must be sufficient to cover bolts.

SECTION A-A

DISTRIBUTION PLATE DETAIL

BASE PLATE DETAIL

BACKING PLATE DETAIL

PILE OR FRAME DETOUR BRIDGE WITH ASPHALT OVERLAY
USE ONLY FOR TEMPORARY BRIDGES
STANDARD PLAN E-2

EFFECTIVE: September 3, 2019 TO September 29, 2020
PRECAST PILES, HANDLING NOTES

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

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

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

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

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

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

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

8. Piles stored on the ground should be bunked on level dunnage at no more than 20' on center, with a maximum overhang of 10'.
FACE OF CURB
VARIES 12" TO 24" (SEE CONTRACT)

MATCH ROADWAY SLOPE
ROADWAY

11 1/2" 11 1/2"

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

Cement concrete traffic curb and gutter

NOTE

CEMENT CONCRETE PEDESTRIAN CURB

At curb ramps, landings, and driveway entrances

Cement concrete or asphalt concrete sidewalk or path

3/8" (IN) PREMOLDED JOINT FILLER
(When adjacent to cement concrete sidewalk)

CEMENT CONCRETE PEDESTRIAN CURB

1/2" (IN) R.

3/8" (IN) PREMOLDED JOINT FILLER

MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

1/2" (IN) R.

CEMENT CONCRETE TRAFFIC CURB

RAMP, LANDING, OR DRIVEWAY ENTRANCE

1/2" (IN) R.

1/2" (IN) R.

FACE OF CURB
VARIES 12" TO 24" (SEE CONTRACT)

MATCH ROADWAY SLOPE
ROADWAY

11 1/2" 11 1/2"

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

FACE OF CURB
VARIES 10" TO 22" (SEE CONTRACT)

MATCH ROADWAY SLOPE
ROADWAY

5 1/2" 5 1/2"

CEMENT CONCRETE TRAFFIC CURB

1/2" (IN) R.

MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

1/2" (IN) R.

MATCH ROADWAY SLOPE
ROADWAY

5 1/4" 5 1/4"

CEMENT CONCRETE TRAFFIC CURB

VARIES FROM 8" (IN) TO 0" (IN) - MAINTAIN 11'- 8" SLOPE ON SIDE OF CURB

MATCH ROADWAY SLOPE
ROADWAY

3" 4"

DEPRESSED CURB SECTION

At curb ramps and driveway entrances

NOTE

CEMENT CONCRETE PEDESTRIAN CURB

At curb ramps, landings, and driveway entrances

Cement concrete or asphalt concrete sidewalk or path

3/8" (IN) PREMOLDED JOINT FILLER
(When adjacent to cement concrete sidewalk)

CEMENT CONCRETE PEDESTRIAN CURB

1/2" (IN) R.

3/8" (IN) PREMOLDED JOINT FILLER

FABY, ED
May 6 2014 3:31 PM

STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: September 3, 2019 TO September 29, 2020

Cement concrete curbs

STANDARD PLAN F-10.12-0
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Edwin P. Field
April 11 2014 11:35 PM

STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: September 3, 2019 TO September 29, 2020
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.

CATCH BASIN GUTTER PAN

SLOPE THE GUTTER PAN DOWN TO THE RECTANGULAR FRAME.

ADJUSTMENT SECTION – NOT INCLUDED IN CURB AND GUTTER BID ITEM

DRAINAGE STRUCTURE – NOT INCLUDED IN CURB AND GUTTER BID ITEM

NOTES
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.
NOTE

JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.
#3 REBAR – REQUIRED ONLY IN TANGENT BLOCK WHEN LENGTH EXCEEDS 30’ (IN)
1 1/2” (IN) CLR. BOTH ENDS – SEE STANDARD SPECIFICATION 9-07

EFFECTIVE: September 3, 2019 TO September 29, 2020
### Curb Radius Table

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<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>
</tr>
<tr>
<td>23' TO 29'</td>
<td>24&quot;</td>
<td>1/2&quot;</td>
<td>23&quot;</td>
</tr>
<tr>
<td>30' TO 34'</td>
<td>30&quot;</td>
<td>1/2&quot;</td>
<td>29&quot;</td>
</tr>
<tr>
<td>35' TO 48'</td>
<td>30&quot;</td>
<td>3/8&quot;</td>
<td>29 1/4&quot;</td>
</tr>
<tr>
<td>49' 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.
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.

**NOTE**

1. Four feet of the sidewalk width shall be the minimum pedestrian accessible route free of vertical and horizontal obstructions. Gratings, Access Covers, Junction Boxes, Cable Vaults, Pull Boxes and other appurtenances within the sidewalk must have slip resistant surfaces, be flush with surface, and match grade of the sidewalk.

**WITH RAISED EDGE**

- SEE RAISED EDGE
- DETAIL - THIS SHEET

**FINISHED GRADE 1" (IN) BELOW TOP OF CONCRETE SURFACE**

- CURB NOT INCLUDED IN BID ITEM - SEE STANDARD PLAN F-10.12
- 2' - 0" (IN) R. (TYP.)
- 3/8" (IN) PREMOLDED JOINT FILLER
- CURB ADJACENT TO WALL DETAIL

**ADJACENT TO CURB**

- FLUSH
- VERTICAL WALL - SEE DETAIL

**ADJACENT TO CURB AND RAILING OR WALL**

- CURB NOT INCLUDED IN BID ITEM - SEE STANDARD PLAN F-10.12
- 3/8" (IN) PREMOLDED JOINT FILLER
- CURB ADJACENT TO WALL DETAIL

**SIDEWALK ADJACENT TO WALL DETAIL**

- CURB NOT INCLUDED IN BID ITEM - SEE STANDARD PLAN F-10.12
- 3/8" (IN) PREMOLDED JOINT FILLER

**RAISED EDGE DETAIL**

- EXTEND SIDEWALK TRANSVERSE EXPANSION JOINTS TO INCLUDE RAISED EDGE

- CURB ADJACENT TO BUFFER STRIP

- PREMOLDED JOINT FILLER

**CEMENT CONCRETE CURB AND SIDEWALK**

**STANDARD PLAN F-30.10-0**

**EFFECTIVE:** September 3, 2019 TO September 29, 2020
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 landing(s) in the 15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the walkway.


9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will be no material to retain.

---

**PLAN VIEW** TYPE PARALLEL A

**SECTION A**

**PLAN VIEW** TYPE PARALLEL B

**SECTION B**

"CEMENT CONCRETE CURB RAMP TYPE PARALLEL A" PAY LIMIT – SEE NOTE 6

"CEMENT CONCRETE CURB RAMP TYPE PARALLEL B" PAY LIMIT – SEE NOTE 6

---

**STANDARD PLAN F-40.12-0**

**SHEET 1 OF 1 SHEET**

Zeller, Scott
Jun 24 2016 7:19 AM

**PARALLEL CURB RAMP**
NOTES

1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.

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

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


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

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


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

1. This plan is to be used where pedestrian crossing in one direction is not permitted.

2. At marked crosswalks, the connection between the Landing and the roadway must be contained within the width of the crosswalk markings.

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

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


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

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


10. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.
NOTES
1. The Detectable Warning Surface (DWS) shall extend the full width of the curb ramp, landing, or other roadway entrance as applicable. Exception: If the Manufacturer of the DWS requires a concrete border around the DWS, a variance of up to 2 inches on each side of the DWS is permitted.

2. The Detectable Warning Surface (DWS) shall be placed at the back of curb, with the two leading corners of the DWS panel placed adjacent to the back of the curb, and with no more than a 2-inch gap between the DWS and the back of the curb measured at the center of the DWS panel. Exception: If the Manufacturer of the selected DWS requires a concrete border around the DWS, a variance of up to 2 inches from the back of the curb is permitted (measured at the leading corners of the DWS panel).

3. The rows of truncated domes shall be aligned to be perpendicular to the grade break at the back of curb.

4. The rows of truncated domes shall be aligned to be parallel to the direction of travel.

5. If curb and gutter are not present, such as a shared-use path connection, the Detectable Warning Surface shall be placed at the pavements edge.


7. If a curb ramp is required, the location of the Detectable Warning Surface must be at the bottom of the ramp and within the required distance from the rail.

8. When the grade break between the curb ramp and the landing is less than or equal to 5 ft from the back of curb at all points, place the Detectable Warning Surface on the bottom of the curb ramp directly above the grade break.
TYPICAL INSTALLATION FOR SINGLE-FACED SIGNS

- Shoulder not less than 8.0' MIN.
- Sign and post centerline
- D10-1, D10-2, & D10-3 Milepost Sign Panel
- 4x4 (nom.) timber sign post or 2x2” steel sign post

1/4” DIAM. x 1 1/2” LAG BOLT AND WASHER

BACK EQUATION PLAQUE (D10-401)
SPUR ROUTE PLAQUE (D10-501)

TYPICAL INSTALLATION FOR DOUBLE-FACED SIGNS

- Shoulder not less than 6.0' MIN.
- Bolt and post centerline
- D10-101, D10-201, & D10-301 Milepost Sign Panel
- 4x4 (nom.) timber sign post or 2x2” steel sign post

1/4” DIAM. x 3” HEX HEAD BOLT, NUT & WASHERS (USE FOR SINGLE-FACE INSTALLATIONS ALSO)
INSTALL PLAQUE ON BOTH SIDES

NOTES


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

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

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

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

MILEPOST
STANDARD PLAN G-10.10-00
EFFECTIVE: September 3, 2019 TO September 29, 2020
**NOTES**

1. Notch is only required with multiple post installations.
2. 6x10, 8x10, and 6x12 Timber Sign Posts cannot be made breakaway and do not have holes or notches. These posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barriers.
4. For 5x6 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>
</tr>
</thead>
<tbody>
<tr>
<td>6x6</td>
<td>3'-0&quot;</td>
<td>1-1/2'</td>
<td>1-1/2'</td>
</tr>
<tr>
<td>8x6</td>
<td>4'-0&quot;</td>
<td>1-1/2'</td>
<td>1-1/2'</td>
</tr>
<tr>
<td>6x10</td>
<td>4'-0&quot;</td>
<td>2'</td>
<td>SEE NOTES 3 &amp; 4</td>
</tr>
<tr>
<td>6x12</td>
<td>6'-0&quot;</td>
<td>2'</td>
<td>SEE NOTES 3 &amp; 4</td>
</tr>
</tbody>
</table>

**ELEVATION VIEW**

SINGLE-POST INSTALLATION

**TIMBER SIGN SUPPORT**

STANDARD PLAN G-22.10-04

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Nisbet, John

Digitally signed by Nisbet, John
Date: 2018.06.27 11:29:46 -07'00'
MAJOR AND SECONDARY SIGN INSTALLATION

WIDEST SIGN POST DIMENSION

STEEL OR ALUMINUM ANGLE (TYP.)

WINDBEAM

SIGN PANEL

NARROWEST SIGN POST DIMENSION

ALUMINUM WINDBEAM AND TWO POST CLIPS (TYP.) - SEE SIGN PANEL ATTACHMENT DETAIL

3/16" (IN) ALUMINUM RIVETS @ 4" (IN) STAGGERED SPACING (TYP.)

TOP OF MAJOR SIGN

VARIABLE 0" TO 3" E

VARIABLE 0" TO 3" E

SECONDARY SIGN

TOP OF POST

DIRECTION OF TRAFFIC

BOTTOM OF SIGN AND TOP OF NOTCH SHALL BE ALIGNED

NUTCH DEPTH - SEE POST INSTALLATION TABLE

LAG BOLT (TYP.)

ALUMINUM POST CLIP - SEE STANDARD SPECIFICATION SECTION 3-28

STANDARD PLAN G-22.10-04

EFFECTIVE: September 3, 2019 TO September 29, 2020

CONCRETE FOUNDATION SLEEVE DETAIL

TO BE USED WHEN PLACING TIMBER POST IN A PAVED AREA

Nisbet, John

TIMBER SIGN SUPPORT

STANDARD PLAN G-22.10-04

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Digitally signed by Nisbet, John
Date: 2018.06.27 11:32:12 -07'00'
**NOTES**

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

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

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

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

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

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

3. 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)

EFFECTIVE: September 3, 2019 TO September 29, 2020
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-1B, SB-2 & SB-3
INSTALLATION DETAILS
STANDARD PLAN G-24.40-01

Nisbet, John
Digitally signed by Nisbet, John
Date: 2018.06.27 11:37:51 -07'00'

EFFECTIVE: September 3, 2019 TO September 29, 2020
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 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. 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 pre tightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.

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

1. All material and workmanship shall be in accordance with the current requirements of the Washington State Department Of Transportation Standard Specifications for Road, Bridge, Municipal Construction and Amendments.

2. Sign support components have been designed to meet the requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, dated 2015 and interim, using basic wind speed of 115 mph, and 50 year design life.

3. All non-steel structural steel parts shall be galvanized in accordance with AASHTO M111 after fabrication, bolts and hardware shall be galvanized in accordance with AASHTO M232.

4. Size of fillet weld shall be 1/4” (in) minimum except where noted.

5. For sign bracing details, see Standard Plan G-30.10 or G-50.10.

6. Rotate sign on post to be normal to traffic.

7. No resin bonded anchors shall be nearer than 1’ - 6” from a vertical expansion joint and all resin bonded anchors shall clear any embedded electrical conduit.

8. Sign support shall be installed on cast-in-place concrete barriers rigidly connected to bridge or retaining wall.

9. Anchors shall be bolted into reinforced concrete only with a nominal thickness no less than 9” (in). Base plate shall be installed such that full bearing contact is achieved.

Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the hole abandoned. Fill hole with grout conforming to Standard Specification, Section 8.02.3(20).

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<table>
<thead>
<tr>
<th>PART</th>
<th>MATERIAL SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLATES AND BARS</td>
<td>ASTM A36 OR ASTM 572</td>
</tr>
<tr>
<td>PLATES AND BARS</td>
<td>ASTM A606 GRADE B TYPE 2 OR 5, OR EQUIVALENT HSB ASTM A606 ROUND GRADE B</td>
</tr>
<tr>
<td>RESIN BONDED ANCHORS</td>
<td>ASTM F1554 GRADE 56 GALV.</td>
</tr>
<tr>
<td>NUTS</td>
<td>ASTM A563 GRADE A</td>
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<tr>
<td>WASHERS</td>
<td>ASTM F436 TYPE 1</td>
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<tr>
<td>EPOXY RESIN</td>
<td>STD. SPEC. SEC. 9-26.1 (TYPE IV)</td>
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**PIECE SIZE**, **XYZ**

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<thead>
<tr>
<th>PIPE SIZE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>W</th>
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</thead>
<tbody>
<tr>
<td>4” STD.</td>
<td>&lt; 160 FT</td>
<td>2” - 6”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4” SXS</td>
<td>&lt; 220 FT</td>
<td>2” - 6”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5” STD.</td>
<td>&lt; 260 FT</td>
<td>3” - 6”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**BARIER MOUNTED ELBOW SIGN SUPPORT STANDARD PLAN G-26.10-00**

**SHEET 1 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

**Washington State Department of Transportation**

Zelikman, Richard
Jul 19 2019 7:37 AM

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**SAMPLE DESIGN CHECK CALCULATIONS**

(OTHER SIGN CONFIGURATIONS OK)

**AREA CALCULATIONS**

\[ X_1 \times Y_1 = 4" \times 4" = 16 \text{ FT} \]

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

\[ \text{TOTAL AREA} = 16" + 6.3" = 22.3 \text{ FT}^2 \]

\[ X \times Y \times Z = (4" \times 4" \times 12.6") = 203.2 \text{ FT}^3 \]

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

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

\[ 254.8 \text{ FT}^3 < 260 \text{ FT} \text{ THEREFORE USE 5" STD. PIPE} \]
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.

DIMENSIONS

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
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<td>6&quot;</td>
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<tr>
<td>3'-0&quot;</td>
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<td>1'-3&quot;</td>
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</tr>
<tr>
<td>4'-0&quot;</td>
<td>2'-6&quot;</td>
<td>1'-3&quot;</td>
<td>9&quot;</td>
</tr>
</tbody>
</table>

MOUNTING BRACKET AND STEEL STRAP (SEE NOTE 1)

LEVEL
NOTES

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

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

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

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type III, IV, VII or IX 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 1/4&quot;</td>
<td>1/2 SIGN WIDTH - 2 1/4&quot;</td>
<td>1/2 SIGN WIDTH - 1&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIGN POST TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x6 OR 6x6 TIMBER POST</td>
</tr>
<tr>
<td>B</td>
</tr>
</tbody>
</table>

**NOTE**

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

### SIGN BRACE DETAIL

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

### NO PASSING ZONE SIGN BRACE DETAIL

### SIGN BRACING

**STANDARD PLAN G-50.10-02**

**SHEET 2 OF 2 SHEETS**

**APPROVED FOR PUBLICATION**

- **Date:** 2018.05.30
- **Time:** 11:42:51

**Nisbet, John**

**SIGN BRACE PLACEMENT**

**EFFECTIVE:** September 3, 2019 TO September 29, 2020

**EFFECTIVE:** September 3, 2019 TO September 29, 2020
NOTES

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

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

3. For VMS mounting, the Contractor may substitute W6 × 12 steel or W8 × 13 steel sections for the Vertical Brace W4 × 13 steel.
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 Braces 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.
EFFECTIVE: September 3, 2019 TO September 29, 2020

PLAN
STEEL GRATING DETAIL
(RAILING NOT SHOWN FOR CLARITY)

1/4" (IN) TOE PLATE
CROSS BAR, 1/8" (IN) MIN. THICKNESS (TYP.)
BEARING BAR, 3/16" (IN) MIN. THICKNESS (TYP.)

1/16" (IN) MAX. CLEAR (TYP.)

BEARING BARS

3/16" (IN) CLEARANCE BETWEEN ENDS OF CROSS BARS

INSTALL AND ARRANGE THE GRATING FASTENERS ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

GRATING FASTENER DETAIL

GRATING FASTENER (TYP.) SEE DETAIL

Zeleny, Richard
Jun 19 2018 10:34 AM

MAINTENANCE WALKWAY FOR SIGN BRIDGES
STANDARD PLAN G-95.10-02

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

18-08-02

Sheet 3 of 3 sheets
EFFECTIVE: September 3, 2019 TO September 29, 2020

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-96-10.
3. Use two tanyards 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. Handrail f-shot with VMS door opening is the responsibility of the contractor.
SHRUB, TREE AND GROUND COVER PLANTING DETAIL

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

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

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

SEE NOTE

EXISTING SOIL

BREAK UP ROOTBALL OF CONTAINER PLANTS, PRUNE CIRCLING ROOTS

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

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

SEE NOTE

EXISTING SOIL

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

TUBER OR RHIZOME PLANTING DETAIL

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

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

MOUND SOIL TO FORM WATERING WELL AT ORIFICE OF EACH PLANT

SEE NOTE

EXISTING SOIL

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

EMERGENT PLANTING DETAIL

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

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

MOUND SOIL TO FORM WATERING WELL AT ORIFICE OF EACH PLANT

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1"

TUBER OR RHIZOME PLANTING DETAIL

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

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

MOUND SOIL TO FORM WATERING WELL AT ORIFICE OF EACH PLANT

SEE NOTE

EXISTING SOIL

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

SLOPE PLANTING DETAIL

(INCLUDES ALL PLANTS ON SLOPES)

PLANT RHIZOME WITH CROWN / GROWTH POINTS AT FINISHED GRADE

FINISHED GRADE

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1"

SECTION

BULB PLANTING DETAIL

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

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

SEE NOTE

EXISTING SOIL

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

SLOPE PLANTING DETAIL

(INCLUDES ALL PLANTS ON SLOPES)

PLANT RHIZOME WITH CROWN / GROWTH POINTS AT FINISHED GRADE

FINISHED GRADE

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1"

TUBER OR RHIZOME PLANTING DETAIL

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

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

MOUND SOIL TO FORM WATERING WELL AT ORIFICE OF EACH PLANT

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1"

EMERGENT PLANTING DETAIL

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

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

MOUND SOIL TO FORM WATERING WELL AT ORIFICE OF EACH PLANT

SEE NOTE

EXISTING SOIL

UPPERMOST ROOT SHALL BE NO MORE THAN 1"
1. See Plant Material List for size and type of live stake.
2. Do not use axe or sledge for driving stakes.
3. In hard ground use an iron bar or star drill to prepare the holes for the stake.
4. Avoid stripping bark or bruising stakes during installation.
5. Fill void around cutting with soil.

LIVE STAKE INSTALLATION IN RIPRAP

TYPICAL LIVE STAKE INSTALLATION

LIVE STAKE INSTALLATION IN QUARRY SPALLS

LIVE STAKE INSTALLATION ON SLOPES
NOTES

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

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

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

4. Score the water intake pipe 1/16" deep, 1/32" wide (width of saw blade), every 1/2", alternating cuts on top and bottom for drainage. Place at lowest water level.

5. Water level may vary, depending on season.

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

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

SECTION A

POST

1 - 2 1/2" Diam.

ROUND FOOTING

SQUARE FOOTING

PLAN VIEW

STANDARD PLAN H-60.20-01

BOLLARD TYPE 2

EFFECTIVE: September 3, 2019 TO September 29, 2020
### Wood Post Assembly Detail

**See Steel Post Assembly Detail for specifications not shown.**

#### Wood Post Fasteners

| Size/Type | Quantity | Washers | Locknut/S
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; Dia. x 4 1/4&quot; Bolt</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; Dia. x 3 1/4&quot; Bolt</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>3/16&quot; Dia. x 1&quot; Screw</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Bracket (Typ.)

- **See Detail, Sheet 2**

- 3/8" x 3 1/4" Hex Bolt
- 2 Washers & Locknut (Typ.)
- Length to fit (Typ.)

- 7/16" Hole (Typ.)


### Steel Post Assembly Detail

#### Steel Post Fasteners

| Size/Type | Quantity | Washers | Locknut/S
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; Dia. x 2 3/4&quot; Bolt</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; Dia. x 3 1/4&quot; Bolt</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>3/16&quot; Dia. x 1&quot; Screw</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>1 7/8&quot; M-Clamp</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

### Notes

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

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

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

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

5. A Type 2 Support (Standard Plan H-70.20) is required when 2 or more mailboxes are to be installed on one support.
MAILBOX - SIZE 1, 1A, OR 2 (SIZE 1A SHOWN) - SEE TABLE, STANDARD PLAN H-70.10, SHEET 2, FOR DIMENSIONS

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

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

SNOW GUARD = WHEN REQUIRED - SEE DETAIL, SHEET 2

MAILBOX MOUNTING HOLE (TYP.) - SPACE PROVIDED ON BOTH ENDS TO ALLOW ACCESS TO FASTENERS - SEE NOTE 4

MAILBOX, PLATFORM & SUPPORT

MAILBOX SUPPORT TYPE 2

STANDARD PLAN H-70.20-01

SHEET 1 OF 2 SHEETS

NOTES

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

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

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

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

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

ADDITIONAL WASHERS / FILL GAP (TYP.):

I . AS REQUIRED TO /

NEWSPAPER BOX - SEE NOTE 5

ASSEMBLY DETAIL

1 7/8" MUFFLER CLAMP (1 7/8" MACLAMP), 2 WASHERS AND 2 LOCKNUTS (TYP.)

PLATFORM - SEE NOTE 3

WASHINGTON DEPARTMENT OF TRANSPORTATION

DATE: 2/16/12

EFFECTIVE: September 3, 2019 TO September 29, 2020
**MAILBOX SUPPORT TYPE 2**

**STANDARD PLAN H-70.20-01**

*Sheet 2 of 2 Sheets*

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**MAILBOX SUPPORT TYPE 1** (Wood Post Shown)

For details, see STANDARD PLAN H-70.10

---

**MAILBOX SUPPORT TYPE 2**

- **ANCHORING SYSTEM**: Socket and Wedge shown (see Note 1)
- **SHEET ROCK**: Behind Sidewalk
- **SIDEWALK**: Behind Shoulder
- **VARIABLE**: 6" to 12"
- **FACE OF CURB**: 0" to 12"
- **BEHIND CURB**: Unless otherwise shown in the plans
- **SNOW GUARD**: When required, place on leading end of support (see detail)

---

**SNOW GUARD DETAIL**

**SECTION A**

- **ANGLE IRON**: 18° x 1 1/2" x 1 1/2" angle
- **METAL**: 1/2" Raised Expanded Metal
- **MUFFLER CLAMP**: 1/2" Raised Expanded Metal
- **18°**: 1 1/2"

---

**BOTTOM VIEW**

**SNOW GUARD DETAIL**

**FRONT VIEW**

**SECTION A**

- **1/8"**: 1 1/8" angle
- **METAL**: 1/2" Raised Expanded Metal
- **MUFFLER CLAMP**: 1/2" Raised Expanded Metal
- **18°**: 1 1/2"

---

**MAILBOX PLACEMENT SECTIONS**

- **AT EDGE OF SHOULDER**: 6" to 12"
- **FACE OF CURB**: 0" to 12"
- **BEHIND CURB**: Unless otherwise shown in the plans
- **BEHIND SIDEWALK**: 0" to 12"

---

**EFFECTIVE**: September 3, 2019 TO September 29, 2020
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 1/4" 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 (.)

U-CHANNEL POST
3 LF/FT

7/16" DIAM. HOLES THROUGH PIPE & CHANNEL (TYP.)
3/8" DIAM. X 2 1/2" HEX HEAD BOLT, NUT & WASHER (TYP.)

CONCRETE BASE
1 1/4" DIAM. + 2" PIPE (THREAD BOTH ENDS)

SECTION VIEW

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

3' - 3" O.C. MIN.

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

45° ELBOW

1 1/4" PIPE

4" R.

1 1/2"

1" NOM. DIAM. SCHED. 40 PIPE + 8" LONG - SEE NOTE 4

9" LONG - SEE NOTE 4

1 1/4" PIPE

8 R.

1" NOM. DIAM. SCHED. 40 PIPE + 8" LONG - SEE NOTE 4

PIPE FITTING ANGLES

VERTICAL SUPPORT
6" TO 12"

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

EDGE OF SHOULDER OR TURNOUT

4'-0" MAX.

3'-0" MIN.

U-CHANNEL BASE

VARIABLE
6" TO 12"

HORIZONTAL MOUNT

DITCII FLOWLINE

COUPLING

COMMERCIAL CONCRETE

U-CHANNEL POST
3 LF/FT

PIPE FITTING ANGLES

PIPE BENDING ANGLES

SECTION 0

VERTICAL SUPPORT

U-CHANNEL BASE

VERTICAL SUPPORT 1 1/4" PIPE

U-CHANNEL POST 3 LF/FT

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

MAILBOX SUPPORT
TYPE 3

STANDARD PLAN H-70.30-02

SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTE
1. Post shall have sufficient strength and durability to support the fence through the life of the project.

HIGH VISIBILITY FENCE

STATE OF WASHINGTON
LANDSCAPE ARCHITECT

CERTIFICATE NO. 000998
8/10/2009

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

2'-0" (DESIRABLE)

ENVIRONMENTALLY SENSITIVE AREA BOUNDARY

HIGH VISIBILITY FENCE
STANDARD PLAN 1-10.10-01

WORK AREA

ISOMETRIC

ELEVATION

FENCE ON SLOPE

ELEVATION

TYPICAL SECTION

2'-0" MAX

6'-0" MAX

EFFECTIVE: September 3, 2019 TO September 29, 2020
Determining excavation, minimize disturbing the ground surrounding trench as much as is feasible, and smooth out the surface following excavation to avoid concentrating flows. Compaction must be adequate to prevent undercutting flows.

Typical installation detail

(Steel posts shown)

Fasten geotextile to post every 6” (in.) o.c.

NOTE

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

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

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

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

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

TYPICAL SILT FENCE WITHOUT BACKUP SUPPORT
ISOMETRIC
(STEEL POSTS SHOWN)

SPLICE DETAIL
(WOOD POSTS SHOWN)

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

CERTIFICATE NO. 000860

SILT FENCE

STANDARD PLAN I-30.15-02

SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

DRAFTED BY: BILL HENRY

DRAWN: BILL HENRY
NOTES

1. Angle high visibility silt fence terminal end uphill 24° (in) to 48° (in) to prevent sediment from flowing around the end of the fence.

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

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

4. Install silt fencing parallel to mapped contour lines.

TYPICAL INSTALLATION DETAIL

(STEEL POSTS SHOWN)

NOTE

DURING EXCAVATION, MINIMIZE DISTURRING 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 HIGH VISIBILITY SILT FENCE WITH BACKUP SUPPORT

ISOMETRIC

(STEEL POSTS SHOWN)

HIGH VISIBILITY SILT FENCE

WITH BACKUP SUPPORT

STANDARD PLAN I-30.16-01

SPLICE DETAIL

(STEEL POSTS SHOWN)
NOTES

1. Angle Terminal end uphill 24" (hn) to 48" (hn) to prevent flow around fence (Typical).
2. Perform maintenance in accordance with Standard Specification, Sections 8-01.3(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.

HIGH VISIBILITY SILT FENCE
STANDARD PLAN I-30.17-01

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

TYPICAL INSTALLATION DETAIL
(STEEL POSTS SHOWN)

TYPICAL HIGH VISIBILITY SILT FENCE
WITHOUT BACKUP SUPPORT
ISOMETRIC
(STEEL POSTS SHOWN)
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

GEO TEXTILE FOR TEMPORARY SILT FENCE - SEE STD. SPEC. 9-33.2(1), TABLE 6

POST - SEE STD. SPEC. 8-01.3(9A)

EMBED POSTS INTO SAND BAGS AS REQUIRED

FLOW

EDGE OF GEO TEXTILE

SECTION A

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

FLOW, EDGE OF GEO TEXTILE SECTION A

COMPOST BERM DESIGN

COMPOST BERM - SEE STD. PLAN 1-40.12

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

STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

EROSION CONTROL AT CULVERT ENDS
STANDARD PLAN 1-30.20-00

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

FLOW, EDGE OF GEO TEXTILE SECTION A

COMPOST BERM DESIGN

COMPOST BERM - SEE STD. PLAN 1-40.12

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

STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

EROSION CONTROL AT CULVERT ENDS
STANDARD PLAN 1-30.20-00

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

1. Wattles shall be in accordance with Standard Specification, Section 5-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification, Section 8-21.3(10).

2. Securely knot each end of Wattle. Overlap adjacent Wattle ends 1/2" 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, Section 8-01.3(15).

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

WATTLE SPACING TABLE

<table>
<thead>
<tr>
<th>TEMPORARY</th>
<th>PERMANENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; - 10&quot; OR 10&quot; - 12&quot; DIAM.</td>
<td>10&quot; - 12&quot; DIAM.</td>
</tr>
<tr>
<td>SLOPE</td>
<td>MAX. SPACING</td>
</tr>
<tr>
<td>1H : 1V</td>
<td>8&quot; - 9&quot;</td>
</tr>
<tr>
<td>2H : 1V</td>
<td>10&quot; - 12&quot;</td>
</tr>
<tr>
<td>3H : 1V</td>
<td>10&quot; - 12&quot;</td>
</tr>
<tr>
<td>4H : 1V</td>
<td>20&quot; - 24&quot;</td>
</tr>
</tbody>
</table>
NOTES


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

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

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

5. Install Compost Sock perpendicular to flow along contours.

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

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

8. Refer to Standard Specification, Section 8-01.3(16) for removal.
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 laboring 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 8-14.6(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).
**NOTES**

1. Prefabicated units may be used in lieu of the design shown on this plan upon approval of the Engineer.

2. Structure shall be constructed such that geotextile material shall be fastened to posts creating a seam­less joint.

3. Ensure that ponding height of water does not cause flooding on adjacent roadways or private property.

4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
NOTES
1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
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(10).

4. Remove Check Dams in accordance with Standard Specification 8-01.3(10).

BIODEGRADABLE CHECK DAM

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

NON-BIODEGRADABLE CHECK DAM

1. Non-Biodegradable Manufactured Check Dam devices approved for use under Standard Specification 9-14.5(4) shall be installed per manufacturer's recommendations and shall perform in accordance with Standard Specification 8-01.3(6).

2. Rock Check Dams shall be placed outside of the clear zone or behind traffic barrier.

3. To ensure adequate damming time, Rock Check Dams used as sediment control may need to be enhanced with plastic that meets the requirements of Standard Specification 9-14.5(3) or fabric that meets the geotextile requirements of Standard Specification 9-33.2(1), Table 6.

EFFECTIVE: September 3, 2019 TO September 29, 2020
**INSTALLATION STEPS:**

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

**NOTES**

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

**STATE OF WASHINGTON**

**LANDSCAPE ARCHITECT**

**BIODEGRADABLE EROSION CONTROL BLANKET PLACEMENT FOR SLOPES**

**STANDARD PLAN 1-60.10-01**

**EFFECTIVE:** September 3, 2019 TO September 29, 2020
**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.

**ISOMETRIC VIEW**

**CHANNEL TERMINATION - DOUBLE ROW OF STAPLES STAGGERED 6" APART**

**SHINGLE SPLICE AT END OF ROLL**

**CHECK SLOT - SECTION**

**LONGITUDINAL ANCHOR DETAIL**

TAMPED NATIVE SOIL FROM PILE

EROSION CONTROL BLANKET

STAPLE - 6" MAX. CENTERED

FLOW

EROSION CONTROL BLANKET

STAPLE - 36" MAX. CENTERED

TAMPED NATIVE SOIL

ANTICIPATED WATER LINE

BLANKET MUST EXTEND 36" ABOVE THE ANTICIPATED WATER ELEVATION

LONGITUDINAL ANCHOR - SEE DETAIL

CHANNEL TERMINATION - DOUBLE ROW OF STAPLES STAGGERED 6" APART

ISOMETRIC VIEW

**EFFECTIVE:** September 3, 2019 TO September 29, 2020
SECTION A-A

PLAN

Conduit reserve area

Conduit

Face of guardrail

Back of curb

Edge of shoulder

Conduit reserve area

ELECTRICAL CONDUIT PLACEMENT

STANDARD PLAN J-10

APPROVED FOR PUBLICATION

STATE OF WASHINGTOM

HINCHTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
**CONSTRUCTION NOTES**

Drive ground roods before placing concrete. Move rod(s) and drain tiles with cover(s) as required to achieve full ground penetration. Maintain a 6'-0" minimum clearance between ground rods and 8" (in) foundation edge as detailed on Standard Plan J-60.06.

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.

Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If PVC couplings are specified, the conduit stub and end bushing shall not be glued to the coupling.

4" (in) diam. x 1/2" (in) deep slump. Slope foundation within cabinet footprint toward sump. Drainpipe shall be installed in 4.5" (in) conduit. Polyethylene or copper tubing shall be used. 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.

Cabinet power supply conduit.

Conduits for service grounding electrodes.

When distance detailed in Typical Foundation Plan is greater than 6' (ft), this conduit end conductor shall be deleted.

**NOTES**

1. The cabinets shown in these details are illustrated 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 bushings, and #4 rod (100" with 30" (in) logo), may be omitted if no transformer or service cabinet is to be installed.

4. The cabinets shall be attached to the foundation with 4 each: 1/2" (in) x 10" (in) x 2" (in) x 4" (in) anchor bolts (see Detail on Sheet 4 of 6), washers, and nuts conforming to Standard Specification 9-06.5(1) and hot-dip galvanized after fabrication in accordance with AASHTO M 232. Locate anchor bolts per cabinet manufacturer. Stainless steel epoxy anchors may be used as an alternative, and shall be 1/2" (in) diameter x 10" (in), or 5/8" (in) diameter x 8" (in). All threaded rod (conforming to ASTM F593), washers (conforming to ASTM A240), and nuts (conforming to ASTM F594), shall be Type 304 stainless steel. Bolts shall extend 1 1/2" (in) min. to 2" (in) max. above the concrete pad prior to placing.

5. All reinforcing steel shall be embedded 2" (in) below surface of concrete. Place a 1/2" (in) bead of silicone between concrete 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 3000. See Standard Specification 8-20.34.

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 service and cabinets. Omit chamfers where foundation abuts sidewalk.

10. If the slope is 3:1 or steeper, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

11. Height of cabinet riser shall be adjusted to serve environmental needs. Type D Service cabinet shall have no riser. NEMA P44, Type 333SD, and Type B Modified shall have a 9" (in) riser. All other cabinets shall have a 3 1/2" (in) riser. See Contract for alternate height. Adjust length of conduit and rebar accordingly.

12. For Type 333SD Control Cabinet, the cabinet vendor shall allow the Utility Transfer Switch to be installed on either side of the cabinet. The Utility Transfer Switch unit shall be shipped inside the cabinet for field installation by Region Maintenance personnel.

13. Height of cabinet riser shall be adjusted to serve environmental needs. Type D Service cabinet shall have no riser. NEMA P44, Type 333SD, and Type B Modified shall have a 9" (in) riser. All other cabinets shall have a 3 1/2" (in) riser. See Contract for alternate 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 Policie Panel location is set by industry standards on all Controller Cabinets.

16. See Standard Plan J-10.20 for additional Foundation Construction and Conduit Housing for Type B Modified Service Cabinet with Controller Cabinet.

17. Verify pad size and location with Project Engineer.

18. Field bend #4 rebar around the Generator Anti-Theft Tie-Down Unit when required.

19. See Standard Plans J-10.21 and J-10.22 for additional details for Type D and Type E Service Cabinets.

20. As an alternate, #3 rebar spaced at 1" - O.C. longitudinally and transversely may be used.
CONTROLLER CABINET FOUNDATION NOTES:

1. Slope conduit reserve area floor 1/4" (in) per 1' (ft) to the sump in the center.
2. All other dimensions shall be approved by the Engineer.
3. Provide 2" (in) clearance between conduit and edge of foundation well for cable slack.
4. For the rest of the foundation, see Standard Plan J-10.20 for details.
**NOTES**

1. Contractor shall orient the maintenance pad to align with the direction of natural grade as shown. Obtain Engineer's approval of maintenance pad orientation prior to proceeding with construction.

2. The maintenance pad and retaining walls have been designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications, 6th Edition, 2012.

3. Concrete for walls and bases shall be class 4000.

4. Height of wall varies to match slope of existing grade. Contractor shall field-determine wall height and each maintenance pad location and obtain approval from the Engineer prior to proceeding with construction.

5. 3/4" (in) chamfer for all exposed corners.

6. For grounding details not shown, see Standard Plan J-60.05.

7. For cabinet and conduit details not shown, see Standard Plan J-10.10.

8. The cabinets shall be attached to the foundation with 4 each: 1/2" (in) x 1/2" (in) x 2" (in) x 4" (in) anchor bolts (see Detail on this Sheet), washers, and nuts conforming to Standard Specification 9-06.5(i) and galvanized after fabrication in accordance with AASHTO M 232. Locate anchor bolts per cabinet manufacturer. Stainless steel epoxy anchors may be used as an alternative, and shall be 1/2" (in) diameter x 9" (in) or 5/8" (in) diameter x 9" (in). All threaded rod (conforming to ASTM F593), washers (conforming to ASTM A240), and nuts (conforming to ASTM F594), shall be Type 304 stainless steel. Bolts shall extend 1 1/2" (in) min to 2" (in) max above the concrete pad.

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**SECTION B**

9" (in) Raised Cabinet Pad Shown = 3 1/2" (in) Raised Cabinet Pad is Similar, with One #4 Top Hoop

**SECTION D**

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**STANDARD PLAN J-10.15-0**

**CABINET ENCLOSURE ON SLOPE**

Sheet 1 of 1 Sheet

Approved for Publication:

Bates, Pasco

Jun 11, 2014 12:29 PM

**EFFECTIVE: September 3, 2019 TO September 29, 2020**

[Diagram and details of cabinet enclosure on slope, including reinforcing steel bending diagram, anchor bolt details, and grounding pad specifications.]
NOTES (CONTINUED)

10. Hinges shall have stainless steel or brass pins.
11. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.
13. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets: Key Numbers 2, 3, 4, 6, 7, 8, and 9. Key Number 4 name plate shall read as follows: "PHOTOCELL BYPASS TEST OFF" AND "PHOTOCELL TEST OFF - AUTOMATIC."
See service cabinet detail.
14. Metering arrangements vary with serving utilities. The Contractor shall verify the serving utility's requirements prior to fabrication and installation of the service equipment.
15. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
16. All buswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the buswork. "Jumpering" of breakers shall not be allowed. Buswork shall accommodate all future equipment as shown in the Breaker Schedule.
17. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.
18. All internal wire runs shall be identified with "TO - FROM" coded tags labeled with the code letters and/or numbers shown on the Schedule. 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 A193 Type 304 or Type 316 stainless steel.
20. A 1% tolerance is allowed for all dimensions.
21. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.
22. Install conduit couplings on all conduits.
23. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or solder in place. See Standard Plan J-10.20 for alternate door hinge details.
24. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded steel mesh with 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

1. Metering arrangements may vary with different serving utilities. The Contractor shall verify the requirements of the utility prior to installing the service equipment.

2. All service pole conduits shall be secured to the pole with two-hole conduit straps spaced at 5 (5) maximum centers. See Standard Plans J-60.13 and J-60.14 for steel channel support and mounting details. Where required by the utility, an alternative-use hot-dip galvanized standoff bracket may be used. See Standard Plan J-10.16 for ALTERNATE STANDOFF BRACKET DETAIL.

3. All risers and service equipment shall be installed on side of pole that is away from traffic.

4. Where required by the serving utility, service breakers shall be installed above meter socket in a separate rain-tight enclosure.

5. See Standard Plan J-60.05 for grounding details.

6. See Breaker Schedule in Contract for breaker and contactor sizes.


EFFECTIVE: September 3, 2019 TO September 29, 2020

Model: 90-50 AMP TYPE 240/480 VOLT SINGLE PHASE
STANDARD PLAN J-10.16-00

SERVICE CABINET TYPE C

Type: 240/480 Volt

Sheets 1 of 2

Approved for Publication
March 1, 2015

Washington State Department of Transportation

DRAWN BY: Colby Fletcher

EFFECTIVE: September 3, 2019 TO September 29, 2020
EFFECTIVE: September 3, 2019 TO September 29, 2020

**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.

**ELEVATION VIEW**

**SIDE VIEW**

**PLAN VIEW**

**SERVICE CABINET TYPE B**

**MODIFIED (0 - 200 AMP TYPE)**

**120/240 SINGLE PHASE**

**STANDARD PLAN J-10.20-02**

Sheet 5 of 5 Sheets

**APPROVED FOR PUBLICATION**

EFFECTIVE: September 3, 2019 TO September 29, 2020

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**EFFECTIVE: September 3, 2019 TO September 29, 2020**

**EFFECTIVE: September 3, 2019 TO September 29, 2020**

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**EFFECTIVE: September 3, 2019 TO September 29, 2020**

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NOTE: DIMENSIONS NOT SHOWN SHALL BE IN ACCORDANCE WITH THE TEES

NOTES

1. Cabinet construction shall meet the requirements of Standard Specification Section 9-29.13(10). Aluminum cabinets shall have mill finish.

2. Cabinet construction shall conform to the requirements of Chapter 6, Section 2, of the California Department of Transportation (CalTrans) Transportation Electrical Equipment Specifications (TEES) as currently published, including all errata, with modifications as described in Standard Specification Section 9-29.13(10).

3. The Housing and Cage numbers refer to the designations shown in the TEES Cabinet Housing #2 (ALT) and Cage #2 (ALT) are modified versions of Cabinet Housing #2 and Cage #2, respectively, using the shorter vertical dimensions shown. All other dimensions and features are the same.

4. Housing #1B shall always use Cage #1. Housing #2 shall always use Cage #2. Housing #2 (ALT) shall always use Cage #2 (ALT).

5. Cage mounting points are designated by rack units (U), which are numbered starting from the bottom of the cage.

6. Install the following in PANEL A location for the applicable cabinet type:
   - Type 331L and 334L Cabinets: Do not install PANEL A.
   - Type 332L Cabinets: Install Generator Transfer Switch.

7. Install the following in PANEL B location for the applicable cabinet type:
   - Type 331L Cabinets: Install Generator Transfer Switch when specified in the contract.
   - Type 332L and 334L Cabinets: Install Police Panel.

8. All cabinet locks shall accept B-Line or 7-line 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
NOTES

1. Cabinet construction shall meet the requirements of Standard Specification Section 9-29.13(10). Aluminum cabinets shall have mill finish.

2. Cabinet construction shall conform to the requirements of Chapter 6, Section 2, of the California Department of Transportation (CalTrans) Transportation Electrical Equipment Specifications (TEES) as currently published, including all errata, with modifications as described in Standard Specification Section 9-29.13(10).

3. The Housing and Cage numbers refer to the designations shown in the TEES. Cabinet Housing #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: Location for the applicable cabinet type:
   - Type 331D and 3340 Cabinets: Do not install PANEL A.
   - Type 332D Cabinets: Install Generator Transfer Switch.

7. Install the following in PANEL B location for the applicable cabinet type:
   - Type 331D Cabinets: Install Generator Transfer Switch when specified in the contract.
   - Type 332D and 3340 Cabinets: Install Police Panel.

8. All cabinet locks shall accept flat 6-pin or 7-pin cores, with the exception of the Police Panel. The Police Panel shall use a standard Police Panel Lock and Keys.

9. Cage side supports for Cabinet Housing #1X shall be as shown in the TEES for Cabinet Housing #1B. Cage upper and lower center supports shall be as shown here, and installed in the same manner as shown in the TEES for the Cabinet Housing #3 center cage supports.
NOTES
2. Where shown in the plans, install plate (R10-32P) “PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME” above the Accessible Pedestrian Signal (APS) assembly. Add 14” (in) to post height to accommodate plaque and leave a 2” (in) space between signs.
4. Junction Box serving the Standard shall preferably be located 5’ - 0” (10’ - 0’ Max.) from the Standard.
5. Two button installation may require adaptor(s).

ACCESSIBLE PEDESTRIAN SIGNAL (APS) ASSEMBLY

ANCHOR BOLT TEMPLATE ASSEMBLY
ANCHOR BOLT TEMPLATE - TWO REQUIRED
12” (in) x 18” (in) FULL THREAD ANCHOR BOLT - FOUR (4) REQUIRED PER ASSEMBLY
1/2” (in) DIAMETER STEEL - HEAVY HEX NUT - FOUR REQUIRED PER ANCHOR BOLT
FLAT WASHERS - FOUR REQUIRED PER ANCHOR BOLT

COMMERCIAL CONCRETE

ELEVATION

FOUNDATION DETAIL

PERSPECTIVE VIEW
EFFECTIVE: September 3, 2019 TO September 29, 2020

2. Where shown in plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (H) to the PPS post height to accommodate plaque and leave a 2" (H) space between signs.
4. Junction Box serving the Standard shall preferably be located 5' - 0" (1500 - 0 Max.) from the Standard.
5. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete; Provide 3' - 0" min, slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
6. Two button installation may require adaptor(s).
PEDESTRIAN SIGNAL STANDARD (TYPE PS)

NOTE

2. Steel shaft shall be tapered either round or dodecagon (12-sided), 11 gage, 4 1/2" (in) O.D. at slipfitter weld. Taper shall be 0.14" (in) per foot.
3. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.
6. Hand holes shall include a removable, rain-tight cover and gasket, fastened with two stainless steel screws (ASTM 563).
7. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete. Provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
8. The junction box serving the standard shall preferably be located 5'-0" (15' - 0" max.) from the standard.
9. Where shown in the plans, install plaque (R10 - 32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" two inches above the Accessible Pedestrian Signal (APS) Assembly.

PEDESTRIAN SIGNAL HEAD WITH TYPE D MOUNT

GROUNDING CONNECTION - SEE DETAIL

EQUIPMENT GROUNDING CONDUCTOR

SUPPLEMENTAL GROUNDING CONDUCTOR (SEE NOTE 8)

STAINLESS STEEL HEX NUT

1/4" (IN) STAINLESS STEEL WASHERS (TYP.)

1/4" (IN) DIAMETER + 1 1/4" (IN) LONG STAINLESS STEEL STUD

FULL CIRCLE CRIMP-ON CONNECTOR (TYP.)

SUPPLEMENTAL GROUNDING CONDUCTOR

GROUNDING CONNECTION DETAIL

NOTE

1/4" WEEP HOLE

FOR SIGNAL MOUNTING
DETAILS; SEE STANDARD
PLAN J-20.16

IMSA 20-1 5C #14 CABLE

IMSA 20-1 7C OR 5C #14 CABLE -
TO SIGNAL DISPLAY (SEE CONTRACT
PLANS FOR WIRE SIZE AND QUANTITIES)

STAINLESS STEEL WASHERS (TYP.)
FULL CIRCLE CRIMP-ON
CONNECTOR (TYP.)

STAINLESS STEEL NUT
GROUNDING CONDUCTOR - SEE NOTE 5

1/4" DIAMETER X 1" LONG
STAINLESS STEEL STUD

3/8" DRAIN TUBE

STEEL REINFORCING
BAR (TYP.)

CONDUIT COUPLING -
INSTALL FLUSH WITH TOP OF FOUNDATION
(DO NOT GLUE PVC STUBOUT)

CONDUCT COUPLING - INSTALL
FLUSH WITH TOP OF FOUNDATION
(DO NOT GLUE PVC STUBOUT)

EQUIPMENT GROUNDING
CONDUCTOR - SEE NOTE 5

LEVELING NUT (TYP.)

GROUNDING CONNECTION
DETAIL
CONFIGURATIONS VARY AMONG
DIFFERENT MANUFACTURERS
(SHOWED EXPLODED FOR CLARITY)

FOUNDATION WIRING DETAIL

PEDESTRIAN SIGNAL WIRING DETAIL
(TYPE D MOUNTING ShOWN)

ACCESSIBLE PEDESTRIAN
PUSHBUTTON WIRING DETAIL

IMSA 20-1 7C OR 5C #14 CABLE -
TO SIGNAL DISPLAY (SEE CONTRACT
PLANS FOR WIRE SIZE AND QUANTITIES)

2C (SH) CONDUCTOR -
FROM CONTROLLER

INSULINER SLEEVE

HAND HOLE

EQUIPMENT GROUNDING
CONDUCTOR - SEE NOTE 5

LEVELING NUT (TYP.)

GROUNDING CONNECTION

STAINLESS STEEL WASHERS (TYP.)

1/4" DIAMETER X 1" LONG
STAINLESS STEEL STUD

2C (SH) CONDUCTOR - TO
PUSHBUTTON (SEE CONTRACT
PLANS FOR WIRE SIZE AND QUANTITIES)

POLE WALL

STAINLESS STEEL NUT

SUPPLEMENTAL GROUNDING
CONDUCTOR - SEE NOTE 4

EQUIPMENT GROUNDING
CONDUCTOR - SEE NOTE 5

GROUNDING CONNECTION

DETAIL
CONFIGURATIONS VARY AMONG
DIFFERENT MANUFACTURERS
(SHOWED EXPLODED FOR CLARITY)

IMSA 20-1 7C OR 5C #14 CABLE -
TO SIGNAL DISPLAY (SEE CONTRACT
PLANS FOR WIRE SIZE AND QUANTITIES)

IMSA 20-1 3C #14 CABLE

ACCESSIBLE PEDESTRIAN
PUSHBUTTON WIRING DETAIL

1/4" WEEP HOLE

SLIPFITTER - OFFSET TOP MOUNT,
PLACE OFFSET TO FRONT OF POLE,
DRILL TO SEAT SET SCREWS

IMSA 20-1 SC
#14 CABLE

#14 CABLE

PEDESTRIAN SIGNAL WIRING DETAIL
(TYPE C MOUNTING ShOWN)

IMPORTANT:

2. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Install heat shrink caps on all spare conductors not terminated on a terminal strip.
4. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete; provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with manufacturer’s recommended crimper).
5. Equipment grounding conductor shall attach to grounding stud with a full circle crimp-on connector (crimped with a manufacturer’s recommended crimper).

NOTES

5C PEDESTRIAN HEAD TERMINATIONS

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<td>WALK DISPLAY</td>
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5C ASSOCIATED PHASE NUMBER

7C PEDESTRIAN HEAD TERMINATIONS

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7C ASSOCIATED PHASE NUMBER

EFFECTIVE: September 3, 2019 TO September 29, 2020
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

ACCESSIBLE PEDESTRIAN SIGNAL (ASP) ASSEMBLY
WOOD POLE INSTALLATION
ALTERNATIVE 2
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER STRAIN POLE)

WOOD POLE INSTALLATION
ALTERNATIVE 3
PPB-W
(ACCESSIBLE PEDESTRIAN PUSHBUTTON - TEMPORARY TIMBER POLE)

PRE-DRILL (3) 1/4" WEEP HOLES IN BOTTOM RADIUS OF CONDUIT
DRIP LOOP - REAM HOLES WITH DRILL BIT TO ELIMINATE BURRS

KEY
1 FACE PLATE
2 1/4-20 x 3/8" LONG STAINLESS STEEL SCREW
3 1/4-20 STAINLESS STEEL SCREWS
4 PUSHBUTTON FRAME ADAPTER
5 LAG BOLT WITH WASHER
6 PUSHBUTTON STATION
7 CONDUIT DIAMETER + 1/8" HOLE THRU POLE
8 CONDUIT
9 3/4" CONDUIT
10 LIQUID TITE FLEX CONDUIT
11 ONE PIECE TWO HOLE CLAMP
12 LAG BOLT
13 INSUL SneEVE

COUNTERBORE = DIAMETER TO FIT CONDUIT

ACCESSIBLE PEDESTRIAN PUSHBUTTON (PPB) DETAILS
STANDARD PLAN J-20.26-01
SHEET 5 OF 2 SHEETS

EFFECTIVE: September 3, 2019 TO September 29, 2020

APPROVED FOR PUBLICATION
STATE DESIGN BUREAU
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

7/10/2012

STATE DESIGN BUREAU
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
**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 polar grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper after state inspection, burr threads to prevent nut rotation. **DO NOT OVERTIGHTEN.**

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-29.70.

6. Keeper Plate shall not extend beyond the edges of the pole base plate.
**NOTES**


2. Steel shaft shall be tapered either round or dodecagonal (12 sided), 11 gauge, 4 1/2" O.D. at slipfitter. Taper shall be 0.14 inches per foot.

3. All poles shall be hot dip galvanized per AASHTO M111.

4. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.


6. Pedestrian signal displays mounted on the side of an octagonal (8 sided) traffic signal pole with a pole attachment angle other than 0°, 45°, 90°, 135°, 160°, 225°, 270°, or 315° shall utilize:
   - Type A mounting when two pedestrian heads are installed on the same signal pole.
   - Type B mounting when only one pedestrian signal head is mounted on a signal pole.

7. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
8" POLYCARBONATE - FULL CIRCLE VISOR (SEE NOTE 5)

SLIPFITIER - OFFSET TOP MOUNT PLACE OFFSET TO BACK OF POLE

1 1/2" DIAM.

SERRATED OR FLANGED ELBOW

CONDUIT LOCKNUT = 1 1/2" DIAM

HEX LOCKNUT - ALLEN HEAD STAINLESS STEEL SET SCREWS, (2 REQ'D)

PIN RECEPTACLES

SERRATED RING WITH PINS

PLACE BEAD OF SILICONE ON TOP OF SERRATED AREA

FLASHING WARNING BEACON

NEOPRENE GASKET

STEEL WASHER

HEX LOCKNUT = 1 1/2" DIAM

CONDUIT LOCKNUT = 1 1/2" DIAM

ORNAMENTAL CAP WITH 2-WAY FLASHER

NEOPRENE GASKET AND LOCKNUT

MOUNTING BRACKET AND STEEL STRAP (TYP.) - SEE STANDARD PLAN G-24.10

SIGN BRACE - SEE STANDARD PLAN G-50.10

TAPERED STEEL SHAFT

TOP OF POLE

1 1/2" DIAM.

ALTERNATING FLASHING BEACON DETAIL (SHOWN WITHOUT HINGE DOOR FOR CLARITY)

1/4" WEEP HOLE

DETAIL B

ALTERNATING FLASHING BEACON DETAIL

TOP OF POLE

1 1/2" DIAM.

FLASHING BEACON TYPE 1

SLIP BASE SHOWN

OR MATCHLINE FOR RAMP METER WITH SINGLE FLASHING BEACON MATCHLINE FROM THE STANDARD

TOP OF POL E SIGN PANEL

TOP OF FOUNDATION

SERRATED RING - NO PINS

USE DETAILS BELOW MATCHLINE ON RAMP METER WITH SINGLE FLASHING BEACON

REAMED TEE WITH SET SCREW

SPRINT)

TOP OF POLE

1/4" WEEP HOLE

DETAIL A

SINGLE FLASHING BEACON DETAIL

1/2" DIAM.

TOP OF POLE

1 1/2" DIAM.

3/5 OD x 1/2" (TYP.)

TOP OF POLE

3/5 OD x 1/2" (TYP.)

MATCHLINE

FLASHING BEACON TYPE 1 SIGNAL STANDARD DETAILS

STANDARD PLAN J-21.16-01

SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

NOTES


2. All poles shall be hot dip galvanized per AASHTO M111.

3. Welding of structures shall be in accordance with the latest edition of the AWS D1.1 Structural Welding Code - Steel. All butt welds shall be ground flush with base metal.

4. Visor shall be 8" Polycarbonate, fully enclosed circle at bottom to reduce glare on sign. Display shall be of appropriate color needed.


6. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
FITTING HARDWARE - SEE ALTERNATING FLASHING BEACON DETAIL ON STANDARD PLAN J-21.16

NOTES

1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to vertical steel reinforcing bar with listed connector suitable for use embedded in concrete.
5. Provide Cable Tie at wiring entering the Junction Box (for Slip Base installations only) - See Detail A, Standard Plan J-28.70.

COLOR USE CODE

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>B</td>
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<tr>
<td>W</td>
<td>NEUTRAL</td>
</tr>
<tr>
<td>R</td>
<td>FLASHER 1</td>
</tr>
<tr>
<td>Bu</td>
<td>FLASHER 2</td>
</tr>
</tbody>
</table>

TERMINAL BLOCK (TYP.)

B&W CABLE - FROM FOUNDATION WIRING

2C (SH) B&W CABLE - TO FLASHING BEACON

GROUNDING STUD WITH NUT - SEE STANDARD PLAN J-30.28 FOR GROUND CONNECTION DETAILS

EQUIPMENT GROUNDING CONDUCTOR LEVELING NUT (TYP.)

STEEL REINFORCING BAR (TYP.)

INSTALL UNFUSED QUICK DISCONNECT FOR W CONDUCTOR, AND FUSED FOR B CONDUCTOR - PULL DOWN TIGHT TO CONDUIT

CONDUIT COUPLING - INSTALL FLUSH WITH TOP OF FOUNDATION (DO NOT GLUE PVC STUBOUT)

1" DIAMETER ELECTRICAL CONDUIT

2C (SH) B&W CABLE - FROM FOUNDATION WIRING

GROUNDING STUD WITH NUT - SEE NOTE 3

CLAMP CONDUCTOR TO STEEL REINFORCING WITH USTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE

POLE

HAND HOLE

SUPPLEMENTAL GROUNDING CONDUCTOR - SEE NOTE 3

INSTALL SIZE REDUCING WASHER AND CONNECTOR TO SECURE CONDUCTORS AT TOP OF POLE

DETAIL A

FLASHING BEACON WIRING

ALTERNATING FLASH WIRING SHOWN

DETAIL B

FLASHING BEACON WIRING

SINGLE FLASH WIRING SHOWN

DETAIL C

FOUNDATION WIRING

FIXED BASE SHOWN

FLASHING BEACON TYPE 1 SIGNAL STANDARD ELECTRICAL DETAILS

STANDARD PLAN J-21.17-01 SHEET 1 OF 1 SHEET

EFFECTIVE: September 3, 2019 TO September 29, 2020

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR REPRODUCTION 09/13

PpoctScott 09/13

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES
1. See Standard Specification 9-29.3 for Cable Conductor requirements.
3. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper, provide 3'-0" min. slack. Clamp to steel reinforcing bar with connector suitable for use embedded in concrete.
4. Heat shrink cap all spare conductors not terminated on a terminal strip.
5. When a Pedestrian Push Button is specified in contract plans, see Standard Plan J-20.20 for details.
6. Provide Cable Tie at wiring entering the Junction Box (for slip base installations only) - See Detail A, Standard Plan J-28.70.
EFFECTIVE: September 3, 2019 TO September 29, 2020

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).

COLOR CODE

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<tr>
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<td>O</td>
<td>AMBER DISPLAY</td>
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<td>G</td>
<td>GREEN DISPLAY</td>
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<tr>
<td>W</td>
<td>NEUTRAL CONDUCTOR</td>
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<tr>
<td>B</td>
<td>SPARE CONDUCTOR</td>
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RAMP METER SIGNAL STANDARD ELECTRICAL DETAILS

STANDARD PLAN J-22.16-0

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

July 15, 2015 5:08 PM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

PERSPECTIVE VIEW RAM METER

SUPPLEMENTAL GROUNDING CONDUCTOR

LEVELING NUT (TOP)  (SEE NOTE 3)

GROUNDING STUD WITH NUT  (SEE STANDARD PLAN J-23.20 FOR GROUND CONNECTION DETAILS)

SPARE WIRE (TOP)  (HEAT-SHRINK CAPPED CABLE TIE TO IMSA 20-1 SC #14 CABLE  SEE NOTE 4)

EQUIPMENT GROUNDING CONDUCTOR
**FOUNDATION DEPTH “D” TABLE**

<table>
<thead>
<tr>
<th>ALTERNATE # 1 DRILLED SHAFT-TYPE CONSTRUCTION</th>
<th>ALTERNATE # 2 CORRUGATED METAL PIPE TYPE CONSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FOR LATERAL BEARING PRESSURE = 2500 PSF &amp; Ø = 34&quot;, 1500 PSF &amp; Ø = 28&quot;, 1000 PSF &amp; Ø = 26&quot;</strong></td>
<td><strong>FOR LATERAL BEARING PRESSURE = 2500 PSF &amp; Ø = 23&quot;, 1500 PSF &amp; Ø = 18&quot;, 1000 PSF &amp; Ø = 17&quot;</strong></td>
</tr>
<tr>
<td><strong>GROUND SLOPE = 3H: 1V OR FLATTER</strong></td>
<td><strong>GROUND SLOPE = GREATER THAN 3H: 1V TO 2H: 1V</strong></td>
</tr>
<tr>
<td><strong>ALLOWABLE LATERAL BEARING PRESSURE</strong></td>
<td><strong>ALLOWABLE LATERAL BEARING PRESSURE</strong></td>
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<td><strong>FOUNDATION TYPE</strong></td>
<td><strong>FOUNDATION TYPE</strong></td>
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<tr>
<td>700</td>
<td>900</td>
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<tr>
<td>1000 PSF</td>
<td>3&quot; ROUND</td>
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<tr>
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<tr>
<td>2500 PSF OR GREATER</td>
<td>3&quot; ROUND</td>
</tr>
<tr>
<td>3&quot; ROUND</td>
<td>11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot; 11&quot; 0&quot;</td>
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<tr>
<td>4&quot; ROUND</td>
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</tr>
</tbody>
</table>

**NOTES**

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signs. Basic wind velocity is 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.

2. Foundations are designed for Type II, III, and 5D Signal Standards with a maximum mast arm length of 65 feet.

3. Foundations are designed for Single Mast Arm Standards and Double Mast Arm Standards with 90° between arms. Special foundation design is required for Double Arm Standards where the angle between mast arms is other than 90°. For Double Mast Arm Standards with 90° between arms, use larger XYZ value for foundation depth selection.

4. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office through the Engineer for Special Foundation Designs.

5. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.

6. The top 2 feet of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.

7. For design parameters between the values listed in Table, depth requirements may be interpolated between the values provided.


**ALTERNATE #2 - CONSTRUCTION METHOD METAL (SUBSURFACE) FORM REQUIRED**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 30" or 48" diameter corrugated metal (pipe) form. The top of the corrugated metal form shall terminate 1 foot below final grade. Continue forming to full height using paper or cardboard form to achieve a smooth finish in final exposed cement concrete. Support the form as necessary to remain plumb.

Place the concrete foundation. After concrete has cured, remove the entire paper or cardboard form portion.

(Shoring or Extra Excavation as required. Excavated area shall be backfilled with Controlled-Density Fill (CDF), or with soil in accordance with Standard Specification Section 8-20.3(2) and Compaction Method 1 of Standard Specification Section 2-03.1(E)).

**TRAFFIC SIGNAL STANDARDS FOUNDATION STANDARD PLAN J-26.10-0**

**SHEET 1 OF 1 SHEET**

APPROVED FOR PUBLICATION
Corridor JFF
11/29/04 1:27 AM

Washington State Department of Transportation

Jul 26 2016 8:25 AM

Zielinski, Rich
3/8" PREMOLDED JOINT FILLER

SEE TYPICAL SECTION FOR REINFORCEMENT

TOP OF FOUNDATION LEVEL WITH GRADE

NOT STEEPER THAN 1.5H : 1V

SLOPE TO DRAIN AWAY FROM THE FOUNDATION
SLOPE NOT STEEPER THAN 5%

EXISTING GRADE OR FILL SLOPE = FLAT TO 10H : 1V

CASE A

SECTION A

PLAN

ELEVATION

EXISTING GRADE OR FILL SLOPE = 3H : 1V TO 2H : 1V

CASE C

SIGNAL STANDARD FOUNDATION – SEE STANDARD PLAN J-26.10

NOT STEEPER THAN 2H : 1V

SLOPE TO DRAIN AWAY FROM THE FOUNDATION
SLOPE NOT STEEPER THAN 5%

PLAN

ELEVATION
NOTE

* * * applies to the side of the foundation when pedestrian push button is to be installed.

APPLICATION OF GROUT EVEN WITH THE BOTTOM OF THE ANCHOR PLATE AFTER PLUMBING THE STANDARD

SHORT (ROUTE CONDUCTOR TO GROUNDING STUD)

GROUNDING CONDUCTOR NON-INSULATED

AWG #4 STRANDED COPPER - PROVIDE 3 MIN.

SLACK (ROUTE CONDUCTOR TO GROUNDING STUD)

FOUNDATION OUTSIDE THE SIDEWALK SECTION

10 GAUGE STAINLESS STEEL TAG RECESS FLUSH WITH TOP OF FINISHED FOUNDATION

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP

FOUNDATION PARTIALLY WITHIN SIDEWALK SECTION

APPLICATION OF GROUT EVEN WITH THE BOTTOM OF THE ANCHOR PLATE AFTER PLUMBING THE STANDARD

SHORT (ROUTE CONDUCTOR TO GROUNDING STUD)

GROUNDING CONDUCTOR NON-INSULATED

AWG #4 STRANDED COPPER - PROVIDE 3 MIN.

SLACK (ROUTE CONDUCTOR TO GROUNDING STUD)

FOUNDATION WITHIN SIDEWALK OR TRAFFIC ISLAND SECTION

10 GAUGE STAINLESS STEEL TAG RECESS FLUSH WITH TOP OF FINISHED FOUNDATION

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP

FOUNDATION OUTSIDE THE SIDEWALK SECTION

10 GAUGE STAINLESS STEEL TAG RECESS FLUSH WITH TOP OF FINISHED FOUNDATION

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP

FOUNDATION PARTIALLY WITHIN SIDEWALK SECTION

APPLICATION OF GROUT EVEN WITH THE BOTTOM OF THE ANCHOR PLATE AFTER PLUMBING THE STANDARD

SHORT (ROUTE CONDUCTOR TO GROUNDING STUD)

GROUNDING CONDUCTOR NON-INSULATED

AWG #4 STRANDED COPPER - PROVIDE 3 MIN.

SLACK (ROUTE CONDUCTOR TO GROUNDING STUD)

FOUNDATION WITHIN SIDEWALK OR TRAFFIC ISLAND SECTION

10 GAUGE STAINLESS STEEL TAG RECESS FLUSH WITH TOP OF FINISHED FOUNDATION

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP

SIGNAL FOUNDATION IDENTIFICATION TAG DETAIL

TEXT SHALL BE ENGRAVED 0.014" DEEP
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 year design life.

3. Adaptors' parameters are based on field data and existing signal standard anchor bolts and bolt circles. Adaptor 1 shall be used for 15" (ft) thru 45" (ft) mast arm signal standards and Adaptor 2 for 46" (ft) thru 65" (ft).

4. Adaptors shall only be used for temporary installation of knocked down signal standards.

5. Materials specifications:
   - All structural steel, except as otherwise noted
   - Pipes: ASTM A586
   - Connecting/clamping bolts: ASTM A325
   - Nuts: ASTM F683 GRADE DH
   - Washers: AASHTO M 293 (ASTM F436)

6. All bolts, rods, and related hardware shall be galvanized after fabrication per ASTM F2329.

7. Steel surfaces shall be galvanized after fabrication in accordance with AASHTO M 111.

8. Install and secure adaptor to existing support anchor bolts. Then install signal standard on adaptor top plate. Rake to be plumb after all load has been placed.

9. All holes in top and bottom plates of Adaptor 1 and Adaptor 2 are thru holes. See engraved or stamped text for bolt hole diameter.

10. ENGRAVED FONT (TYP):
    - Font shall be engraved or stumped 0.02" (mm) deep.
### Alternate #1 Drilled Shaft-Type Construction - Depth "D"

**For Lateral Bearing Pressure = 2500 PSF & Ø = 23", 1500 PSF & Ø = 28", 1000 PSF & Ø = 26"**

<table>
<thead>
<tr>
<th>Ground Slope</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:1 1V or Flatter</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td></td>
</tr>
<tr>
<td>4:1 1V to 2:1 1V</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td></td>
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</tbody>
</table>

### Alternate #2 Corrugated Metal Pipe Type Construction - Depth "D"

**For Lateral Bearing Pressure = 2500 PSF & Ø = 23", 1500 PSF & Ø = 28", 1000 PSF & Ø = 26"**

<table>
<thead>
<tr>
<th>Ground Slope</th>
<th>Pole Class</th>
<th>Resultant Horizontal Tension (LBS)</th>
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</thead>
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<td>1900 2700 3700 4800 5600 6300 7200</td>
<td></td>
</tr>
<tr>
<td>4:1 1V to 2:1 1V</td>
<td>1900 2700 3700 4800 5600 6300 7200</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:***
1. This structure has been designed according to the Fifth Edition 2009 AASHO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals. Basic wind velocity 60 mph. Design Life/Recurrence Interval 50 years, and Fatigue Category III.
2. Foundations are designed for Type IV and V Strain Pole Standards with a maximum mast arm length of 16' - 2".
3. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office for design and special foundation requirements.
4. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.
5. The top 2 feet of the foundation shall produce a smooth form finish (such as paper or cardboard). After the concrete has cured, this form shall be removed.
### STRAIN POLE DIMENSION CHART

<table>
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<tr>
<th>KEY</th>
<th>ITEM</th>
<th>POLE CLASS (Resultant Horizontal Tension)</th>
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<tr>
<td></td>
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<td>3000 LB</td>
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<tr>
<td>A</td>
<td>BASE PLATE</td>
<td>15&quot;</td>
</tr>
<tr>
<td>B</td>
<td>ANCHOR BOLT CIRCLE DAM.</td>
<td>15&quot;</td>
</tr>
<tr>
<td>C</td>
<td>POLE BASE DIAMETER</td>
<td>11&quot;</td>
</tr>
<tr>
<td>D</td>
<td>BASE PLATE THICKNESS</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>E</td>
<td>ANCHOR BOLT DIAMETTER</td>
<td>1 1/4&quot;</td>
</tr>
</tbody>
</table>

* Minimum required dimension - contractor may revise with engineer approval.

### NOTES

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals: Basic wind velocity 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.
2. 2 1/2" diameter weatherhead may be substituted for the elbow and nipple assembly.
3. Pole shaft shall have 0.14" for paper.
5. Hand holes may be 6" x 4", oval or rectangle. Provide a "J" or "C" hook at 90° or 180° off upper hand hole.
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 Luminaires Pole shall not exceed 50’ (#H1)

3. Slip Bases shall not be installed on 50’ (#H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaires head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaires head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

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

EDGE OF SHOULDER VARIES WITH OFFSET DISTANCE (3.0' MIN.)

SLOPE ROUNDDING

FILL MATERIAL

STEEL LIGHT STANDARD FOUNDATION

CASE A

HAND HOLE

SLIP BASE

NOT STEEPER THAN 10H:1V SLOPE

NOT STEEPER THAN 1.5H:1V

SLOPE 3H:1V THRU 2H:1V

EMBANKMENTS

SLOPES FLATTER THAN 3H:1V

STEEL LIGHT STANDARD FOUNDATION

CASE B

HAND HOLE

SLIP BASE

NOT STEEPER THAN 10H:1V SLOPE

SLOPE FLATTER THAN 3H:1V

FILL MATERIAL

CASED

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

FILL MATERIAL

STEEL LIGHT STANDARD FOUNDATION

CASE C

FORE SLOPES 4H:1V OR FLATTER

STEEL LIGHT STANDARD FOUNDATION

CASE D

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

DITCH SECTIONS

STEEL LIGHT STANDARD PLACEMENT (SLIP BASE)

STANDARD PLAN J-28.22-00

EXPIRES AUGUST 3, 2021
CASE I
POSTED SPEED LIMIT LESS THAN 35 MPH

CASE J
POSTED SPEED LIMIT LESS THAN 35 MPH

CASE K
ROADWAYS WITH 10H:1V OR FLATTER SIDE SLOPES

CASE L
PARKING LOTS

NOTES
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 bolts. Eighteen heavy duty hex nuts and six round washers are required for a slip base assembly. Eighteen heavy duty hex nuts 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. Steeper than 2H:1V shall require a special design.

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 Luminaire Pole height shall not exceed 50' (ft). (H1)

6. Slip bases shall not be installed on 30' (ft) 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 duty hex bolts 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 8-2034.

**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 concrete. Support the form as necessary to remain plumb.


Place the concrete foundation. After concrete has cured, remove the paper or cardboard form portion. Construct the embankment widening (if required).

**METHOD 2**

**METAL (SUBSURFACE) FORM REQUIRED**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal (pipe) form. The corrugated metal form shall not extend more than 6" (in) +/- 1" (in) below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation. After concrete has cured, remove the paper or cardboard form portion. Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2). Construct the embankment widening (if required).
1. 50' (t) (H) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.

2. Galvanizing shall be in accordance with AASHTO M 111.

3. See Standard Plans C-6, C-65.15, and J-28.30 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.

4. See Standard Specification Sections 6-03.3(33) and 8-20.3 (4) for the torque requirements for all of the anchor bolt installations. Install 1" (in) diameter clamping bolts in all slip bases to a torque of 95 Foot-Pounds - See Standard Specification Section 8-20.3 (13)A. DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.

1. 50' (H1) poles with double mast arms or poles weighing in excess of 1000 lbs. shall not be installed on a slip base.

2. The Slip and Anchor Plates shall be manufactured from ASTM A572 GR.50 or ASTM A36. All Slip Plate notched surfaces shall be finished smooth.

3. The clamping bolts shall be high-strength steel, manufactured from AASHTO M 164, with heavy hex nut and hardener 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 resuing 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, burl threads to prevent nut rotation.
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'-0" OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.
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.
NOTES

1. These Foundations are designed for a minimum of 1,500 PSF allowable lateral bearing pressure for the soil. A Special Foundation shall be required for soil with allowable lateral bearing pressure lower than 1,500 PSF.

2. These Foundations are designed for installation on level ground, or on sloping ground, not to exceed 2H : 1V slopes. Slopes steeper than 2H : 1V require a special design.

3. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.

4. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office through the Engineer for Special Foundation Designs.

5. The top 2’ - 0” of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.

**DESIGN CRITERIA:**

This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Basic wind velocity is 90 MPH. Design Life/Recurrence Interval 50 years and Fatigue Category III.

**WIND VELOCITY:**

90 MPH

Maximum Pole Deflection shall not exceed 0.7” in 30 MPH and 1.4” in 70 MPH wind.

**LOAD CASE #1:**

Camera (1) - EPA = 4.00 sq. ft. @ 2’ - 0” above pole top, and:

   - Dish (1) - 1’ - 0” diameter @ pole top level.

**LOAD CASE #2:**

Camera (2) - EPA = 4.00 sq. ft. @ 2’ - 0” above pole top, and:

   - Camera (2) - EPA = 0.54 sq. ft. each @ 1’ - 0” and 2’ - 0” from pole top, and:

     - NEMA Cabinet (2) - EPA = 1.33 sq. ft. each @ 3’ - 8” from pole top, install both NEMA cabinets back to back, and:

     - Radio Equipment (2) - EPA = 2.25 sq. ft. each @ 2’ - 0” and 9’ - 0” from pole top.

EPA = Effective Projected Area

**ALTERNATE #2 - CONSTRUCTION METHOD**

1. Shoring or Extra Excavation as required. Excavated area shall be backfilled with Controlled-Density Fill (CDF), or with soil in accordance with Standard Specification Section 8-G.1 and Compaction Method 1 of Standard Specification Section 2-08.3(1).

2. **GROUNDING CONDUCTOR #4 AWG STRANDED COPPER WITH 3’ (1 FT) MIN. BLACK ROUTE CONDUCTOR TO CCTV TRAFFIC SIGNAL STANDARD (CAMERA POLE) GROUNDING STUD.**

3. **CLAMP CONDUCTOR TO STEEL REINFORCING WITH LOCKETTED CONNECTOR SUITABLE FOR USE EMBEDDED IN CONCRETE.**

4. SEE NOTE 3.
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.
**SECTION B**

4" (IN) THICK MAINTENANCE PAD IS SHOWN IN THIS VIEW – 12" (IN) THICK MAINTENANCE PAD DETAIL IS SIMILAR (REINFORCING, ANCHOR BOLTS, AND GUIDEPOSTS NOT SHOWN IN THIS VIEW FOR CLARITY)

**SECTION C**

CHAIN LINK FENCE NOT SHOWN FOR CLARITY

**SECTION D**

HIGH MAST LUMINARIA MAINTENANCE PAD

STANDARD PLAN J-30.10-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
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**

**KEY**

1. BONDING JUMPER
2. EQUIPMENT GROUNDING CONDUCTOR
3. BONDING JUMPER ATTACHED TO BOX WALL COUPLING NUT
4. BONDING JUMPER ATTACHED TO BOX LID(S) GROUND STUD. #8 AWG (MIN.) x 4" (FT) TINNED BRAIDED COPPER.

**FRAME BONDING DETAIL**

- Fillet weld and edge weld (typ.)
- Lid support - frame varies among manufacturers' (field vary)
- Bonding jumper - #8 minimum x 4" (ft) tinned braided copper (bond jumper to equipment grounding conductor)
- Stainless steel flat washer
- Stainless steel adjusting nuts

**BONDING JUMPER**

- To equipment grounding conductor with full circle connector
- Route lid bonding jumper to lid bonding stud with full circle connector
- Frame bonding stud ~ 1/4 NC x 1" Stainless Steel weld to frame bonding stud plate - liberally coat this assembly with anti-seize compound

**LID BONDING DETAIL**

- Stainless steel flat washer - fender
- Stainless steel nut = 2 each
- Attach to frame bonding bolt
- Bond tinned braided copper bonding jumper - #8 minimum
- 1/8" center to frame bonding stud location

**ELEVATION**

- BONDING JUMPER - FRAME TO EQUIPMENT BONDING CONDUCTOR
- Copper solderless crimp connector
- Lid to frame bonding jumper
- GRS
- PVC

**EXISTING JUNCTION BOX RETROFIT GROUNDING DETAILS**

STANDARD PLAN J-40.05-01

EFFECTIVE: September 3, 2019 TO September 29, 2020
LOCKING LID STANDARD DUTY JUNCTION BOX

NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. Minimum lid thicknesses are shown. Junction Boxes installed in sidewalks, walkways, and
shared-use paths shall have a slip-resistant coating on the lid and lid cover plate and shall be
installed with the surface flush with and matched to the grade of the sidewalk, walkway,
shared-use path. The non-slip lid shall be identified with permanent markings on the
underside, indicating the type of surface treatment (see Contract Documents for details) and the
year of manufacture. The permanent marking shall be 1/8" (in) line thickness formed with a
mild steel weld bead and shall be placed prior to hot-dip galvanizing.

3. Lid support members shall be 3/16" (in) min. thick steel C, L, or T shape, welded to the frame.
Exact configurations vary among manufacturers.

4. A 1/4-20 NC x 3/4" (in) S. S. ground stud shall be welded to the bottom of each lid; include (2) S. S. nuts and (2) S. S. flat washers.

5. The hinges shall allow the lids to open 180°.

6. Bolts and nuts shall be liberally coated with anti-seize compound.

7. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to the ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge socket with a 5/16-20 NC x 3/4" (in) S. S. bolt, (2) each S. S. nuts, and (2) each S. S. flat washers. Equipment Bonding Jumper shall be #8 AWG min. = 4’ (ft) of tinned braded copper.

8. The System Identification labels shall be 1/8" (in) line thickness formed by a mild steel weld bead. See Cover Marking detail.


11. Capacity ~ conduit diameter = 24" (in)

12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement; actual configurations of assembly will vary among manufacturers. See approved manufacturers’ shop drawing for specifics.

13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults and Pull Boxes shall not be placed
within the sidewalk, walkway, shared use path, traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.

14. Distance between the top of the conduit and the bottom of the Junction Box Lid shall be 6" (in) min. to 8" (in) max. for final grade of
new construction only. See Standard Specification 8-20.3(6). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" (in) min. to 10" (in) max. See Standard Specification 8-20.3(6).
NOTE
1. Install the Junction Box on the Timber Sign Post or the Steel Sign Support that is farthest from the roadway.

EFFECTIVE: September 3, 2019 TO September 29, 2020
VARIES - SEE CONTRACT

8" FLASHING BEACON (TYP.) - SEE NOTE 2

STAINLESS STEEL CONDUIT STRAP SUPPORT (TYP.)

SEAL TITE FLEX CONDUIT

STAINLESS STEEL 2 HOLE CONDUIT STRAPS

POST-MOUNTED (NEMA 3) J-BOX

STAINLESS STEEL STRAP (TYP.)

FLAS HING BEACON ATTACHMENT
(STEEL SIGN SUPPORT SHOWN)

SIGN PANEL

BREAKAWAY SIGN SUPPORT HINGE

SEAL TITE FLEX CONDUIT

STAINLESS STEEL 2 HOLE CONDUIT STRAP (TYP.)

8" FLASHING BEACON WITH CAP VISOR - SEE NOTE 2

1" CONDUIT

POST-MOUNTED (NEMA 3) J-BOX

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES
1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel welded seam construction. Finish shall be #4 for backbox and #2B for 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, stampping, or with a stainless steel weld bead. See Standard Specification 9-28.2(4) for details.

3. Conduit Capacity = 8" (4" per end).
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 9-29.2(4) for details.

3. Conduit capacity = 8" (4" per end).

4. Box shall include # 8 AWG (min.) x 1 ft. tinned, braided copper Bonding Juniper for bonding Box and Telescoping Top.

State of Washington
Department of Transportation
NOTES
1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel. Cover shall be constructed of ASTM A 36 steel with slip-resistant surfacing.

2. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box connection. Use an insulated grounding and bushing on the inside for Rigid Metal Conduit.

3. Equipment Bonding Jumper shall be #6 AWG (min.) x 3 feet minimum of stranded, braketed copper.

4. The System Identification letters shall be 1/8" (in.) thick formed by a milled steel weld bead. See Standard Specification, Section 9-29.2(4).

5. Junction Box shall be dimensioned as shown in the Contract if the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with NEC 314.28 using the 8 times multiplier for length and width dimension.
   - Maximum Height = Sidewalk Depth
   - Maximum Interior Length = 29" (in.)
   - Maximum Interior Width = 16" (in.)


7. Field drill 1/2" (in.) diameter hole for Drain Tube from the inside to the outside of Junction Box. One place, on the lowest side only. Seal with bead of silicone. See Standard Specification, Section 9-29.2(3). For drain tube roughing, see Standard Plan J-50.16.

8. Conduct capacity is 12" (in.) - 4" (in.) per side.

9. Conduits shall enter through the sides as shown. Conduits shall not enter through the bottom of Junction Box.

10. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.

WHITWORTH FLINT TOLMAN P.A.

NEMA 4X JUNCTION BOX IN SIDEWALK LOCATED ON STRUCTURE
STANDARD PLAN J-40.40-02

APPROVED FOR PUBLICATION SHEET 1 OF 1 SHEET

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

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EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES

1. Each wire shall be physically separated by at least 1/4" (in) so that sealing material can fill in between the wires; where heat shrink tubing is used for the outer splice enclosure, it shall meet one of the following requirements:
   a. Have separate ports for each conductor ("Y" or "X" shaped tubing). ~ or ~
   b. Have rubber electrical mastic tape wrapped around each conductor to ensure a weather-proof seal. See Rubber Electrical Mastic Tape Installation Detail.

2. Heat shrink tubing shall extend a minimum of one inch onto the original wire insulation of each wire in the splice. Rigid splice enclosures shall be centered over the crimped connection(s).

3. Electrical tape used in splicing applications shall be 3/4" (in) wide, be UL listed under UL S10, and be CSA certified under C22.2 No. 197-M1993.

4. No more than two splices may be installed in the same splice enclosure.

5. Crimp splices shall be installed with an approved crimping tool for the type and size of crimp splice used. Pliers and similar multi-purpose tools may not be used.

STANDARD PLAN J-50.05-00

LOOP SPlice DETAILS

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES

1. For Installation Notes and Details see Standard Plan J-50.15.


3. For wiring details, see Standard Plan J-50.18.
NOTES

1. For an odd number of lanes, the higher number of loops shall be cut to the right side of the roadway (example: 1 left and 2 right), unless the left-most lane is an HOV lane. In which case the higher number of loops shall be cut to the left side of the roadway.

2. Square loops may be used in place of round loops - see Standard Plan J-50.11 for square saw cut details.

3. For installation details see Standard Plan J-50.15.

4. For Sections A, B, C or D, see Standard Plan J-50.15.
LOOP INSTALLATION NOTES

1. Install the Junction Box and the stub-out conduit with Sch. 80 PVC stub-out sleeve. Conduit for the loop stub-out shall be as required in the conduit size table shown on sheet 1 of this set.

2. Lay out loops and loop lead-ins to miss cracks/joints in road, when possible. Maintain 18" (in) minimum clearance from manholes and valve boxes.

3. The opening around the loop stub shall be patched with matching paving material if opened larger than PVC sleeve + 2" (in).

4. Sawcut the loop slots and the lead-in slots. Washi and 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’ (ft) minimum slack.

6. Install the wire in the loop slot as shown.

7. Finish laying out the wire at the Junction Box and identify the leads with the loop number, the “S” for start and the “F” for 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/sawcunts.

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 8-20.3(14) once installation is complete.

12. Existing stub-out shall be upgraded as necessary to conform to the conduit size table shown on sheet 1.

13. All loop lead-in sawcuts parallel to lane edge shall be at least 12" (in) from edge of pavement and within six inches outside of lane or fog line when possible. Maintain 12” (in) separation between parallel cuts or joints.

14. The loop stub-out sleeve shall have an inside diameter 1” (in) larger than the outside diameter of the End Bell Bushing. Sleeve shall be notched 5/8” (in) to 3/4” (in) to accommodate loop wires. Plug conduit and fill sleeve with sand until loops are installed to keep out Hot Asphalt during paving operations.
**NOTES**

1. Installation of signal detection loops in the bridge deck shall be cast-in-place and installation by saw cutting an existing bridge deck shall not be allowed. This plan is intended for new construction only (not allowed for existing structures).

2. For Supplemental Splice in adjacent junction box, see splice detail, per Standard Plan J-50.15.

3. Prefomed loops shall conform to the layouts, numbering details, marking requirements, and wiring diagrams of Standard Plan J-50.12 for the number and types of loops shown in the Contract Plans.

4. Loops shall be tested immediately prior to pouring concrete, per Standard Specification 8-20.3[14](D).

5. Layout Preformed loops and loop leads-ins to maintain 1’ (ft.) clearance from joints. 

6. Construct a supplemental splice containing any series loop connections in adjacent Junction Box as required in the Plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice, as shown in Standard Plan J-50.12.

7. Barrier Junction Box 8” x 8” x 18” NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slip-form barrier. (Junction Box can be recessed up to 1/8”.) See Standard Plan J-40.36 or J-40.37.

8. For installation of Junction Box in the sidewalk, see Standard Plan J-40.40.

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**PREFORMED LOOP INSTALLATION DETAILS**

**NEW BRIDGE DECKS**

**STANDARD PLAN J-50.16-01**

1. Installation of signal detection loops in the bridge deck shall be cast-in-place and installation by saw cutting an existing bridge deck shall not be allowed. This plan is intended for new construction only (not allowed for existing structures).

2. For Supplemental Splice in adjacent junction box, see splice detail, per Standard Plan J-50.15.

3. Prefomed loops shall conform to the layouts, numbering details, marking requirements, and wiring diagrams of Standard Plan J-50.12 for the number and types of loops shown in the Contract Plans.

4. Loops shall be tested immediately prior to pouring concrete, per Standard Specification 8-20.3[14](D).

5. Layout Preformed loops and loop leads-ins to maintain 1’ (ft.) clearance from joints.

6. Construct a supplemental splice containing any series loop connections in adjacent Junction Box as required in the Plans. Supplemental splices are subject to the same requirements shown for the loop lead-in and the shielded cable splice, as shown in Standard Plan J-50.12.

7. Barrier Junction Box 8” x 8” x 18” NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slip-form barrier. (Junction Box can be recessed up to 1/8”.) See Standard Plan J-40.36 or J-40.37.

8. For installation of Junction Box in the sidewalk, see Standard Plan J-40.40.

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**SELF-LOCKING TIE - NYLON 6/6 (MIN. GRADE)**

120# MIN. TENSILE STRENGTH, UV STABILIZED (TYPICAL)

**TOP OF BRIDGE DECK OR APPROACH SLAB**

**LONGITUDINAL REBAR**

**TRANSVERSE REBAR**

**ROUTE LEAD-IN BETWEEN TOP AND BOTTOM REBAR MATS**

**LOOP LEAD-IN TO JUNCTION BOX**

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**ELEVATION VIEW**

**PLAN VIEW**

**LONGITUDINAL REBAR**

**TRANSVERSE REBAR**

**SECURE PREFORMED INDUCTION LOOP TO THE REBAR AT APPROXIMATELY 2’ (FT) INTERVALS (TYPICAL)**

**SECURE SPICE BOX BETWEEN TRANSVERSE REBAR**

**SELF-LOCKING TIE - NYLON 6/6 (MIN. GRADE) 120# MIN. TENSILE STRENGTH, UV STABILIZED (TYPICAL)**

**TOP OF BRIDGE DECK OR APPROACH SLAB**

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**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**APPROVED FOR PUBLICATION**

**2/4/2013**

**PREFORMED LOOP INSTALLATION DETAILS FOR NEW BRIDGE DECKS**

**STANDARD PLAN J-50.16-01**

**SHEET 1 OF 2 SHEETS**

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**EFFECTIVE: September 3, 2019 TO September 29, 2020**
NEMA JUNCTION BOX IN SIDEWALK WITH SLIP RESISTANT LID - SEE STANDARD PLAN J-40.40
SEE CONTRACT DOCUMENTS FOR SIZE 2" CONDUIT

2-2" CONDUITS IN BARRIER
8" x 8" x 18" NEMA JUNCTION BOX IN BARRIER - SEE STANDARD PLAN J-40.36

PLAN VIEW
NEMA JUNCTION BOX IN SIDEWALK WITH SLIP RESISTANT LID - SEE STANDARD PLAN J-40.40
SEE CONTRACT DOCUMENTS FOR SIZE 2" CONDUIT

TOP OF BRIDGE DECK

SECTION
NEMA JUNCTION BOX IN BARRIER

ELEVATION VIEW

PEDESTRIAN BARRIER

PREFORMED LOOP INSTALLATION DETAILS FOR NEW BRIDGE DECKS
STANDARD PLAN J-50.16-01
SHEET 2 OF 2 SHEETS

3/11/2013

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
EFFECTIVE: September 3, 2019 TO September 29, 2020

NOTES

1. Loops may be Round (shown) or Square (see detail). Square (Type 2) and Round (Type 3) Loop wiring is identical, with the exception of the shape of the sawcuts.


NOTES

1. See Standard Plan J-40.30 for Piezo axle sensor General Installation instructions, and Modified Type 2 Loop wiring details.

2. The contractor shall notify the Statewide Travel and Collision Data Office (STCDO) formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.

3. The loop inductance of two loops within the same lane shall be within 20 micro henries of each other. All piezo chime readings shall be OIL from shield to center conductor. See piezo specifications for piezo capacitance readings.

4. The loops and axle sensors shall be cut in the final lift of asphalt after lane stripping 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 9.29.2(1 )B. for further information.

11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets, according to the Color Code Identification Chart. For Wire Color Code Detail see Standard Plan J-50.30.

12. Cabinet can be placed on either side of road depending on terrain/slope, etc. It does not have to be placed on increasing milepost side of the roadway.

13. For 6 - lane layouts and above, see Contract.

PLAN VIEW

TYPICAL 2 LANE PTR LAYOUT

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

SECTION A

PERMANENT TRAFFIC RECORDER INSTALLATIONS

STANDARD PLAN J-50.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Approved for Publication

[Signature]

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 3 SHEETS
PLAN VIEW

TYPICAL 4 LANE PTR LAYOUT WITH MEDIAN

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

INDUCTION LOOP / PIEZO AXLE SENSOR
NUMBER IDENTIFICATION

SHOULDER NOTCH - SEE NOTES 6 AND 7
FOR CONDUIT SIZE - SEE NOTE 8

JUNCTION BOX - SEE NOTE 10

OFFSET LANE LINE (TYP.)

DECREASING MILEPOST DIRECTION

OFFSET LANE LINE (TYP.)

DECREASING MILEPOST DIRECTION

SEE NOTE 8

SEE NOTE 10

SHOULDER NOTCH

FOR CONDUIT DIA. (WHERE APPLICABLE)

CONDUIT FOR LOOP WIRES

HOME RUN CONDUIT

CONDUIT FOR LOOP WIRES

HOME RUN CONDUIT (UNDER ROADWAY)

SECTION A

SHOULDER NOTCH DETAIL (B)

DECREASED LANE 4 MILEPOSTS

SEE NOTES 6 AND 7 FOR CONDUIT SIZE

ADVANCED INDUCTION LOOP MODIFIED TYPE 2 (TYP.)

SEE NOTE 9

LED IN SAWCUT (TYP.)

MANHOLE (TYP.)

INDUCTION LOOP

PIEZO AXLE SENSOR NUMBER IDENTIFICATION

SECTION B

PERMANENT TRAFFIC RECORDER INSTALLATIONS

STANDARD PLAN J-50.20-00

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

DATE: 6/2/2011

EFFECTIVE: SEPTEMBER 3, 2019 TO SEPTEMBER 29, 2020

DRAWN BY: FERN LIDDELL

SHEET 2 OF 3 SHEETS
NOTES
1. See Standard Plan J-50.30 for Piezo Axle Sensor General Installation instructions, and Modified Type 2 Loop Wiring Details.
2. The Contractor shall notify the Statewide Travel and Collision Data Office (STCDO) (formerly TDO) a minimum of five working days prior to the scheduled site installation. An inspector from the WSDOT STCDO shall be on site for all phases of installation.
3. The loop inductances of two loops within the same lane shall be within 20 micro henries of each other. All piezo ohms readings shall be OIL from shield to center conductor. Class WIM piezo capacitance shall be 6nf to 20nf.
4. The loops and axle sensors shall be cut in the final lift of asphalt after lane striping is completed. All PRT loops shall be spaced @ 10 ft. leading edge to leading edge.
5. For concrete pavement lanes with asphalt shoulders, install all of the piezo sensors and splices in the concrete lane. Also, for concrete pavement lanes, install the loops 4" to 6" away from the expansion joints.
6. The shoulder notch length along the roadway shall be 4" or the conduit diameter plus 2" or whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".
7. After all sensor leads are installed, seal the end of the conduit with conduit sealant. Use asphalt cold-patch to fill notch unless otherwise specified in Contract.
8. Use Schedule 40 PVC conduit from the Junction Box to the Cabinet. Where there are 2 or 4 lanes, use one 1 1/4" min. conduit for each direction of travel. Where there are 5 lanes in either direction of travel, use one 2" min. conduit for each direction. Where there are 6 or more lanes in either direction, use one 3" min. conduit for each direction.
9. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. For conduit installation, see Standard Specification 6-20.3(5).
10. Junction Boxes installed in the paved shoulder or median shall be a Heavy Duty Junction Box. If box is installed in unpaved shoulder use type 1 or 2. See Standard Plan J-40.10 for size and type. See Standard Specification 9-29.2(1)8 for further information.
11. All loop wire, loop leads, and piezo leads shall be labeled with colored electrical tape at all Junction Boxes, Pull Boxes and Cabinets. For Wire Color Code Identification Chart & Detail see Standard Plan J-50.30.
12. Cabinet can be placed on either side of the road depending on terrain/slope, etc. It does not have to be placed on increasing milepost side of the roadway.
13. For 6-lane layouts and above, see Contract.
14. Concrete lanes shall use 11' class 1 piezos. Asphalt lanes with 1' shoulder or less may use 12' piezos. For shoulders over 1', use 13' piezos.

WEIGHT-IN-MOTION
SITE INSTALLATION
DETAILS
STANDARD PLAN J-50.25-00
SHEET 1 OF 2 SHEETS

DECEMBER 5, 2019

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
DECREASING MILEPOST DIRECTION

EDGE OF SHOULDER

EDGE OF LANE

LANE 3

LANE 4

LANE 2

LANE 1

PLAN VIEW

TYPICAL 4 - LANE WIM LAYOUT WITH MEDIAN

INCREASING DIRECTION

INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION

Lane 1 - (drive lane) ~ Loop L1, Piezo P1, Piezo P2, Loop L2

Lane 2 - (pass lane) ~ Loop L3, Piezo P3, Piezo P4, Loop L4

DECREASING DIRECTION

Lane 3 - (drive lane) ~ Loop L1, Piezo P1, Piezo P2, Loop L2

Lane 4 - (drive lane) ~ Loop L3, Piezo P3, Piezo P4, Loop L4

1 1/4" MIN. SCHEDULE 40 PVC CONDUIT - SEE NOTE 8

JUNCTION BOX TYPE 1 OR 2 (TYP.)

SEE STANDARD PLAN J-40.10

ADVANCED INDUCTION LOOP

MODIFIED TYPE 2 (TYP.)

SEE NOTE 3

SHOULDER NOTCH

DETAIL B

SECTION A

WEIGH-IN-MOTION

SITE INSTALLATION

DETAILS

STANDARD PLAN J-50.25-00

SHEET 2 OF 2 SHEETS

INDUCTION LOOP TO PIEZO AXLE SPACING

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CONDUIT FOR LOOP WIRES

HOME RUN WIRES

JUNCTION BOX TYPE 1 OR 2 (TYP.)

SEE STANDARD PLAN J-40.10

EDGE OF SHOULDER

FOR CONDUIT SIZE - SEE NOTE 8

FOR CONDUIT DIAM - SEE NOTE 8

SENSOR LEADS

SHOULDER NOTCH

DETAIL 0

SHOULDER NOTCH - SEE NOTES 6 AND 7

SECTION 0

SHEET 2 OF 2 SHEETS

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: SEPTEMBER 3, 2019 TO SEPTEMBER 29, 2020
THESE ARE GENERAL INSTALLATION INSTRUCTIONS
SEE SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS
IN THE SPECIAL PROVISIONS OF THE CONTRACT

1. Using paint and a straight edge, carefully mark the layout of the sensor installation. Ensure sensors are placed exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the piezo coax length can reach the cabinet with a minimum of 8 ft. of cable inside the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" blade width, cut the piezo slot approximately 4 to 6 inches longer than the piezo length. The piezo slot depth must be a minimum of 1" to a maximum of 1 1/2".

3. Lead-in cuts for the piezo coax should be 1/4" minimum wide, at a depth of 1 1/2" to 2".

4. Using a pressure washer, remove all slurry and loose material from the piezo slot.

5. Completely dry piezo slot. No moisture or oily residue shall be allowed in piezo slot.

6. After piezo cut is dry, wire brush sides and bottom of entire piezo slot. Blow out loose debris.

7. Install the piezo according to manufacturer's recommendations. Class 2 piezo sensors shall be placed at bottom of piezo slot. Class 1 sensors must be installed at a specific depth particular to each site location. This depth will be measured and set by Statewide Travel and Collision Data Office (formerly TDO) inspector on site.

8. Place two pieces of 2" duct tape along the length of the sensor slot. Tape should be about 1/16" from slot edge.

9. Mix epoxy according to manufacturer's recommendations and pour in slot into small bead. Make sure grout pours into slot slowly to avoid air pockets. Start at the piezo end and pour toward the coax to piezo attachment point. Repeat until the slot is completely full, at least two passes.

10. Use a putty knife with a notched center to spread the epoxy smooth the length of the sensor.

11. Remove tape.

12. Class 2 sensor installation is complete after epoxy has cured. Class 1 WIM sensors shall be sanded flush with the pavement surface the entire length of the piezo sensor. Use a belt sander with a coarse grit paper to get an even surface finish.

13. Lead-in placement and saw-cut methods vary depending on Regional preference and location. Coordination between WSDOT and Contractor is needed to determine method to be used prior to installation.

14. Place the Installation Brackets on the sensor every 12" for class 2 sensor, and every 9" for class 1 sensor, for the length of the sensor. Use the 3/4" brackets.

PERMANENT TRAFFIC RECORDER AND WEIGHT-IN-MOTION DETAILS
STANDARD PLAN J-50.30-00
COLOR CODE IDENTIFICATION

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WHITE IS ALSO USED FOR DESIGNATING INCREASING MILE POSTS

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-60.06. See Standard Specification 8-20.3(9) for other requirements.

6. SEE SPECIAL PROVISIONS IN THE CONTRACT FOR SPLICE REQUIREMENTS.
**TYPICAL GROUNDING DETAILS**

**STANDARD PLAN J-60.05-0**

- **SUPPLEMENTAL GROUND**: Required to supplement equipment grounding for luminaires standards with direct burial aerial feeds, or where required in the plans.
- **SERVICE GROUND**: Required at all service and separately derived systems.
- **Type D service cabinet shown**: Use this concept for Type E cabinet or transformer. Type D service cabinet shall be installed on lower surface of foundation only. Type B service cabinet and transformer cabinet shall be installed on raised surface of foundation only.
- **Type B modified service cabinet**: Grounding electrode conductor and equipment grounding conductor shall not be routed through lug on grounding bushing.

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**RIGID PVC CONDUIT (PVC) APPLICATION**

**GALVANIZED STEEL RIGID METAL CONDUIT (RMC) APPLICATION**

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**SEE KEY ON SHEET 1 FOR PARTS**

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**EFFECTIVE: September 3, 2019 TO September 29, 2020**
NOTES
1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adaptor in the barrier.
   PVC Conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adaptor.
   RMC Conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.
3. Pipe wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

KEY NOTES
- 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) Use NEMA 4X Junction Box with stationary-forms – See Standard Plan J-40.36. Use NEMA 3R Junction Box with slip-forms – See Standard Plan J-40.37.
- 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 extended closed-call 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.
SCHEMATIC
SHOWN FOR DUAL-CONDUIT INSTALLATION
(CIRCUIT TYPES MAY VARY)

CONDUIT DEFLECTION FITTING "A" DETAIL
CONDUIT FITTING - TYPE DX - PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE

CONDUIT DEFLECTION FITTING "B" DETAIL
CONDUIT FITTING - TYPE DX - FOR DEFLECTION OF 30° AND 3/4" MOVEMENT

CONDUIT INSTALLATION
IN TRAFFIC BARRIER
ON RETAINING WALL
STANDARD PLAN J-60.11-00

PLACE @ EXIT FROM STRUCTURE

3" MIN. 6" MAX. - CONDUIT AND THREADS - CAST OUTSIDE STRUCTURE

CONDUIT PIPE
NOTES

1. Install a Conduit Deflection (DX) Fitting "A" at the exit from the barrier. Install a Conduit Deflection (DX) Fitting "B" to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-60.11 for Conduit Deflection Fitting details.

2. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". RMC conduit shall also be used from the DX fitting(s) "A" to the PVC adapter in the barrier. PVC conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adapter. RMC conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.

3. See Standard Plan C-80.10 for additional details on Single-Slope Concrete Barrier.


5. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

KEY NOTES

- 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). Use NEMA 4X Junction Box with stationary-forms. See Standard Plan J-40.36. Use NEMA 3R Junction Box with slip-forms. See Standard Plan J-40.37.

- Where conduit is in a structure is routed across a cold joint with continuous reinforcing steel, install premolded joint filler and wrap the conduit pipe for 1" - 0' on each side of the joint. Omit pipe-wrap tape on PVC conduit.

- Where conduit exits a structure, wrap the conduit pipe for 1" - 0' on each side from the exiting point.

- 10' - 0" long section of RMC conduit.

- Conduit Deflection Fitting shall be in neutral state after installation.

- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1" - 0' on each side of the joint.
NOTES

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to Standard Specification 6-02.3(20). There shall be a minimum of a 3" edge distance to the centerline of anchor holes in concrete. Mount the stainless steel support using an approved resin bonded anchor system. Anchors shall be stainless steel and shall be of 3/8" diameter (expansion anchors are not allowed). Anchor Bolt embedment of 4 1/2" minimum.

2. Number of clamps shall be determined by number of conduits to be attached to the Stainless Steel Channel Support. See Conduit Plans for conduit routing.

3. Add additional Attachment Bolts when required to maintain 8" maximum spacing between adjacent Attachment Bolts.

4. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line. When barrier is not plumb, size spacer to maintain back of barrier line.


PLUMB LINE - SEE NOTE 4

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

SPACER

SECTION A

CONDUIT SUPPORT DETAIL

CONNECTOR BOLT WITH LOCK WASHER AND FLAT WASHER (TYP.)

CLAMP SHALL FULLY SPAN THE ENTIRE WIDTH OF THE CHANNEL HARDWARE - SEE STRAP THICKNESS CHART (SEE NOTE 2)

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.)

STRAP THICKNESS CHART

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CONDUIT DIMENSIONS

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CONDUIT DIAMETERS REFLECT THE DIMENSIONS FOR RIGID GALVANIZED STEEL, SCHEDULE 40 PVC AND SCHEDULE 80 PVC (3 1/2" SCHEDULE 80 PVC IS NOT AVAILABLE)
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 sheathing 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 sheathing.
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.
NOTES
1. Type M mounting shall have "O" ring groove and seal on top and bottom of signal attachment.
2. Type M mounting for conventional heads shall have a 2" (in) diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2" (in) diameter opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 14" (in) nominal arms.
5. See Standard Plan J-75.30 for tether wire and backplate requirements.
6. Apply bead of silicone around the perimeter of all top end cap openings prior to installation of the end cap assembly.
7. See Standard Specification 9-29.16 for backplate requirements. Where required, prismatic sheeting shall be applied in accordance with the manufacturer's recommendations. The application surface of the backplate shall be cleaned, degreased with isopropyl alcohol, and dried prior to application of the sheeting.
8. Drill a 1/4" (in) drain hole in the bottom of each signal assembly. When signal display assembly is mounted horizontally, drill a 1/4" (in) drain hole at the lowest point of each section of the signal assembly.

NOTE: BACKPLATES NOT SHOWN FOR CLARITY

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

Carpenter, Jeff
Jul 10 2015 7:18 AM

SIGNAL HEADING DETAILS ~ MAST ARM AND SPAN WIRE MOUNTINGS

STANDARD PLAN J-75.20-0
MULTI-SIDED (ROUND) TERMINAL CABINET MOUNTING DETAIL

PULLING GRIP - SIZE TO SECURE CONDUCTORS
6" (IN) X 11" (IN) HAND HOLE W/GASKET & REINF. RING CENTERED OPPOSITE NEMA TERMINAL CABINET (TYPE) (SEE NOTE 6)

J-HOOK
6" (IN) X 11" (IN) HAND HOLE W/GASKET & REINF. RING CENTERED OPPOSITE NEMA TERMINAL CABINET (TYPE) (SEE NOTE 6)

TERMINAL CABINET MOUNTING - 3/8" (IN) DIA. X 1 1/2" (IN) BOLT WITH WASHER DRILL AND TAP POLE TO ACCEPT
1/4" (IN) CAP WITH 1/4" (IN) THICK NYLON BUSHING WASHER FOR SPACER - FOUR LOCATIONS
2" (IN) DIA. NIPPLE WITH THREADED CONDUIT AND LOCK NUT (TYPE)

SQUARE TUBE SHOWN FOR MULTI-SIDED (ROUND) MONOTUBE STRUCTURE - ATTACH TERMINAL CABINET AS DETAILED PER MULTI-SIDED (ROUND) TERMINAL CABINET MOUNTING DETAIL

SECTION @ TERMINAL CABINET

SQUARE MONOTUBE CABINET MOUNTING DETAIL

"1" REINFORCEMENT RING OR WELD SIZE TO MEMBER THICKNESS
1 1/8" (IN) MAX. - SEAL WITH APPROVED SEALANT AT INSTALLATION OF HAND HOLES ON TOP OF BEAM ONLY

"1/4" COVER PLATE
1/8" (IN) THICK X 5/8" (IN) NEOPRENE HAND HOLE GASKET (TYPE) EXCEPT AT BOTTOM OF BEAM

1 1/4" (IN) FOR 6" (IN) X 11" (IN) HAND HOLE - 6" (IN) FOR 6" (IN) DIAM. HAND HOLE

DRILL AND TAP 1/4" (IN) S.S. COVER SCREWS IN REINFORCING RING (TYPE)
EQUALLY SPACED AROUND HAND HOLES - SIX SCREWS FOR 6" (IN) X 11" (IN) HAND HOLE
FOUR SCREWS FOR 6" (IN) - DIAM. HAND HOLE

BOLTS, NUTS, AND WASHERS ~ ASTM F1554 OR A193 TYPE 304 OR TYPE 316 STAINLESS STEEL (S.S.)

KEY NOTES
1 6 x 8.2 LB/FT CHANNEL - HOT-DIP GALVANIZED
2 TWO EACH
* 1/2-13 NC X 2 1/2" (IN) HEX HEAD BOLT
** LOCK WASHERS (DRILL AND TAP POLE TO ACCEPT)
3 WIREFAY (SEE DETAIL THIS SHEET)
4 METAL POST
5 CABINET
6 END BUSHING (TYPE)
7 SEALING LOCKNUT (TYPE)
8 POLE WALL DRILLED SO BUSHING WILL PASS THROUGH (TYPE)
9 CABINET WITH BACK WALL DRILLED 1 1/8" (IN) OVERSIZE OF NIPPLE (TYPE)
10 CHANNEL DRILLED 1 1/8" (IN) OVERSIZE OF NIPPLE (TYPE)
11 2" (IN) DIAM. X 4" (IN) NIPPLE (UNLESS OTHERWISE NOTED) (TYPE)

TESTED AND APPROVED: JOSEPH BELEY
SENIOR DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

SIGNAL BRIDGE STANDARD ELECTRICAL DETAILS

STANDARD PLAN J-75.41-0

SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION
Washington, State Department of Transportation

SCALE 1:50

EFFECTIVE: September 3, 2019 TO September 29, 2020
EFFECTIVE: September 3, 2019 TO September 29, 2020

NOTES

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

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


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

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

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

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

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

9. Jumpers may be oriented horizontally or vertically.

10. The Red Monitor Program Board shall have the label shown printed on the back of Output File #1LX, directly above the cutout for the board.
**DISPLAY PANEL NOTES**

D1. The Display Panel shall be 0.125" (in) thick aluminum with a brushed finish. All text on the Display Panel shall be a minimum of 0.25" (in).

D2. The Cabinet Name Plate shall be a phenolic label with white minimum 0.375" (in) text on a black background, permanently affixed to the panel. See Contract Plans for cabinet identification number.

D3. The Detector Labels shall have 0.5" (in) black text on a white background. The labels may either be phenolic or industrial grade outdoor vinyl, and shall be permanently affixed to the panel.

D4. All other text shall be black and screened directly onto the panel.

D5. The Sign Relay socket and connectors P1P, P2S, and CSP shall be installed on the back of the panel. Connectors P1P/S and P2P/S are Type DD90 D-Sub connectors with pin assignments as shown on sheet 3. The suffix "S" indicates a socket (female connector) and the suffix "P" indicates a plug (male connector).

D6. The Sign Relay shall be DPDT, wired as shown, with a contact rating not less than 10 amps continuous duty. The relay shall operate on ground output from the controller, and draw less than 75 miliamps when energized. AC wiring between the relay and the PDA shall be #16 AWG.

D7. See Standard Specification Section 9-29.13(11) for additional requirements.

**SIGN RELAY DETAIL**

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>CONNECT TO</th>
<th>SIGN RELAY (SR)</th>
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<td>SIGN CTRL</td>
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<td>AC</td>
<td>C-18</td>
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<tr>
<td>T-5</td>
<td>OR NS</td>
<td>0-24</td>
<td>GND</td>
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**SIGN DE-ENERGIZED**

(NEVER METERING)

**SYSTEM DETAIL**

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<th>T-15 (LOAD CTX #2)</th>
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**SIGN FLASHER DETAIL**

(SEE NOTE 6)

**SIGN SWITCH (SS) DETAIL**

(SEE NOTE 7)

**POLICE CONTROL (PC) SWITCH DETAIL**

(SEE NOTE 8)
### CONNECTOR PIN ASSIGNMENTS

**P1 and P2 Connector Pin Assignments**

<table>
<thead>
<tr>
<th>P1 CONNECTOR PIN</th>
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**C4, C5, and C6 Connector Pin Assignments**

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**Display Panel Inputs**

- INPUT FILEDS: Display Panel
- C1 CONNECTOR: Pin 88
- C1 CONNECTOR: Pin 88

**Display Panel Functional Block Diagram**

- Connector P1
- Connector P2
- Connector P3
- Display Panel
- C1 Connector

**Legend**

- C1: C1 Connector
- C4: C4 Connector
- C5: C5 Connector
- C6: C6 Connector
- CM: Current Monitor
- DET: Detector
- DP: Display Panel
- IFI: Input File I
- IFJ: Input File J
- L#: Lane (Number)
- MU: Monitor Unit
- NA: Not Assigned
- NC: Not Connected
- PCs: Police Control Switch
- SB: Sign Switch
- SWP: Switch Pack
- TR: Transfer Relay

**Pin Table Examples:**

- J-IF: Input File J, Slot 1, Terminal F
- DP: Display Panel
- DET-7: Display Panel, Detector 7 Position
- C1-88: C1 Connector, Pin 88

**Type 334 Ramp Meter/Data Station Cabinet Standard Plan J-81.10-00**

*Noted, Matthew 18 Jan 2010 6:17 AM
Approved for Publication Jan 18 2010 10:29 AM
Washington State Department of Transportation*
NOTES
1. Under FCC Rules & Regulations 90.242, the antenna is limited to a maximum height of 15 meters (49.2 feet). Mount the antenna to the pole with a bracket and high-strength insulated antenna mounts with stainless steel hardware.
2. The antenna shall be center or base loaded vertical featuring a low-loss, embedded weatherproof loading coil.
3. The amplitude modulated transmitter must be FCC type approved. See Contract for the transmitter frequency.
4. The voice voice unit shall be as specified in the Contract.
5. See Standard Plan J-60.14 for details on mounting a NEMA junction box to a timber pole.
6. All HAR conduits shall be secured to the pole with two-hole conduit straps spaced at 5 (5) maximum centers. See Standard Plans J-60.13 and J-60.14 for steel channel support and mounting details.
7. The shield shall be tightly wrapped around the center conductor when attaching the PL 259 connector to the UG 175/U adapter. The shield wrapping on the center conductor may ONLY come in contact with the center pin at the solder point. The shield MUST NOT come in contact with the PL 259 shell.
8. The shield shall be soldered through all of the holes on the PL 259 connector, and the center conductor shall be soldered at the top of the connector. The shield and center conductor MUST NOT be shorted together.
9. The shield shall be tightly wrapped around the center conductor. Crimp and solder the center conductor and shield to the terminal lug and attach securely to the antenna. Seal the entire connection assembly, including the antenna connection point, with butyl tape or heat shrink.

HIGHWAY ADVISORY RADIO (HAR) TRANSMITTER STANDARD PLAN J-86.10-00 SHEET 1 OF 3 SHEETS

NEELY, MATTHEW
Jun 8 2018 10:46 AM

APPROVED FOR PUBLICATION

Washington State Department of Transportation
CONSTRUCTION NOTES

1. Backfill material shall meet ANSI/NSF Environmental Standard 60. Follow manufacturer’s mixing recommendations.

2. Ground Pipe and types of non-hazardous salts will vary per manufacturer. See the WSDOT Qualified Products List (QPL) for approved manufacturers and follow guidance provided.
NOTES

1. The Heavy Duty Lid thickness varies by installation type:
   a) 6" (in) for new installations
   b) 7" (in) for existing boxes with no roadway overlay
   c) Such that it flush with the surface of the new overlay, when a new overlay is specified

2. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" (in) thick.

3. Slip-resistant lids shall be identified with a permanent marking on the underside of the lid, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The marking shall use 1/8" (in) thick lines formed with a weed bead, and shall be placed prior to galvanizing.

4. For Standard Duty Lids, attach a 1/4-20 UNC x 1 1/4" (in) S. S. ground stud coated with anti-seize compound. For Heavy Duty Lids, install a 1/2-13 UNC x 1 1/4" (in) S. S. bolt in a 5/8" (in) diameter cored hole in the ductile iron lid gusset as a ground stud. All ground studs shall include (3) S. S. nuts and (2) S. S. flat washers. See Standard Plan J-90.00 for grounding and bonding details.

5. The bonding jumper between the lid and frame shall be #8 AWG (min.) x 4" (ft) lined braided copper.

6. System identification letters shall use 1/8" (in) wide lines. Cover marking for steel lids shall be formed by casing or with a mild steel weld bead. Cover marking for ductile iron lids shall be recessed. See COVER MARKING DETAIL and Standard Specification section 9-29.24 for additional details. Ductile iron lids shall also provide a minimum 1 1/2" (in) wide x 3 1/2" high x 3 1/8" (in) thick, flat area for lifting purposes.

7. Cement concrete shall be Class 4000.

8. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.

9. Conduit Capacity = 40 inches (sum total of all conduit diameters).

10. This drawing depicts a typical Pull Box assembly. Reinforcing not shown. Each manufacturer’s Pull Box assembly will vary. Refer to the approved manufacturer’s shop drawings for all dimensions and the actual arrangement.

11. The lid is an assembly consisting of the metal lid and frame, reinforcing steel, brass ground inserts, and concrete.

12. #3 reinforcing bar shall be capable of being bent out of the way and restored, to allow for conduit installation.
NOTES

1. The Heavy Duty Lid thickness varies by Installation type:
   a) 3/8" (9 mm) for all new installations
   b) 5/8" (16 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" (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 lines formed with a weld bead, and shall be placed prior to galvanizing.

4. For Standard Duty Lids, attach a 1/4-20 UNC x 1" (6 mm) S. S. ground stud, coated with anti-seize compound. For Heavy Duty Lids, install a 1/2-13 UNC x 1 1/4" (32 mm) S. S. bolt in a 5/8" (16 mm) diameter core hole in the duffle 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-90.59 for grounding and bonding details.

5. The bonding jumper between the lid and frame shall be #8 AWG (min.) x 4" (100 mm) tinned bared copper.

6. System identification letters shall use 1/8" (3 mm) wide lines. Cover markings for steel lids shall be formed by caging or by a #4 lid steel weld bead. Cover marking for duffle iron lids shall be recessed. See COVER MARKING DETAIL and Standard Specification section B-39 for additional details. Duffle iron lids shall also provide a minimum 1 1/2" (38 mm) high x 3 1/2" (90 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 antiseize compound. A 1/4 - 20 UNC x 1" (in) ground stud with three nuts and two washers shall be welded to the frame and coated with antiseize compound. See Standard Plan J-90.6D 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 cooper.
5. The system identification letters shall be 1/8" (in) thick, thickness 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.
NOTES
1. Vaults (including Pull Boxes) installed within the traveled way or paved shoulder must use Heavy Duty Lid. 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. Condut 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" (ft) of stranded 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-60.05 for bonding jumper requirements.
7. Connect the equipment grounding conductor(s) to the vault wall bonding connection with a #6 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 coated such that the cable's minimum bending radius limitations are not compromised. For cable 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'(t) offset may be used. A 1'(t) 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.
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  
AREA CLOSED TO TRAFFIC

TYPE 3L BARRICADE

STRIPES ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

AREA CLOSED TO TRAFFIC  
USEABLE TRAFFIC LANE

TYPE 3R BARRICADE

ROAD CLOSURE AT INTERSECTION

WORK AREA

TYPE 3L BARRICADE

ROAD CLOSURE AT OTHER LOCATIONS

WORK AREA

TYPE 3R BARRICADE

TYPE 3R BARRICADE

TYPE 3 L BARRICADE

BARRICADE PLACEMENT

STANDARD PLAN K-80.20-00

EFFECTIVE: September 3, 2019 TO September 29, 2020

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

ENTRUSTED TO THE MAINTENANCE OF THIS DOCUMENT

EXPIRES AUGUST 9, 2007

DRAWN BY: LISA CYRUS

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES

1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2' wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrow base barrier.

2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

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

6. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.
NOTES

1. The intended use of this plan is for the temporary installation of Alternative Temporary Concrete Barrier (F-Shape), Narrow Base (see Standard Plan K-80.30) on cement concrete pavement or bridge deck.

2. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.

3. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.

4. Use shims to properly fit the anchors to the barrier and roadway surfaces.

5. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).

TRAFFIC SIDE

PROTECTED WORK AREA

OR EDGE OF DECK

SEGMENT LENGTH = L

PLAN VIEW

NARROW BASE, ALTERNATIVE TEMPORARY CONCRETE BARRIER SEGMENT

ATTACHMENT LOCATION (TYP.) – SEE NOTE 3

TYPE 2 ANCHOR: CLASS 2

ATTACHMENT LOCATIONS

NARROW BASE. ALTERNATIVE TEMPORARY CONCRETE BARRIER SEGMENT

ATTACHMENT LOCATION (TYP.) – SEE NOTE 3

TYPE 2 ANCHOR: CLASS 1

ATTACHMENT LOCATIONS

SECTIONS VIEW

TYPE 2 ANCHOR: CLASS 1 & 2

ATTACHMENT LOCATIONS
NOTES

1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.

2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts that mark the angle point of any sudden change in topography.

3. See Standard Specification 9-16.2(1) for wood post sizes. Wood anchors (for wood posts) shall be 2 x 4 lumber, 12'' long minimum, and fastened with three 16d galvanized nails.

WIRE FENCE TYPES 1 & 2
AND WIRE GATES

STANDARD PLAN L-10.10-02

SHEET 1 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR SUBMITTAL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTES
1. Materials shall meet the requirements of Standard Specification 9-16.
NOTES
1. All glare screen posts shall be 2 1/2" I.D. galvanized steel.
2. Wood blocks shown. Blocks of alternate material may be used. Wood blocks shall be toe-nailed to post with 16d galvanized nails to prevent block rotation. See Standard Specification 9-16.3(2).
3. Attach blocks to steel posts using bolt holes on approaching traffic side of post web.

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**DETAIL A**
- End or corner (brace) post with steel post
- Steel post - see note 1

**DETAIL A**
- End or corner (brace) post with existing wood post
- Steel post - see note 4

**VIEW B**
- 1/2" diameter U-bolt
- 1/2" heavy hex nut
- 12" eye nut
- Steel body plate - see detail
- 1/2" anti-rotation nail (typ.) - see note 2

**VIEW B**
- 1/2" diameter U-bolt
- 1/2" heavy hex nut
- 1/2" eye nut
- Steel body plate - see detail
- 1/2" anti-rotation nail (typ.) - see note 2

**PULL POST WITHIN RUN**
- Pull post - see note 1
- Eye bolt
- Eye nut
- Tension wire (typ.)
- Fabric band (typ.) - spaced @ 12" max.
- Steel body plate
- 1/2" anti-rotation nail (typ.) - see note 2

**DETAIL C**
- Fabric band (typ.) - spaced @ 12" max.
- Steel body plate

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**ELEVATION VIEW**
- Tension wire
- Brace post
- Pull post - see detail
- Tie wires (typ.) - spaced @ 1/4" max.
- 12" - 8" max. (typ.)

**ISOMETRIC VIEW**
- Glare screen fabric - 1" diamond wire mesh
- Beam guardrail

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**GLARE SCREEN TYPE 1**
**DESIGN A**
**STANDARD PLAN L-40.10-02**

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**APPRAISED APPROVAL**
**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

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**EFFECTIVE:** September 3, 2019 TO September 29, 2020
FABRIC BAND (TYP.)

3/8" EYE BOLT (TYP.)
WITH HEX NUT AND WASHER

STRETCHER BAR (TYP.)

HOG RING - SPACED @ 24" MAX. (TYP.)

GUARDRAIL POST (STEEL SHOWN)

TENSION WIRE (TYP.)

U-BOLT (TYP.)
- SEE DETAIL A

END OR CORNER (BRACE) POST DETAIL

PULL POST (WITHIN RUN) DETAIL

3/8" EYE BOLT (TYP.)

3/8" EYE NUT (TYP.)

TURNBUCKLE

TENSION WIRE

STRETCHER BAR (TYP.)

HOG RING - SPACED @ 24" MAX.

TENSION WIRE

GUARDRAIL POST (STEEL SHOWN)

U-BOLT (TYP.)
- SEE DETAIL A

GLARE SCREEN TYPE 1
DESIGN A

STANDARD PLAN L-40.10-02

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
NOTE

Hardware shall be stainless steel or galvanized in accordance with AASHTO M222.

PLASTIC PIPE CAP (TYP.)

PLASTIC PIPE - 12" (NOM.) x 2'-7" LONG
COLOR SHALL BE HIGHLY VISIBLE (SAFETY YELLOW IS ACCEPTABLE)

ELEVATION

TIMBER POST - 4 x 6 (NOM.)

SECTION A

HEX LAG BOLT - 3/8-7UNC x 5" With 1" DIAM. FLAT WASHER (4 SETS TOTAL)
1 1/2" DIAM. HOLE (TYP.)

5/8" S.S. EYE STRAP - FASTENED TO THE SIGN PANEL WITH 2 1/8" DIAM. SCREWS AND 2 HEX NUTS (TYP.)

SIGN PANEL MOUNTING DETAIL

SIDE OPPOSITE STRIPES
PLASTIC PIPE CAP (TYP.)

SIGN PANEL W12-502 SP
~ 48" x 12" (TYP.)

SEE MOUNTING DETAIL

MIDDLE POST
REMOVABLE

YELLOW REFLECTIVE
TAPE ~ 3" (TYP.)

END POST

PADLOCK (TYP.) -
AGENCY PROVIDED

5/8" DIA. WIRE ROPE

TOP OF ROADWAY

= 12' - 0"

ELEVATION

WOOD SPACER
4" x 6" (NOM.)

PLASTIC PIPE - 12" (NOM.) x 2'-7"
COLOR SHALL BE HIGHLY VISIBLE
(SAFETY YELLOW IS ACCEPTABLE)

EYE SCREW - 5/8" DIAM. x 6"
WITH 2" FLAT WASHER (TYP.)

HEX LAG BOLT - 3/8"-7UNC x 5"
WITH 1" DIAM. FLAT WASHER
(4 SETS TOTAL)

GALV. STEEL TUBE

1 1/2" DIAM. HOLE (TYP.)

GALV. LAG SCREW - 3/16" DIA. W/ FLAT WASHER (TYP.) (2 SETS Req.)

COMMERCIAL CONCRETE

NOTE
Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.

5/8" S.S. EYE STRAP - FASTENED TO THE SIGN PANEL WITH 2 1/8" DIAM.
SCREWS AND 2 HEX NUTS (TYP.)

SIDE OPPOSITE STRIPES

SIGN PANEL MOUNTING DETAIL

ACCESS CONTROL
DOUBLE GATE

STANDARD PLAN L-70.20-01

EXPIRES JUNE 30, 2021

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR REPLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
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

WALSH, Lillian
JUN 24 2014 12:40 PM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
Hickok, Penn
Jan 24, 2014 4:43 PM

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

RAMP CHANNELIZATION
SINGLE LANE

STANDARD PLAN M-1.20-03

SHEET 1 OF 1 SHEET
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: September 3, 2019 TO September 29, 2020
LEGEND

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

NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown herein. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal geometric design. The dimensions may vary to fit existing conditions. See Contract.

RAMP CHANNELIZATION
COLLECTOR-DISTRIBUTOR ROAD
STANDARD PLAN M-1.60-02

COLLECTOR-DISTRIBUTOR ROAD OFF-CONNECTION

COLLECTOR-DISTRIBUTOR ROAD ON-CONNECTION
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 (SEE TABLE)</th>
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<tr>
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**RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION**

**STANDARD PLAN M-1.50-03**

**WEAVING SECTION**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

**EFFECTIVE:** September 3, 2019 TO September 29, 2020
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.
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 = 52' Typical Lane Width. See Contract for specified lane width.

Type 2L (SL) Traffic Arrow

---

**LEFT-TURN CHANNELIZATION**

**ASYMMETRICAL WIDENING ABOUT CENTERLINE**

**LEFT-TURN CHANNELIZATION**

**ASYMMETRICAL WIDENING LEFT OF CENTERLINE**

**LEFT-TURN CHANNELIZATION**

**ASYMMETRICAL WIDENING RIGHT OF CENTERLINE**

---

**SPECIFICATIONS**

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<th>POSTED SPEED</th>
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<td>100'</td>
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**EFFECTIVE:** September 3, 2019 TO September 29, 2020

Washington State Department of Transportation
NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

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

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

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

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

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

LEGEND

L = 12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

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<th>APPROACH TAPER</th>
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LEFT-TURN CHANNELIZATION

REDUCED TAPER LENGTHS - ASYMMETRICAL WIDENING

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

LEGEND

- Type 2L (SL) Traffic Arrow
- Type 6R (SR) Traffic Arrow
- Centerline Stripe (SEE NOTES)
- Double Centerline (Yellow) (Narrow Pattern)
- Centerline Stripe (SEE NOTES)
- Left-Turn Channelization

POSTED SPEED APPROACH TAPER A DIMENSION B
60 MPH 39'7" 5'2"
55 MPH 33'6" 5'5"
50 MPH 30'7" 5'7"
45 MPH 27'7" 5'9"
40 MPH 24'7" 5'9"
35 MPH 21'7" 5'6"
30 MPH 18'7" 5'7"
25 MPH 15'7" 5'5"
20 MPH 12'7" 5'0"

LEFT-TURN CHANNELIZATION
TEE INTERSECTION AND BACK-TO-BACK TURN LANES
STANDARD PLAN M-3.30-03

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

DRAWN BY: LISA OWEN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

EFFECTIVE: September 3, 2019 TO September 29, 2020
LEFT-TURN CHANNELIZATION IN TWO-WAY LEFT-TURN LANE

NOTES
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
2. The channelization shown on this plan is for a two-lane highway. The channelization plan may be used on four-lane undivided highways with the appropriate considerations.
3. Centerline striping on the approach to raised channelization shall be No Pass in accordance with MUTCD figure 3B-19. Centerline striping on the departure from raised channelization shall be determined by an engineering study.
4. Centerline striping on the approach to and departure from painted channelization shall be determined by an engineering study.
5. Centerline striping on four-lane undivided highways shall be a double centerline.
6. The two Type 2L (SL) Traffic Arrows shown in the left-turn storage lane are optional, but recommended. Arrows may be added for longer storage lanes or deleted for shorter storage lanes. See Contract Plans.

LEGEND
L = 12' Typical Lane Width. See Contract for specified lane widths.

Type 2L (SL) Traffic Arrow

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


- Type 2R (SR) Traffic Arrow

- Type 3L (SL) Traffic Arrow

DOTTED EDGE LINE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
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 solid yellow painted line
- Paved path

**Plan Marking around Multiple Bollards**

- 4" wide solid yellow painted line
- Bollard
- Paved path

**Plan Marking around Bollard**

- 4" wide solid yellow painted line
- Bollard
- Paved path

**Plan Marking at Intersection with Roadway**

- 4" wide solid yellow painted line
- Painted traffic letters
- Paved path

**Detail**

- Shared-use path markings
- Bollard
- Paved path

**Notes:**

1. In cases where the bollard location is not visible to an approaching bicyclist, use the minimum sight distance for the Solid Yellow Painted Line (taper portion), to extend the Solid Yellow Painted Line as needed to provide advanced warning of the upcoming obstruction.

2. In cases where there is a crossing, bridge or other structure on the path that does not support or accommodate a vehicle, (See Contract).

3. Provide Breakaway Bollards within the Roadway Design Clear Zone.

**Effective:** September 3, 2019 to September 29, 2020
GENERAL NOTES

1. Bold "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" (in) white transverse lines.

2. 24" (in) white transverse line.

3. Place Stop Line 15' (ft) minimum from nearest rail. If gate is present, place stop line approximately 8' (ft) from RR gate.

4. See contract for location, material requirements, and W10-1 sign information.

STANDARD PLAN M-11.10-03

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

RICHMOND FUSION, LIMITED

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
NOTES

1. See the Contract Plans for locations of crosswalk centerlines.

2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.

3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.

NOTES

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 roads) 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

WASHINGTON DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
GENERAL NOTE
See Standard Plan M-20.10 for pattern and color requirements.
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.
EFFECTIVE: September 3, 2019 TO September 29, 2020

SECTION A
TWO-WAY ROADWAY RECESSSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT

SECTION B
ONE-WAY ROADWAY RECESSSED 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).
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.

TYPE 1 TRAFFIC ARROW

MARKING AREA 17.4 sq.ft.

TYPE 5 TRAFFIC ARROW

MARKING AREA 23.14 sq.ft.

TYPE 2R (RIGHT) TRAFFIC ARROW

MARKING AREA 17.3 sq.ft.

TYPE 2L (LEFT) TRAFFIC ARROW

MARKING AREA 17.3 sq.ft.
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.
NOTE

1. If Rumble Strips are present, install marking outside of the Rumble Strip.

STOP LINE

MARKING AREA = 11.73 SQ.FT.
HALF-MILE MARKER

MARKING AREA = 0.56 SQ.FT.
JUNCTION BOX, PULL BOX, OR CABLE VAULT MARKINGS

MARKING AREA = 0.56 SQ.FT.
CROSS CULVERT

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

PAVED SHOULDER

MARKING AREA = 6.00 SQ.FT.
FULL MILE MARKER

PAVED SHOULDER

MARKING AREA = 1.06 SQ.FT.
DRAINAGE STRUCTURE INLET

PAVED SHOULDER

DRAINAGE MARKING

MARKING AREA = 0.56 SQ.FT.
JUNCTION BOX, PULL BOX, OR CABLE VAULT MARKINGS
NOTES:
1. If rumble strips are present, install marking outside of the rumble strip.
3. WSDOT BMP sticker to be placed on first flexible guide post only.
NOTES:
1. If rumble strips are present, install marking outside of the rumble strip.
BARRIER DELINERATOR REQUIREMENTS

- Spacing of Barrier Delineators shall be as shown in the Plans.
- The housing or bracket can be flexible or rigid, molded from a durable plastic or other durable material approved by the Engineer, and shall be attached to the barrier with an adhesive recommended by the manufacturer. The attachment point on the barrier surface shall be free of dirt, curing compound, moisture, paint, or any other matter that would adversely affect the adhesive bond.
- Barrier Delineators shall be one-sided for single direction traffic, or two-sided for bi-directional traffic.
- Color shall be white on the right of traffic, and yellow on the left of traffic.
- The reflective surface shall be rectangular or trapezoidal.
- Reflective Sheeting: 12 square inches minimum surface area, Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.
- Plastic Reflector: 9 square inches minimum surface area; acrylic or polycarbonate conforming to AASHTO M 290. Reflectors shall equal or exceed the following minimum values of Specific Intensity:
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.
### Guide Post Spacing

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<td>2,300</td>
<td>140</td>
</tr>
<tr>
<td>3,000</td>
<td>160</td>
</tr>
<tr>
<td>3,700</td>
<td>180</td>
</tr>
<tr>
<td>4,500</td>
<td>200</td>
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<tr>
<td>5,500</td>
<td>220</td>
</tr>
<tr>
<td>6,500</td>
<td>240</td>
</tr>
<tr>
<td>7,600</td>
<td>260</td>
</tr>
<tr>
<td>8,800</td>
<td>280</td>
</tr>
<tr>
<td>10,000</td>
<td>300</td>
</tr>
<tr>
<td>&gt;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

### Effective Dates

Effective: September 3, 2019 to September 29, 2020

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**Two-Way Undivided Highways**

- Guide Posts on Outside of Curve in Direction of Travel

**Multi-Lane Divided Highways**

- Guide Posts on Inside and Outside of Curve for Each Direction of Travel

---

**Notes**

- **Note 1**: The first guide post is positioned "S" distance from the beginning of curvature.
- **Note 2**: If the last guide post beyond the curve is 1/2 "S" or more, no additional posts are required.
- **Note 3**: If the last guide post beyond the curve is less than 1/2 "S", one additional post is required.
1. Locate the initial Guide Post so that it does not hinder the visibility of the bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

2. Locate the initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

NOTE

LEGEND

○ TYPE W
• TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

MEDIAN CROSSOVERS

LANE REDUCTIONS

EFFECTIVE: September 3, 2019 TO September 29, 2020
**SHOULDER RUMBLE STRIP TYPE 1**

**FOR DIVIDED HIGHWAYS**

**STANDARD PLAN M-60.10-01**

**EFFECTIVE:** September 3, 2019 TO September 29, 2020

**APPREOVED FOR PUBLICATION**

- **5' MIN. WITH SHEDDER OR GUARDRAIL AT EDGE OF SHOULDER**
- **10' MIN.**
- **60' MIN.**
- **4' MIN.**

**SINGLE-LANE ON-CONNECTION**

- **END RUMBLE STRIP ON RIGHT SHOULDER AT END OF ACCELERATION TAPER**
- **BEGIN RUMBLE STRIP ON RIGHT SHOULDER ADJACENT TO BEGINNING OF ON RAMP**
- **WIDE LANE LINE**
- **SHOULDER RUMBLE STRIP ON LEFT SHOULDER**
- **SHOULDER RUMBLE STRIP ON OUTSIDE SHOULDER**
- **SHOULDER RUMBLE STRIPS ON MEDIAN SHOULDERS**

**MEDIAN CROSSOVER**

- **STRUCTURE OR OTHER FEATURE NECESSITATING A REDUCTION IN SHOULDER WIDTH**
- **MEDIAN SHOULDER**

**SHOULDER TAPER DETAIL**

- **4' MIN.**

**DRAWN BY:**

**DATE:**

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

IF A MEDIAN ACCELERATION TAPER IS INCLUDED, START THE RUMBLE STRIP AT THE END OF THE TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

SHOULDER RUMBLE STRIP
TYPE 1
FOR DIVIDED HIGHWAYS
STANDARD PLAN M-60.10-01

EFFECTIVE: September 3, 2019 TO September 29, 2020

Washington State Department of Transportation
NOTES

1. Centerline Rumble Strip installation requires a minimum distance of 12 feet from Centerline to edge of paved shoulder.

2. When directed by the Engineer, Rumble Strips may be installed along the turn p-sack taper where there is a history of rear-end collisions in the turn pocket.
INSTRUCTION WITH LEFT TURN CHANNELIZATION

INSTALL RUMBLE STRIP

RUMBLE STRIP OPTIONAL - SEE NOTE 2

TERMINATE AT END OF LEFT TURN CHANNELIZATION STRIPING

APPROX. MIDWAY BETWEEN MILLED GROOVES

MARKER

RUMBLE (TYP.)

RAISED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

REFER TO STANDARD PLAN M-20.30 FOR
RECESSED PAVEMENT MARKER DETAIL

RECESSED PAVEMENT MARKER
WHEN SPECIFIED IN CONTRACT

LONGITUDINAL MARKING (TYP.)

CENTERLINE RUMBLE STRIP (TYP.)

BRIDGE APPROACH SLAB

BRIDGE

LONGITUDINAL MARKING (TYP.)

CENTRELINE RUMBLE STRIP

STANDARD PLAN M-65.10-02

SHEET 2 OF 2 SHEETS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

LOW-SPEED APPLICATION

TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

LOW-SPEED APPLICATION

TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

LOW-SPEED APPLICATION

TRAFFIC LANE
VEHICLE WHEEL PATH

HIGH-SPEED APPLICATION

LOW-SPEED APPLICATION

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.

TRAFFIC LETTER AND NUMERAL APPLICATIONS

STANDARD PLAN M-80.10-01

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EFFECTIVE: September 3, 2019 TO September 29, 2020
EIGHT FOOT HIGH LETTERS AND NUMERALS ARE SHOWN ON A FOUR-INCH SQUARE GRID FOR USE ON ROADWAYS WITH A POSTED SPEED OF 45 MPH OR MORE.

TRAFFIC LETTERS AND NUMERALS (HIGH SPEED ROADWAYS) STANDARD PLAN M-80.20-00

EFFECTIVE: September 3, 2019 TO September 29, 2020
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

TRAFFIC LETTERS AND NUMERALS
(LOW SPEED ROADWAYS)
STANDARD PLAN M-80.30-00

EFFECTIVE: September 3, 2019 TO September 29, 2020

EXPIRES AUGUST 9, 2021

Washington State Department of Transportation

APPROVED FOR PUBLICATION

DARRELL J. TREVELLIN
Professional Engineer

DRAWN BY: FERN LORILL

EFFECTIVE: September 3, 2019 TO September 29, 2020